UPPER MISSISSIPPI RIVER SYSTEM-ENVIRONMENTAL MANAGEMENT PROGRAM DEFINITE PROJECT REPORT (SL-5) WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

SWAN LAKE

REHABILITATION AND ENHANCEMENT

MAIN REPORT

POOL 26
ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS

FINAL

DECEMBER 1991
(Revised January 1993)

US Army Corps of Engineers
St. Louis District
Partners in Progress

CELMS-PD-F

26 December 1991
Gates/8478

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Final Definite Project Report with Integrated EA and Draft FONSI, Swan Lake, Illinois, Habitat Rehabilitation and Enhancement Project

1. A copy of the subject report is provided for your file. This report incorporates revisions based on LMVD, public, agency and SLD comments on the Draft DPR, and SLD comments on the preliminary Final DPR.

2. The document was transmitted on 20 December 1991 for LMVD approval. A signed copy of the Appendix DPR-T baseline cost estimate will be sent to Division under separate cover, as will a copy of a letter of intent from the U.S. Fish and Wildlife Service. The report will be forwarded to the public, along with a Section 404 public notice, once LMVD and NCD have approved the DPR.

Dave Gates

DAVID GATES
Plan Formulation Branch

Encl

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UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT (SL-5)
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SWAN LAKE
HABITAT REHABILITATION AND ENHANCEMENT PROJECT

POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

U.S. Army Corps of Engineers
St. Louis District
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December 1991

(Revised January 1993)

EXECUTIVE SUMMARY

The Swan Lake Habitat Rehabilitation and Enhancement Project (HREP) is located adjacent to the west bank of the Illinois River between river miles 5 and 13. The immediate project area includes 2,900 acre Swan Lake, 200 acre Fuller Lake, and approximately 950 acres of bottomland forest and 550 acres of cropland surrounding these lakes (totaling 4,600 acres). Also included in the project area is the local watershed adjacent to Swan Lake's west shore.

Management of the project area is divided. Fuller Lake and the uppermost 300 acres of Swan Lake are managed for the U.S. Fish and Wildlife Service (USFWS) by the Illinois Department of Conservation (IDOC). The remaining 2,600 acres of Swan Lake are managed directly by the USFWS as part of the Mark Twain National Wildlife Refuge. East of the project area is the Stump Lake HREP, and to the southwest, the project abuts the Calhoun Point HREP Area. Collectively, these three areas comprise about one-fourth of all wetland and deepwater habitats to be found in the lower 80 miles of the Illinois River valley, and they form an integral component of a nationally significant ecosystem.

Swan Lake is vitally important as habitat for both waterfowl and fish. The lake lies within a portion of the Mississippi Flyway designated as an area of major concern under the North American Waterfowl Management Plan. Ongoing habitat loss has reduced the value of this area for waterfowl as a migration feeding and resting area. From a fisheries standpoint, the lake furnishes a major portion of the region's available spawning, rearing, and wintering habitat. The lake is open to both sport and commercial fishing. Biologists are concerned that a continuing loss of river backwater habitat could result in a future reduction in fish abundance and diversity.

The major threats to the Swan Lake complex are: sedimentation, water level fluctuations, and wind generated waves. The lake receives substantial sediment input, not only from the flood waters of the Illinois River, but from the 30 square mile watershed adjacent to the lake's west shore. It is estimated that two-thirds of the lake's sediment is from the river, and one-third is from the hillside. The existing overall deposition rate in the lake is .50 inch per year, and is expected to average .33 inch per year over the next 50 years, resulting in a 30 percent reduction in lake surface acreage.

Sediment deposition results in a direct loss of fish and waterfowl habitat acreage over time. It also results in decreased water depth, leaving fish susceptible to temperature extremes during the summer and winter periods and to the effects of lake freeze over during the winter. Sediment also contributes to a soft lake bottom, not conducive to plant anchorage, and contributes to high turbidity levels when agitated by wind generated waves. This increased turbidity results in reduced light penetration into the water column, causing reduced photosynthetic activity, and reduced plant production. Lost plant production results in food supply impacts to both waterfowl and fish.

The project area is also affected by fluctuations in river stage. Water elevations can fluctuate by a number of feet above normal pool stage (419.5 NGVD), and for extended periods of time. These fluctuations can impact the growth of wetland plants, and the availability of these plants as a food source for waterfowl. An influx of cold flowing water from the river during the winter can be a severe physiological stress on the lake's fish populations.

To guide the planning effort, major goals with associated objectives were developed by an interagency study team:

Goals	Objectives
1. Restore aquatic macrophyte beds and associated invertebrate communities for the benefit of migratory waterfowl	a. Substantially reduce future sedimentation
	b. Maintain stable water levels during the growing season
	c. Provide the ability to solidify the lake bottom
	d. Provide wave control
	e. Form smaller independently managed lake units
2. Provide habitat for over winter survival of fish	a. Provide areas of deep water
	b. Allow for free movement of fish between river and lake during late fall/early winter
	c. Buffer impact of cold water and ice
3. Provide habitat for spawning and rearing of fish	a. Provide alternate structures so as to assure fish passage

Three project alternatives were considered: Alternative A, No Federal Action; Alternative B, Wetlands Excavation; Alternative C, Wetlands Protection System. The following measures were identified and evaluated for Alternative C:

1. Dredging
2. Riverside Levee/Dike
3. Water Control Structures
4. Hillside Sediment Control
5. Interior Closures
6. Islands

The plan formulation process revealed that Alternative C best addressed the project objectives, provided the most habitat benefits, and was the most cost efficient. Alternative C was thus selected as the proposed project, thebasic components of which are described below: (The attached figure provides a visual display of the project plan, and TABLE ES-1 provides a more detailed summary of project features and benefits.)

1. A riverside dike/levee to retard the deposition of river sediment, and to reduce the influence of river stage fluctuations.

2. An interior lake closure to subdivide the lake's refuge into independently managed compartments.

3. Water and sediment control traps in the upland watershed to reduce sediment contribution from tributaries flowing into the lake. (An upland sediment control program was chosen over bottomland sediment traps because it was determined by an engineering analysis to be more effective and cheaper by

$2.3 million. In addition, the uplands program was able to meet all cost-share, fund transfer, land acquisition, and operation and maintenance requirements established by the 6th Annual Addendum.)

4. Island groups to reduce turbidity levels by serving as barriers to wind generated wave action.

5. A gated CMP at upper Swan/Fuller Lake, and a combination sluice gate/stop-log structure with an open-top channel between river and lake in both the middle and lower lake compartments, to help regulate water levels.

6. Couch pumps, one located at each compartment water control unit to meet recharge and dewatering needs.

7. Boat access areas to mitigate for project impacts to existing site access areas.

The project design will provide the physical conditions necessary for creating a wide spectrum of strategies for waterfowl and fisheries management. The precise manner in which the lake will be managed in the future, will evolve during the initial years of the project. This fine tuning of the management plan will take into account the results of biological response analyses to access the benefits of various alternative water control regimes.

Habitat enhancement from the project would be anticipated to result in a net gain of +1,021 average annual habitat units (AAHU's) for waterfowl and +669 AAHU's for slackwater fish. The project is designed to provide habitat benefits for approximately 50 years.

A Project Performance Evaluation Plan (including physical and chemical analyses) that complies with the scope and methodologies used for other HREP's, and the Upper Mississippi River System-Long Term Resource Monitoring Program (UMRS-LTRM), has been developed. Pre-construction and post-construction monitoring will be implemented at an annual cost of approximately $17,000. In addition, Swan Lake is one of two District HREP locations selected for intensive biological response analysis. This effort, as presently proposed for Swan Lake, would cost approximately $500,000. The project's compartmentalization provides a unique opportunity to experimentally ascertain the relative fish and waterfowl benefits of various design features and water level management regimes. Changes that would be evaluated include, fish community and population structure, lake/river fish movement, overwintering habitat use, waterfowl presence and abundance, and vegetation and invertebrate composition, biomass and production.

IDOC, through a separate agreement with the USFWS, is the local sponsor for the upper Swan/Fuller Lake area; the USFWS is the sponsor for middle and lower Swan Lake areas; and the Calhoun County Soil and Water Conservation District (CCSWCD) is the local sponsor for the hillside sediment control program.

The USFWS Regional Director, and the St. Louis District Commander, will sign a Memorandum of Agreement for enhancing fish and wildlife resources at the Swan Lake complex, addressing the specific relationships, arrangements, and general procedures under which the USFWS and Department of the Army will operate in constructing, operating, maintaining, repairing and rehabilitating the project.

A local cooperative agreement will be signed between the St. Louis District and the CCSWCD. Via this agreement, the CCSWCD will agree to provide its share of the costs for the hillside sediment control program, and will provide the needed access for the placement and periodic inspection of these features.

A Memorandum of Agreement for the hillside program will be signed between the U.S. Soil Conservation Service (USSCS) and the St. Louis District Commander. This agreement will describe the terms of the USSCS's technical assistance to the Corps during advanced planning and implementation of the hillside features, and of the USSCS's operations and maintenance responsibilities, through successive agreements with the Conservation District and landowners of the hillside program.

All sponsors will operate and maintain the project after its completion, and will accomplish this work in accordance with Section 906(e) of the 1986 Water Resources Development Act. A manual will be developed during the construction phase of the project which will more specifically define operation, maintenance and rehabilitation responsibilities.

The total project cost is estimated at \$7,854,000. Project construction is scheduled to be completed in April 1996. The cost of construction for the hillside features will be cost-shared 75 percent Federal and 25 percent local, with the cost of operation and maintenance (estimated at \$20,000 annually) being incurred 100 percent by the landowners through the local sponsor. All other project features are on Federally owned lands, and the cost of construction would be 100 percent Federal and the cost of operation and maintenance (estimated at \$41,000 annually) would be 75 percent Federal and 25 percent non-Federal.

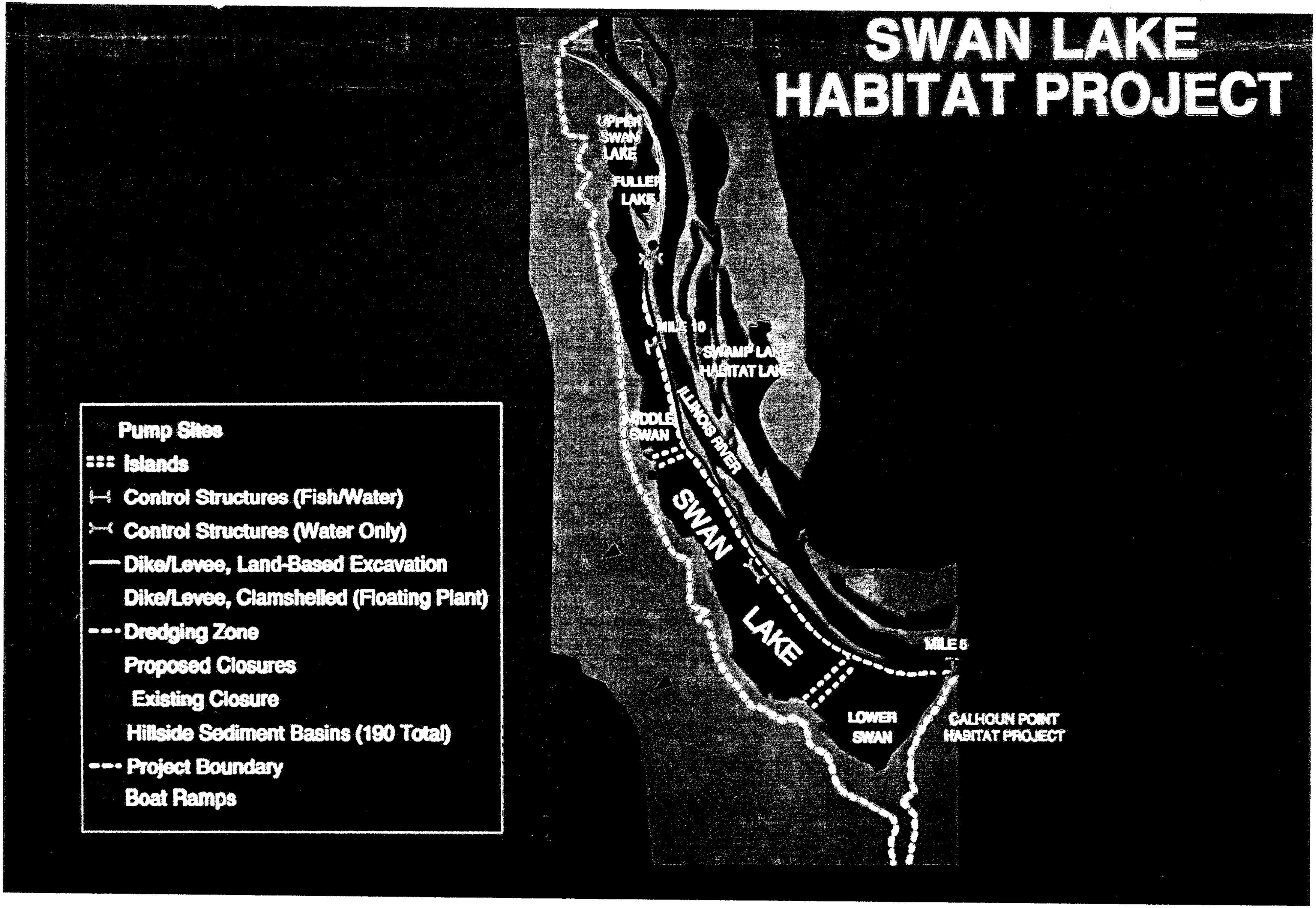
SWAN LAKE
HABITAT PROJECT
UPPER SWAN LAKE
FULLER LAKE
MILE 10
SWAMP LAKE
HABITAT LAKE
ILLINOIS RIVER
MIDDLE SWAN
SWAN LAKE
MILE 5
LOWER SWAN
CALHOUN POINT
HABITAT PROJECT
Pump Sites
Islands
Control Structures (Fish/Water)
Control Structures (Water Only)
Dike/Levee, Land-Based Excavation
Dike/Levee, Clamshelled (Floating Plant)
Dredging Zone
Proposed Closures
Existing Closure
Hillside Sediment Basins (190 Total)
Project Boundary
Boat Ramps

TABLE ES-1

PLAN C - MAJOR PROJECT FEATURES DESCRIPTION AND HABITAT BENEFITS

Major Project Features	Description	Habitat Benefits/Remarks
Hillside Sediment Control (Partnership Program)	Entails a $1.0 million program cost-shared with the Calhoun County Soil and Water Conservation District. Construction of 95 water and sediment 55 ponds. O&M and real estate costs incurred by landowner	Reduces hillside sediment input to lake by 30 percent, and overall lake sedimentation by 17 percent. Combined with dike/levee, a substantial 60 percent reduction in lake sedimentation is possible. Provides net gain of +105 average annual habitat units for waterfowl and +67 AAHU's for fish. Other benefits include reduced farm soil loss, dollars to local economy, upland game habitat improvement, upland marsh habitat creation, and, most significantly, an important interagency cooperative precedent. Major improvement in hillside sediment control is not expected in the absence of this separable EMP feature. The partnership program was found to be the least costly EMP alternative. Other programs were explored, but were unavailable as a major source of funding.
Dike/Levee Embankments (Including Water Control Structures)	Feature is in 3 segments totaling 46,700 feet, extending between Calhoun Point and Hadley Landing. Includes 2,000 feet of stone-capped lower lake closure, 29,100 feet of lower peninsula clamshelled structure, and 15,600 feet of borrow fill structure. Overall crown elevation is 426 NGVD (net grade) with structure height varying from 3 to 6 feet. Lower 2,000 feet of peninsula levee serves as flood overflow section. Water control structures include single gated CMP at upper Swan/Fuller Lake, and combination sluice gate/stop-log structures with open-top channels between river and lake in middle and lower lake compartments. Three pumps with associated power units and fuel tanks would be included.	Reduces river sediment input by 85 percent, and overall lake sedimentation by 43 percent. Flood events during growing season reduced from present 1 in 2 years to 1 in 8 years. Cold water intrusion reduced from annual intrusion to 1 in 2 years. Increase of +634 AAHU's for waterfowl and +320 AAHU's for fish. Feature permits periodic bottom solidification. Improves plant anchorage conditions and lowers turbidity levels. Fish movement allowed via open channel water control structures.
Interior Lake Closure	Consists of soil core/stone-capped structure subdividing Swan Lake. Inner clamshelled core built to top elevation 421 NGVD (net grade), stone cover extends to elevation 422.5 NGVD. Structure also equipped with a gated CMP.	Feature breaks-up lake into smaller independently manageable units, increasing habitat diversity. Structure serves in reducing wave action. Gated CMP places additional water on lower lake prior to pumping. Habitat unit gains are +235 AAHU's for waterfowl, and +164 AAHU's for fish.
Islands	Two island groups constructed from clamshelled dredged material. One group perpendicular to Illinois River at R.M. 6, the other at R.M. 8.8. Individual island size, shape, spacing, width, and height would be varied.	Provides additional 25 percent wave control. Some of the islands will be maintained in grass cover to provide optimal mallard duck nesting habitat, while others will be allowed to undergo natural succession to a forested state. Lake habitat benefits from wave control (which increases plant production) yield +47 AAHU's for waterfowl and +71 AAHU's for fish.
Dredging	Feature is a by-product of excavation for construction of dike/levee, closures and islands. Water depth increased in those areas to 7 feet.	Results in a drainage system needed for bottom solidification. Resulting deepwater also serves as improved habitat for diving ducks and fish.

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POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

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REPORT ACRONYMS

AAHU	Average Annual Habitat Unit
ACHP	Advisory Council on Historic Preservation
ACP	Agricultural Conservation Program
AHAG	Aquatic Habitat Appraisal Guide
AT&T	American Telephone and Telegraph
CCSWCD	Calhoun County Soil and Water Conservation District
CMP	Corrugated Metal Pipe
CPP	Conservation Practices Program
CRP	Conservation Reserve Program
CWS	Canadian Wildlife Service
DEMO	Demonstration Project
DPR	Definite Project Report
DU	Ducks Unlimited
EA	Environmental Assessment
E&D	Engineering and Design
EMP	Environmental Management Program
EMTC	Environmental Management Technical Center
GIS	Geographic Information System
GPM	Gallons Per Minute
HEC	Hydrologic Engineering Center
HES	Habitat Evaluation System
HREP	Habitat Rehabilitation and Enhancement Project
HUA	Hydrologic Unit Areas
IEPA	Illinois Environmental Protection Agency
IDOC	Illinois Department of Conservation
IDOT	Illinois Department of Transportation
INHS	Illinois Natural History Survey
LCA	Local Cooperative Agreement
LTRM	Long Term Resources Management
MARSH	Matching Aid To Restore States Habitat
MOA	Memorandum of Agreement
MTNWR	Mark Twain National Wildlife Refuge
NAWMP	North American Waterfowl Management Plan
O&M	Operations and Maintenance
PA	Programmatic Agreement
P&S	Plans and Specifications
S&A	Supervision and Administration
SHPO	State Historic Preservation Officer
SIU-C	Southern Illinois University--Carbondale
SLD	St. Louis District
UMRBA	Upper Mississippi River Basin Association
UMRBC	Upper Mississippi River Basin Commission
UMRS	Upper Mississippi River System
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USSCS	U.S. Soil and Conservation Service
WET	Wetlands Evaluation Technique
WHAG	Wildlife Habitat Appraisal Guide
WLRC	Washington Level Review Center
WLTP	Watershed Land Treatment Program
WQSP	Water Quality Special Projects

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1. INTRODUCTION.

a. Purpose. The purpose of this Definite Project Report (DPR) is to present a detailed proposal for the rehabilitation and enhancement of wetlands at Swan Lake. This report provides planning, engineering, and sufficient construction details of the Selected Plan to allow final design and construction to proceed subsequent to approval of this document. The Environmental Assessment (EA) for the project is integrated with the DPR.

b. Authority. Public Law (PL) 95-502 authorized the construction of a new dam and 1,200-foot lock at Alton, Illinois, and directed the Upper Mississippi River Basin Commission to prepare a Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Upper Mississippi River Basin Commission (UMRBC) completed the Master Plan report and submitted it to Congress on 1 January 1982. The report recommended an environmental management program that included construction of habitat rehabilitation and enhancement projects.

The 1985 Supplemental Appropriations Bill (PL 99-88), signed into law by President Reagan on 15 August 1985, provided initial authorization and appropriations for that environmental management program. A more comprehensive authorization was later provided by Section 1103 of the Water 9Resources Development Act of 1986 (PL 99-662). Section 1103 is summarized as follows:

> Section 1103. UPPER MISSISSIPPI RIVER PLAN
>
> (a) (1) This section may be cited as the Upper Mississippi River Management Act of 1986.
>
> (2) To ensure the coordinated development and enhancement of the Upper Mississippi River System (UMR), it is hereby declared to be the intent of Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system. Congress further recognizes that this system provides a diversity of opportunities and experiences. The system shall be administered and regulated in recognition of its several purposes.
>
> (e) (1) The Secretary, in consultation with the Secretary of the Interior and the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, is authorized to undertake, as identified in the Master Plan -
>
> (a) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement...

c. Project Selection Process.

(1) Eligibility Criteria. The Master Plan, completed by the UMRBC in 1981, served as the basis for recommendations (including the UMRS-EMP) s9ubsequently enacted into law by the Water Resources Development Act of 1986. A design memorandum (or implementation document) did not exist at the time of enactment of Section 1103. Therefore, the North Central Division, U.S. Army Corps of Engineers, completed a "General Plan" for implementation of the UMRS-EMP in January 1986. The USFWS, Region 3, and the five affected states (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) participated in the development of that plan through the Upper Mississippi River Basin Association (UMRBA). Programmatic updates of the General Plan for budget planning and policy development are accomplished through Annual Addendums.

The Master Plan report and the General Plan identified examples of potential habitat rehabilitation and enhancement techniques. Consideration of the Federal interest and Federal policies resulted in the following conclusions:

(a) First Annual Addendum. "The Master Plan report... and the authorizing legislation do not pose explicit constraints on the kinds of projects to be implemented under the UMRS-EMP. For habitat projects, the main eligibility criteria should be that a direct relationship should exist between the project and the central problem as defined by the Master Plan, i.e., the sedimentation of backwaters and side channels of the UMRS. Other criteria include geographic proximity to the river (for erosion control), other agency missions, and whether the condition is the result of deferred maintenance...."

(b) Second Annual Addendum. The types of projects that are definitely within the realm of Corps of Engineers implementation authorities include the following:

- backwater dredging
- dike and levee construction
- island construction
- bank stabilization
- side channel openings/closures
- wing and closing dam modifications
- aeration and water control systems
- waterfowl nesting cover (as a complement to one of the other project types)
- acquisition of wildlife lands (for wetland restoration and protection.) Note: By letter of February 5, 1988, the Office of the Chief of Engineers directed that such projects not be pursued.

A number of innovative structural and nonstructural solutions which address human-induced impacts, particularly those related to navigation traffic and operation and maintenance of the navigation system, could result in significant long-term protection of UMRS habitat. Therefore, proposed projects which include such measures will not be categorically excluded from consideration, but the policy and technical feasibility of each of these measures will be investigated on a case-by-case basis and recommended only after consideration of system-wide effects.

(2) Selection Process. In the past, projects have been nominated and ranked for inclusion in the St. Louis District's habitat projects program by the respective state conservation agencies, and the USFWS, based on agency management objectives. The USFWS ranked the Swan Lake project first in importance.

d. Scope of Study. The geographical scope of the study is limited to Swan Lake, and its adjacent 30 square mile west shore watershed, near Brussels, Illinois. The project features considered would involve both Federal and private lands. Various field surveys were conducted during the study, these included topographic, hydrographic boundary, soils (borings), habitat, cultural resources and landowner participation surveys.

e. Coordination. The DPR report was developed in coordination with the USFWS (sponsor for the middle and lower Swan Lake), the IDOC (sponsor for the Upper Swan/Fuller Lake portion of the project), and the Calhoun County Soil and Water Conservation District (CCSWCD) (sponsor for the hillside program) with the technical assistance of the USSCS. Representation from IDOC included personnel from the land management, planning, and fisheries divisions. Representation from the USFWS included refuge, ecological services, fisheries assistance and EMP personnel.

2. EXISTING ENVIRONMENTAL CONDITIONS AND FUTURE WITHOUT.

The following section presents information on the existing environment in the area affected by the project. Where relevant, a discussion is included on the environmental conditions if no project action is taken (i.e., the future without).

a. Location. The Swan Lake Habitat Rehabilitation and Enhancement Project (HREP) is located adjacent to the west bank of the Illinois River between river miles 5 and 13 (FIGURE 1). The immediate project area includes 2,900 acre Swan Lake, 200 acre Fuller Lake, and approximately 950 acres of bottomland forest and 550 acres of cropland surrounding these lakes (totaling 4,600 acres). Also included in the project area is the local watershed adjacent to Swan Lake's west shore. Management of the project area is divided; Fuller Lake and the uppermost 300 acres of Swan Lake are managed by the Illinois Department of Conservation for waterfowl hunting. The remaining 2,600 acres of Swan Lake are managed by the U. S. Fish and Wildlife Service as part of the Calhoun Division of the Brussels District of the Mark Twain National Wildlife Refuge.

b. Physiography-Topography. Swan Lake lies in the floodplain of the lower Illinois River and consists of alluvial material. The floodplain area is relatively flat, with elevations ranging from about 419.5 to 445 feet NGVD (National Geodetic Vertical Datum). The adjacent uplands terrain is rolling with maximum elevations reaching 470 NGVD.

In the Illinois River valley, sedimentation has resulted in the aggradation and disappearance of off-channel water habitat. Sedimentation from Illinois River floods, and from tributaries in the local watershed, has significantly affected lake geography. For example, in their 1976 report, Lee and Stall (1976: 48) calculated the lake had lost a total capacity of 2,033 acre-feet or 42.2 percent since 1903, although the lake surface area had only been reduced by 10 percent. They estimated the annual deposition had caused the loss of about 28.2 acre-feet per year.

TABLE 1 provides an estimation of the changes in sedimentation rate and water depth at Swan Lake over the period 1900-2040. During the pre-impoundment period (1903-1940), the river's natural backwater creation/extinction process was still operative. During this period the average rate of sedimentation in the lake was only 0.2 inches/year, and the average water depth was about 54 inches. In the post-impoundment phase between 1940 and the present, the navigation pool slackwater effect and increases in upland crop production caused the sedimentation rate to increase 2.5 times to .5 inches/year. Average water depth during this period decreased to 40 inches. Between the present and the year 2040, the sedimentation rate in the absence of a project is anticipated to average .33 inches/year with an average water depth of 17 inches.

In TABLE 1 it has been assumed that the recent trend of increasing sedimentation rate, and concomitant rapid decrease of water depth, has or will soon reach a peak. Accordingly, future changes in sedimentation should be primarily a function of changing water depth (i.e., with the sedimentation rate decreasing as water depth decreases). The lake's existing projected life span is 90 years (i.e., until year 2080).

To help illustrate the sedimentation process, FIGURE 2 shows the accumulation of sediments around the delta of one creek entering Swan Lake from the local watershed. The combined annual acreation from all deltas is 16 acres per year. Comparing past and predicted future changes, FIGURE 3 shows lake profiles based on contour elevations for the 1903 floodplain, the 1975 lake bottom and the expected lake bottom profile for the year 2040 without a project. For the sake of comparison, a 419.5 water surface elevation was assumed. It is predicted that by the year 2040, the lake will have lost 30 percent of its present water surface area; and the remaining open lake will have extremely shallow uniform depths, averaging only 0.7 foot in depth.

PROJECT LOCATION MAP

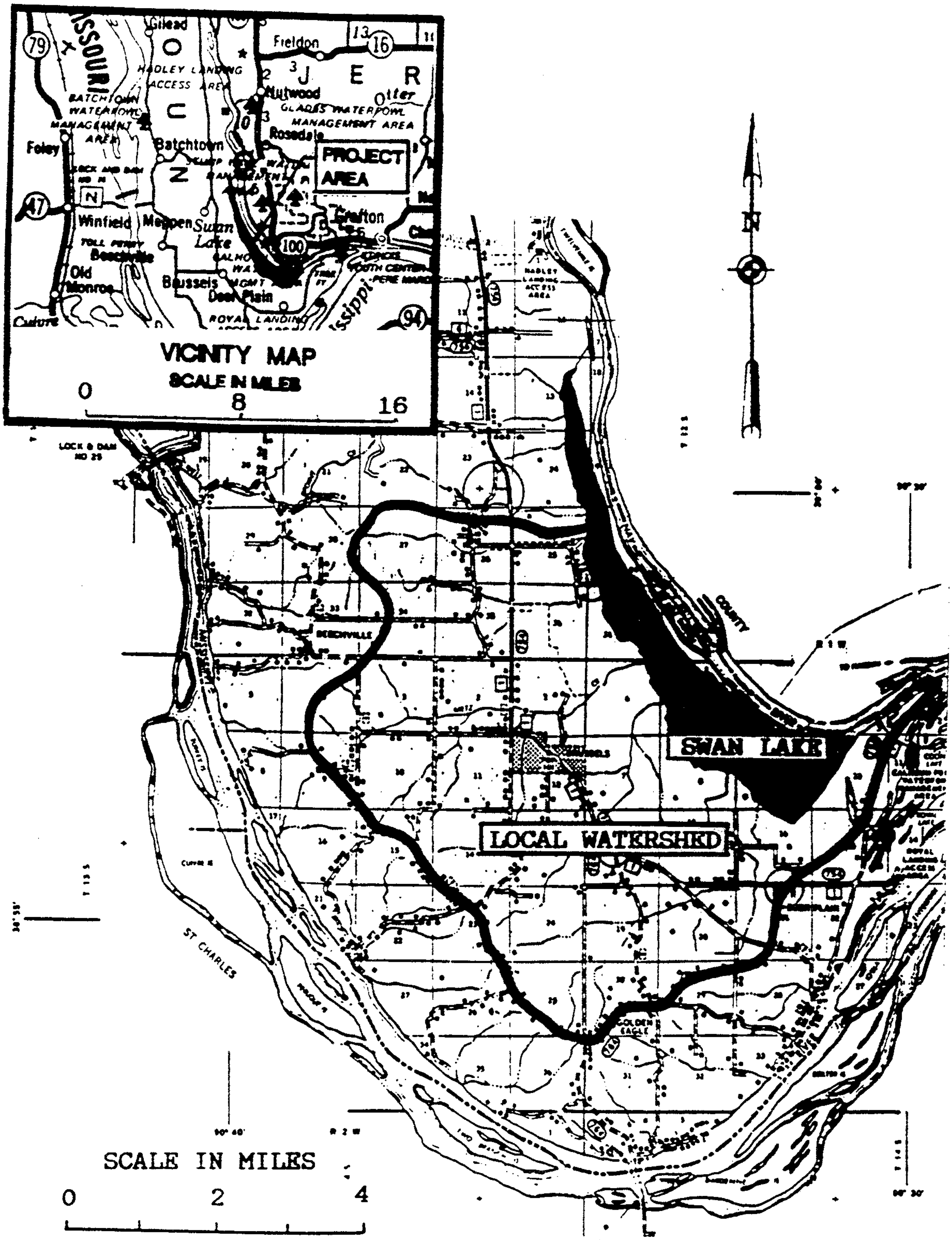


Figure 1A

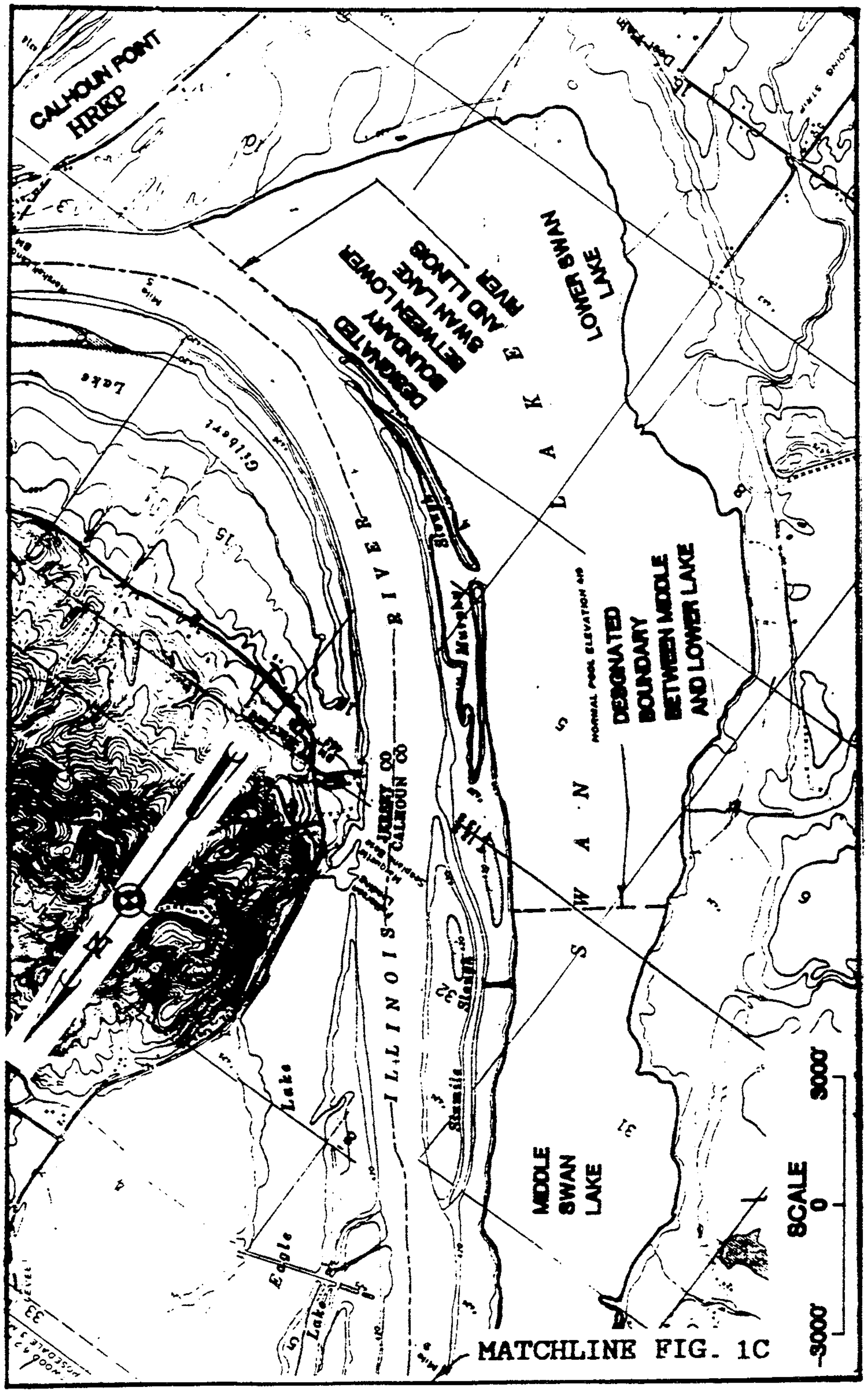

CALHOUN POINT
HRKP
DESIGNATED BOUNDARY BETWEEN LOWER SWAN LAKE AND ILLINOIS RIVER
LOWER SWAN LAKE
S W A N L A K E
DESIGNATED BOUNDARY BETWEEN MIDDLE AND LOWER LAKE
ILLINOIS RIVER
MIDDLE SWAN LAKE
SCALE
0
3000'
MATCHLINE FIG. 1C

Figure 1B

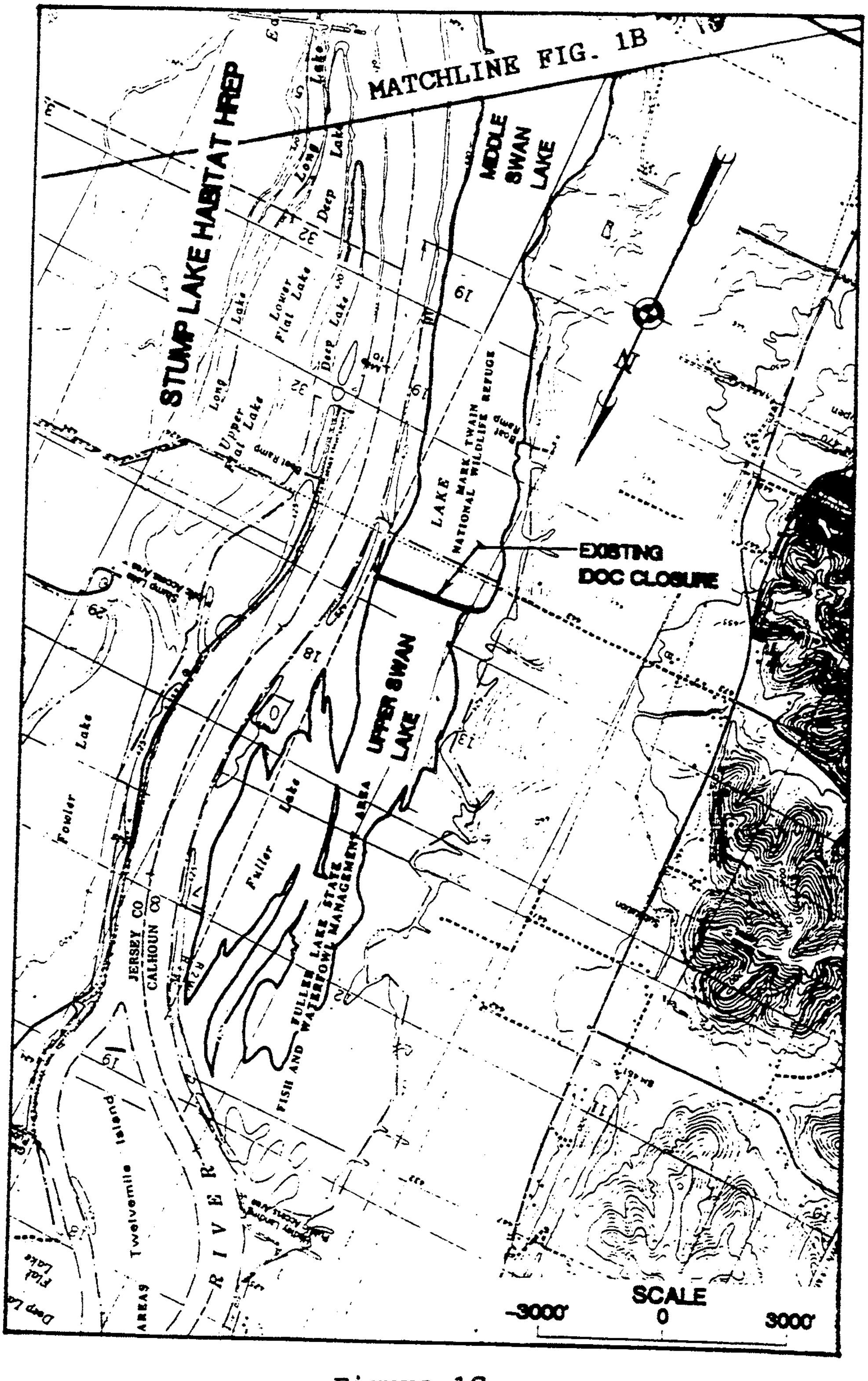
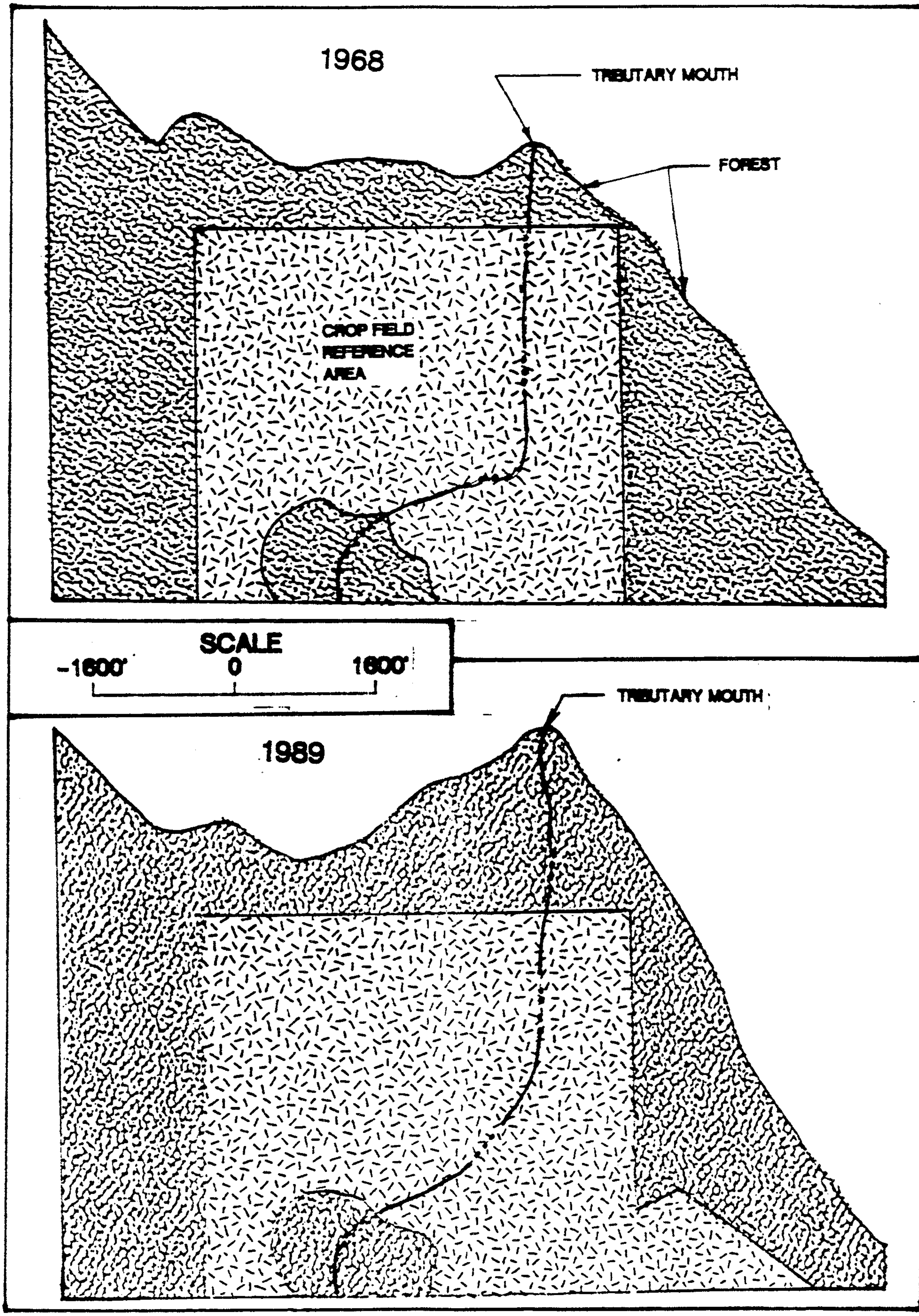

MATCHLINE FIG. 1B
STUMP LAKE HABITAT HREP
MIDDLE SWAN LAKE
EXISTING DOC CLOSURE
UPPER SWAN LAKE
SCALE
-3000'
0
3000'

Figure 1C

DELTA GROWTH 1968 vs 1989

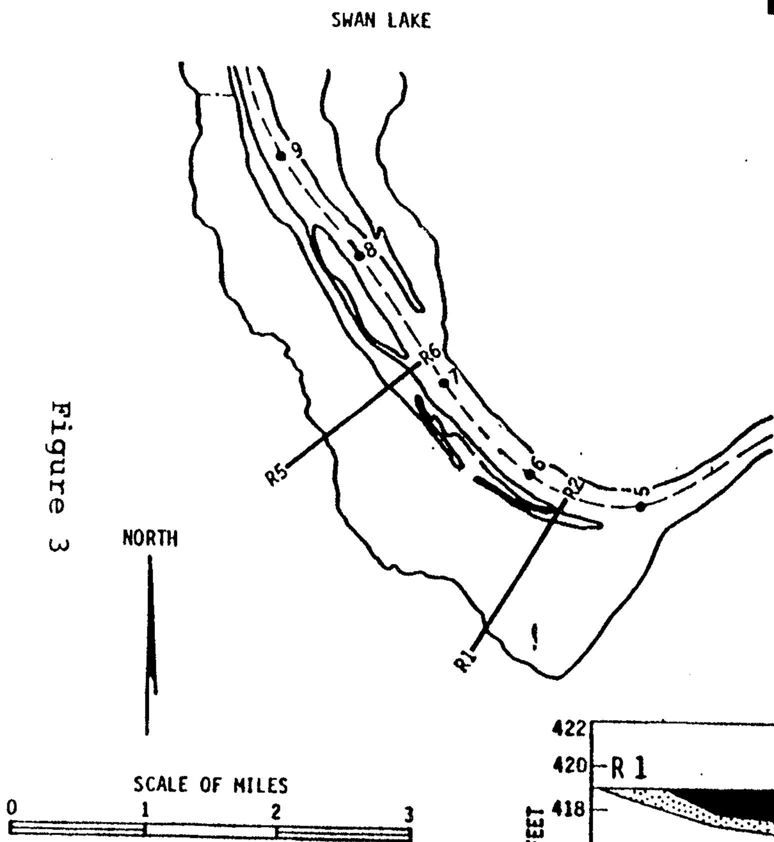


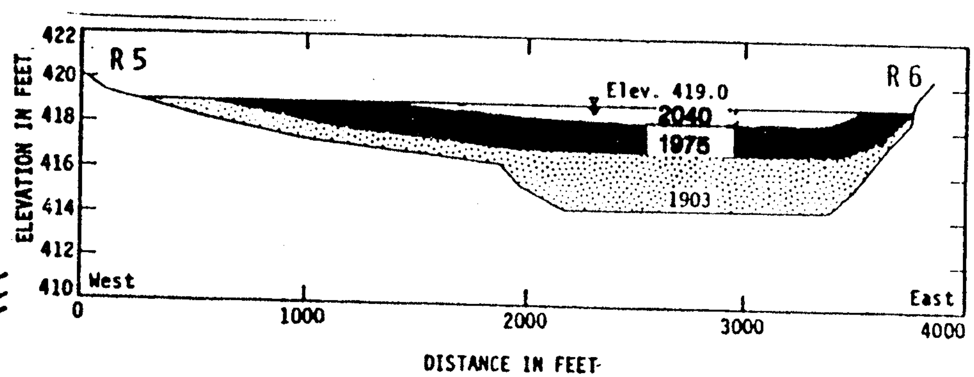
NET LAND TO WATER CONVERSION = 4 ACRES/YEAR

TRIBUTARY = 25 PERCENT OF HILLSIDE SEDIMENT LOAD TO LAKE

Figure 2

LAKE SEDIMENTATION PROFILES
PAST AND FUTURE





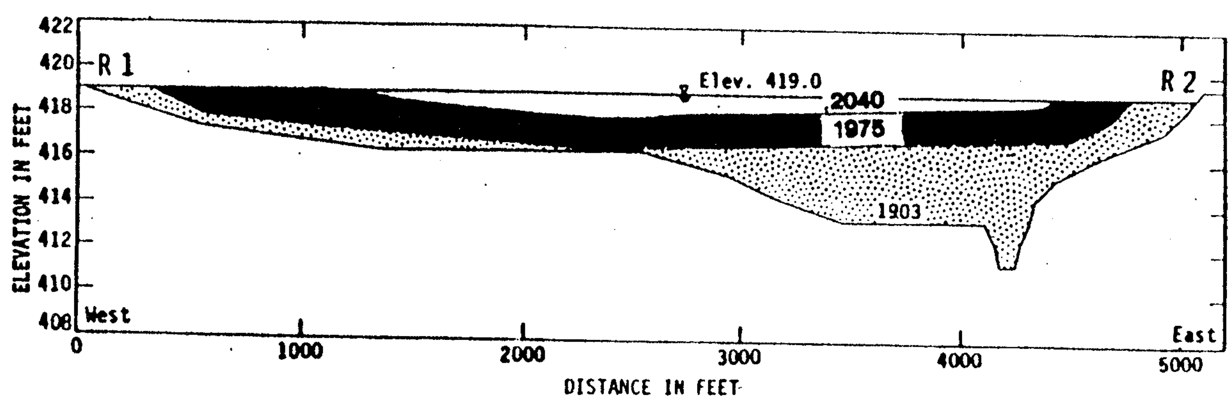


Figure 3

Under the future without project condition, it is estimated that one-third of the lake's sedimentation would be derived from the hillside and two-thirds from the river.

TABLE 1

ESTIMATED PRESENT AND FUTURE SEDIMENTATION RATE AND WATER DEPTH CHANGES (1900 - 2040)

Period	Average Water Depth (Inches)1/	Average Sedimentation Rate (Inches/Year)
Pre-Impoundment (1900 - 1940)	54	.20
Past Post-Impoundment (1940 - 1990)	40	.50
Future Post-Impoundment (1900 - 2040)	17	.33

1/ All water depths are relative to a reference water surface elevation of 419.5 NGVD.

c. Hydrology/Hydraulics. Water stages at Swan Lake are controlled by the operation of the Melvin Price Locks and Dam on the Mississippi River near Alton, Illinois. The pool stage is 419.5 feet NGVD under normal conditions. To illustrate the regular water level fluctuations over the course of one year, FIGURE 4 provides a stage-hydrograph based on the year 1978, a typical year. Due to its connection with the Illinois River at the lower end of Swan Lake, flood waters can back into the lake system. Overtopping of the lake from the upstream end occurs at about 424 NGVD; such flood events occur about once every 2 years (TABLE 2).

TABLE 2

STAGE FREQUENCY AT SWAN LAKE

Frequency (Years)	Elevation (NGVD) Downstream End (R.M. 5)	Elevation (NGVD) Upstream End (R.M. 13)
2	424.8	425.5
5	429.9	430.6
10	432.6	433.3
25	435.6	436.1
50	437.8	438.0
100	440.0	440.1

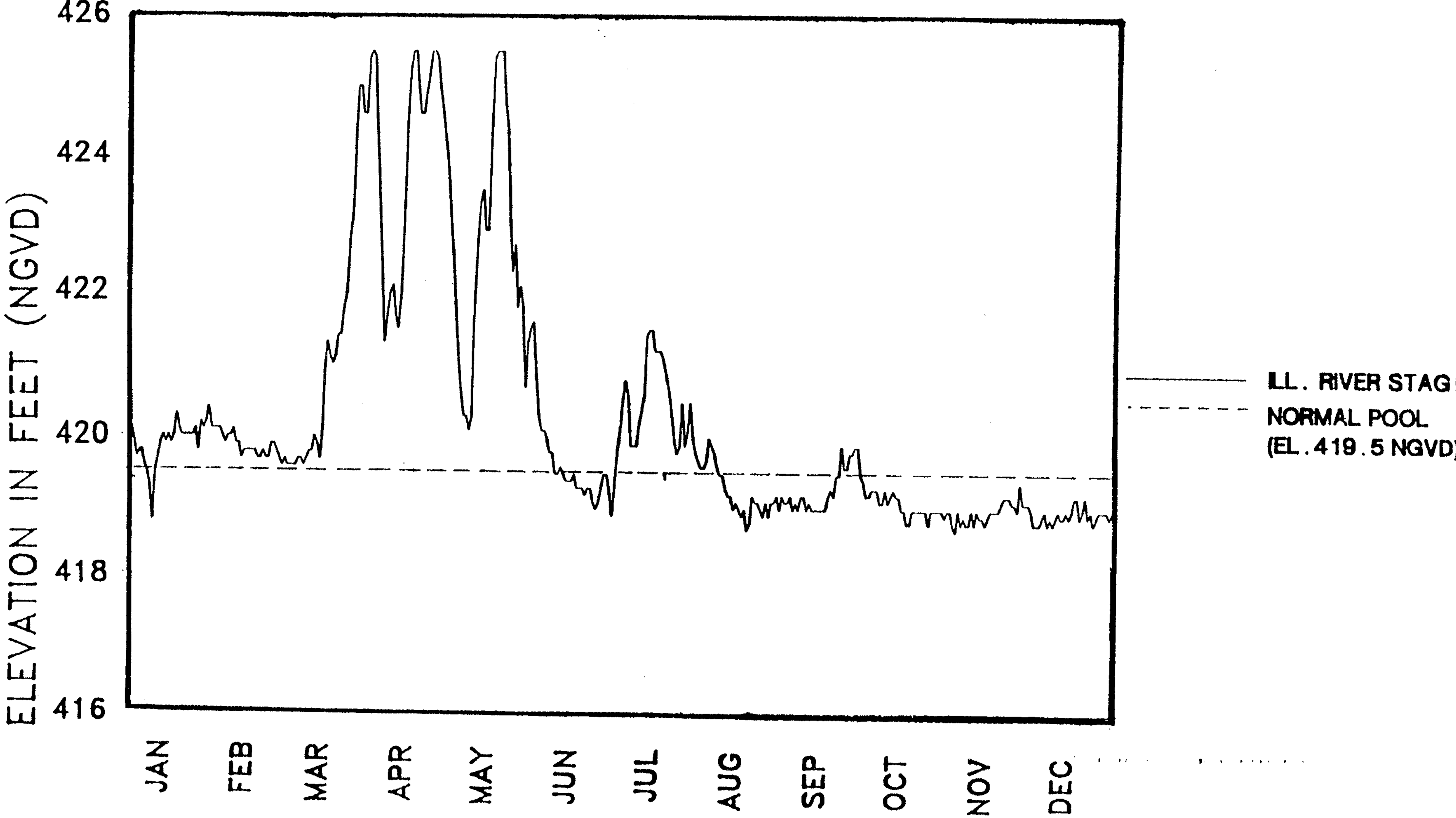
d. Water Quality. Currently, Swan Lake has low water clarity due to a combination of shallow depths, unconsolidated bottom, exposure to periodic high winds, and small boat traffic within the lake. Because the lake is shallow, its water temperatures are unstable. Winter water temperatures in

Figure 4
11

STAGE HYDROGAPH

SWAN LAKE AT ILLINOIS RIVER MILE 5.5

CALENDER YEAR 1978



Swan Lake vary greatly, from about 0 to 10° C (Sheehan et al. 1989). Dissolved oxygen levels in the lake are usually fairly high due to high wave action, even though water levels are shallow and water temperatures are high during the summer. Water turbidity and unstable temperatures are expected to continue to be an important problem in the future without the project.

e. Air Quality. There are no major sources of pollutant emissions in the vicinity of the project area. Most of the air pollutants in the area consist of suspended particles from agricultural activities and navigation operations. The existing air quality conditions are expected to continue into the future, if the project is not implemented.

f. Noise. The major sources of noise in the project area result from the diesel power plants of tows passing along the Illinois River, and from occasional motorboats on the lake. No significant changes in noise levels are expected in a future without a project.

g. Prime Farmland. In accordance with the Farmland Protection Policy Act, the St. Louis District forwarded Form AD-1006 to the Soil Conservation Service for its land evaluation (see Appendix DPR-N). In addition, the Illinois Department of Agriculture was given an opportunity to evaluate the project during its review of the draft DPR/EA. It has been determined that 33 acres of prime farmland would be affected by a project.

h. Wetlands. Havera (1985), made an inventory of the wetlands and deepwater habitats of the state of Illinois. TABLE 3 indicates that for off-channel open water habitat, the lower 80 miles of Illinois River (i.e., Alton Pool) has proportionally far less of this habitat than in other reaches of the Illinois River.

TABLE 3

COMPARISON OF OFF-CHANNEL OPEN WATER HABITAT IN THE ILLINOIS RIVER VALLEY BY POOL 1/

		Deepwater Habitat					
		Lakes (> 20 ac)		Ponds & Sloughs (< 20 ac)		Total	
Pool	River Miles	Acres	ac/RM	Acres	ac/RM	Acres	ac/RM
Alton	0-80	3,759	47	737	9	4,496	56
LaGrange	80-160	14,981	187	1,204	15	16,185	202
Peoria	160-230	15,929	228	410	6	16,339	234
Starved Rock	230-245	1,505	100	0	0	1,505	100
Marseilles	245-270	2,481	99	105	4	2,586	103

1/ From Illinois Natural History Survey (1985), based on interpretation of aerial photography taken in 1978-80.

In addition, many wetlands in the Illinois River valley are disappearing or are changed and degraded. Of special concern is the filling in of wetland areas by sedimentation (see Lee and Stall 1982, Bellrose et al. 1983, Sparks 1984, Cahill and Steele 1986). Increased rate of sedimentation has had a negative effect on wetlands vegetation by causing high turbidity, and by creating bottoms too soft for plant anchorage (Mills et al. 1966). Consequently, since the middle 1950's, aquatic vegetation has disappeared from many wetland areas in the Illinois River valley (Havera 1985: 537). Sedimentation has also reduced the habitat diversity of the lakes and channels along the river by making areas shallow and creating rather uniform bottoms.

A brief description of project area wetlands and deepwater habitats is provided below. Wetland categorization follows that of the U. S. Fish and Wildlife Service's wetlands classification system, as defined by Cowardin et al., 1979. Under this system, the project's habitat can be divided into two major categories: the palustrine system and the lacustrine system. TABLE 4 shows the number of acres in the project area under this wetlands classification scheme.

TABLE 4

SWAN LAKE HREP - MAJOR WETLANDS AND DEEPWATER HABITATS WITHIN PROJECT AREA

		Acres 1/	
System	Habitat Type	Existing	Future (No Action) Year 2040
Palustrine	Forested Wetland 2/	942	1,803
Lacustrine	Nonforested Wetland		
	Lower Swan	1,353	977
	Middle Swan	1,210	817
	Upper Swan/Fuller	540	448
		4,045	4,045

1/ Based on area contained within Corps of Engineers 9-foot navigation project boundary.

2/ Wetland type meets the regulatory definition for administering the Section 404 permit program (Reference: "Federal Manual for Identifying and Delineating Jurisdictional Wetlands").

(1) Palustrine Wetlands. Most palustrine wetland in the project area consists of broad-leaved deciduous forest (i.e., bottomland forest). In the Swan Lake area, such communities are dominated by willow, maple and cottonwood. In terms of waterfowl, these areas are used mainly by wood ducks for nesting and feeding. There are also localized areas along the lake classified as palustrine emergent wetlands, which are used by dabbling ducks.

(2) Lacustrine Wetlands. Most of the existing lake in the project area can be placed in the limnetic subsystem of the wetland classification scheme and described as shallow open water with an unconsolidated bottom. Much of the lake's open water is of limited value to waterfowl due to a lack of aquatic vegetation needed as food and shelter. Aquatic plants can provide habitat for invertebrates and also provide plant parts and fruits, all of which serve as food for waterfowl. Invertebrates also provide important food sources for fish. Re-establishment of aquatic vegetation is prevented at the lake by a combination of high turbidity and a soft lake bottom.

There are a few sections existing along or near the lake shore that consist of lacustrine wetland with aquatic bed (littoral subsystem). However, many of these areas are part of moist soil units created and managed by IDOC for the production of natural vegetation for wildlife. Water levels in these moist soil units are manipulated to encourage vegetation development, with the units subsequently flooded in the fall to make the food available to waterfowl.

i. Waterfowl. The Illinois River valley is part of the Mississippi flyway, a major flight corridor for millions of migrating waterfowl (FIGURE 5). Swan Lake (in combination with nearby locations such as Stump Lake, Calhoun Point and Batchtown) forms an important link in a chain of waterfowl areas, extending from the northern breeding grounds to the Gulf Coast. At Swan, migrating waterfowl find food, water and rest areas necessary for survival. Peak populations of 278,000 ducks, mostly mallards, 15,000 blue and snow geese and 9,000 Canada geese have been recorded at the lake (USFWS 1987). The average peak populations for the years 1977-1987 were 136,900 ducks, 4,000Canada geese, and 14,700 blue and snow geese (USFWS 1987). In addition, wood ducks and mallards currently nest in the lower sections of the flood plain (Havera 1985), including the Swan Lake area.

Since 1970, trend analysis data show a steady decrease nationwide for duck populations. A report on the management and status of waterfowl in Illinois by Havera (1985) is the most comprehensive and relatively recent work on waterfowl and their habitats in the lower Illinois River. That report, based on aerial waterfowl surveys between 1948 and 1985, documents declines for a number of duck species, including mallards, scaup, and canvasback (see APPENDIX DPR-K). Contributory to this decline has been the degradation of wetlands by sedimentation and water pollution. This degradation has affected the abundance of aquatic plants, and other natural waterfowl foods such as fingernail clams (Sphaeriidae) (Mills et al. 1966, Bellrose et al. 1979, Sparks 1984, Havera 1985). Unfortunately, Swan Lake is a graphic example of ongoing loss of waterfowl habitat due to sedimentation. By the year 2040, the lake will have lost 30 percent of its existing habitat acres. USFWS data on waterfowl use days also appears to reflect ongoing habitat degradation, with 20 million waterfowl use days for the lake in 1955, and only 3 million use days in 1985.

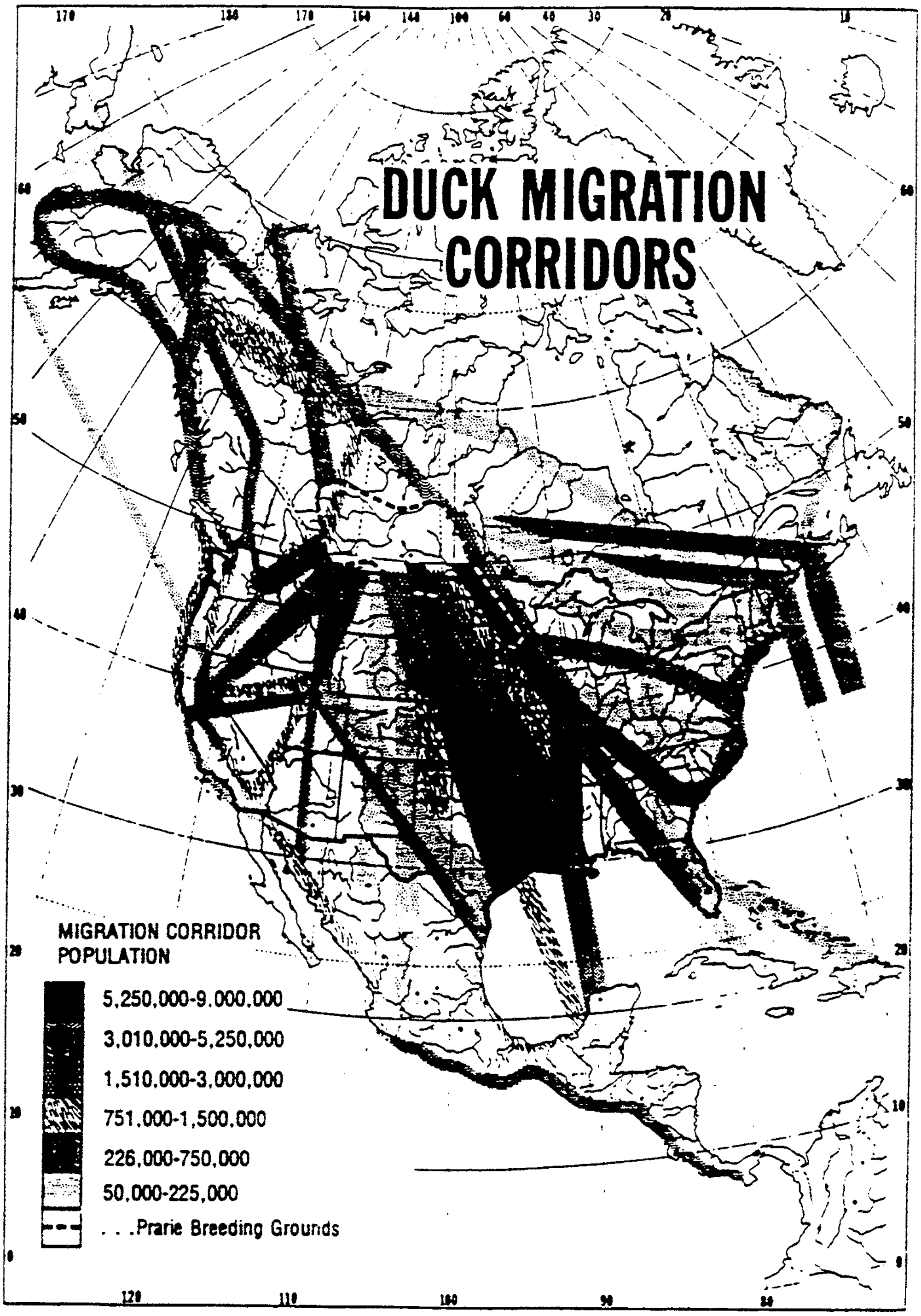
Swan Lake lies within a region designated as an area of major concern by North American Waterfowl Management Plan (NAWMP; see FIGURE 6). The aim of the NAWMP is to ensure the preservation of enough high quality waterfowl habitat to sustain nationwide waterfowl populations at levels for a fall flight of more than 100 million ducks (i.e., the 1970 level). For the mallard duck, the goal is to return to 1970-1979 population levels (or approximately 15 million birds in the fall flight). With regard to migration habitat, the Corps is in a unique position to contribute to this goal. Corps owned river lands within the St. Louis District (such as Swan Lake) provide some of the best, and in many cases, the only opportunities for waterfowl. The USFWS, IDOC, the Corps and others, recognizing this, are working in partnership to improve habitat conditions for waterfowl.

j. Fish. Increased sedimentation and water turbidity, combined with the disappearance of benthic diversity and aquatic vegetation, have greatly reduced the importance of the Illinois River as a sport and commercial fishery (Havera and Bellrose 1985). Aggradation has reduced the size and number of off-channel water habitat areas available to fish for spawning and rearing.

In the past, Swan Lake has served as an important backwater spawning and nursery area for river fishes. As a river connected backwater, it is also important as a wintering site for river fishes (Sheehan et al. 1988, 1989). Large fishes using Swan Lake include bluegill, white and black crappie, brown bullhead, white bass, sauger, freshwater drum, and smallmouth buffalo (Sheehan et al. 1988: 20). The lake has special significance to local fishes because it is the only major backwater available to fish in the lower Illinois River, representing about 40 percent of the total backwater habitat for Pool 26, and about 10 percent of all backwater habitat on the Illinois River.

Because the lake is shallow, the water temperatures are unstable and often extreme, very cold in the winter and warm in the summer, further risking the survival of both resident and river fish using the backwater. Sheehan et al. (1988, 1989) are involved in a long-term study on the habitat requirements of wintering fishes. One of their study areas is Swan Lake. Their investigation

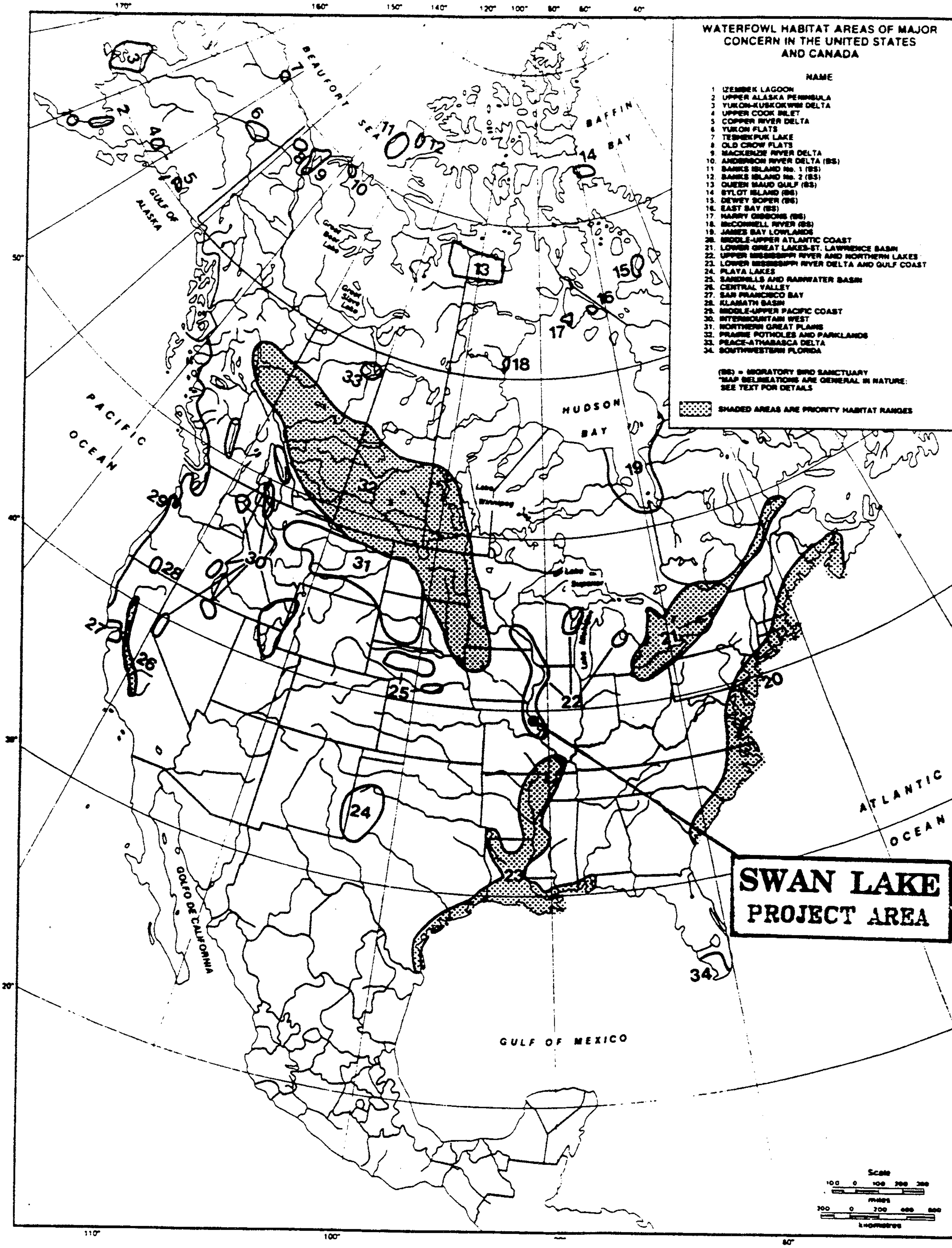
DUCK MIGRATION CORRIDORS



FROM: BELLROSE, 1976

Figure 5

Waterfowl habitat areas of major concern in Canada and in U.S. (1985)



FROM: USFWS/CWS, 1986

Figure 6

(and their review of the literature) strongly indicates winter survival of the young-of-the-year fish determines the future population structure of fish communities in large rivers (Lewis and Bodensteiner 1986; Sheehan et al. 1988, 1989). River water temperatures can remain at near 0° C for long periods of time during the winter (Sheehan et al. 1988) due to the mixing of moving water. During this stress period, river fishes must survive both freezing or near-freezing temperatures, as well as constantly deal with expending energy fighting currents.

To escape the cooler temperatures of winter and flowing conditions, river fishes often take refuge in backwater areas. Such habitats lack water currents and, if of sufficient depth, can maintain temperatures in excess of 5° C (Sheehan et al. 1988). However, Sheehan et al. (1988: 22) suggest that a backwater must be deep enough to resist both complete freezing, as well as oxygen depletion. The configuration of backwaters should also be such that they are not frequently inundated by the colder river waters during high water periods. In addition, they recommend that backwater areas provide a diversity of habitats (above 0° C) in order to optimally benefit over wintering fish, especially small juveniles.

During their winter studies of Swan Lake, Sheehan et al. (1989) also reported that minimum daily temperatures in the lake approached 0° C intermittently for much of the winter. In comparison with other sites studied, they found Swan Lake showed wide fluctuations in water temperatures from day-to-day and at night, sometimes by as much as 9° C, providing a very unstable habitat. Although Swan Lake was occasionally ice covered, temperature stratification of the lake water was still very weak. Sheehan et al. (1989: 26) concluded the temperature instability of Swan Lake was most likely attributed to its shallow, aggraded condition.

Although shallow and cold, Swan Lake and other backwaters in the lower Illinois River are still heavily used by river fishes during winter when compared with sites further upriver (based on collections by Sheehan et al. 1989). Sheehan et al. (1989: 20) attributed the intense use as a result of the paucity of deeper backwater areas in the area of the Illinois and Mississippi Rivers' confluence.

In the future, if a project is not constructed, it is expected that sedimentation will continue to reduce the usefulness of the area as a spawning and nursery area, as well as its function as a fish wintering area.

k. Other Biota. Swan Lake is an integral component of the river ecosystem, providing environmental conditions affecting the productivity and diversity of a wide spectrum of biota. In addition to waterfowl, other migratory birds using the area include herons, egrets, bitterns, and rails. Many species of songbirds use the extensive forest, brush and edge habitats. Many other species, including fish, amphibians, reptiles and mammals also utilize the area. Some of these species are Federally or state listed endangered or threatened species. It is a goal of the refuge system, and of the state, to protect, improve, and manage such environments for the continued enjoyment and benefit of the public.

l. Historic Properties. Although no systematic archaeological surveys of the immediate project area have been completed, surveys conducted adjacent to this area have yielded extensive archaeological remains. Occupation of the area probably began around 14,000 years ago, when nomadic Indians first moved into the area. Occupation has continued unabated to the present.

Today, the majority of the project area consists of marsh, lake and low natural levees. These natural levees separate Swan Lake proper from the Illinois River channel. The ground surface within this area is near the elevation of the river at normal pool and, as such, is not suitable for cultivation; rather these areas are overgrown with thick, weedy vegetation. The remaining acreage associated with the project is situated on the west side of Swan Lake. A relatively high site density exists on the hillside. Approximately 75 percent of this area is cultivated. Archaeological sites situated within cultivated areas are presently being damaged by this land use.

m. Recreation. The Swan Lake area provides various day-use activities, including wildlife observation and photography, environmental education, fishing, and nut, berry and mushroom gathering. Present public use facilities include roads and trails which can be driven or hiked, boat launch facilities, and parking areas. The USFWS maintains a public use/office building which includes an auditorium, visitor contact area and a wildlife observation deck. The Illinois Department of Conservation permits hunting in the Fuller Lake area of Swan Lake; however, all areas of Swan Lake controlled by the USFWS are closed to the public from October 15 to December 15 each year to provide an undisturbed area for migrating waterfowl during the hunting season (USFWS 1987).

Currently, Swan Lake is open to sport fishing, in accordance with Illinois fishing regulations. However, due to sedimentation and the shallowness of the lake, use of the lake for recreational fishing is limited. Even shallow draft boats are easily grounded within the lake. Existing boat ramps are also of limited use, due to the accumulation of sediments around the launch sites.

n. Aesthetics. The aesthetics of Swan Lake could be considered typical for a large backwater area of the lower Illinois River. If no project is built, the size and quality of the lake habitat will continue to decline at a rapid rate, due to sedimentation. Thus, the aesthetic value associated with the presence of a large diverse lake area would also decline.

3. RESOURCE PROBLEMS AND OPPORTUNITIES.

Sediment deposition in the project area results in a direct loss of fish and waterfowl habitat acres. It also results in decreased water depth, leaving fish susceptible to temperature extremes during the summer and winter periods. Sediment contributes to a soft lake bottom, not conducive to plant anchorage, and it contributes to high turbidity levels when agitated by wind generated waves. This increased turbidity results in reduced light penetration into the water column, causing reduced photosynthetic activity, and reduced plant production. Lost plant production results in direct and indirect food supply impacts to both waterfowl and fish. A flocculent bottom and turbid water can also reduce spawning success, and feeding efficiency after spawning success, for certain species of fish (such as sunfish). Roughly one-third of the existing sediment contribution to the lake is attributable to hillside runoff with the remaining two-thirds being attributable to the Illinois River.

The project area is also affected by fluctuations in river stage. Water elevations can fluctuate by a number of feet above normal pool, and for extended periods of time. These fluctuations impact the growth of wetland plants, and the availability of these plants as a food source to waterfowl. An influx of cold flowing water from the river during the winter and early spring can be a severe physiological stress on the lake's fish population.

An opportunity exists to construct measures which could vastly improve the biological diversity and productivity of the Swan Lake project area.

4. PROJECT OBJECTIVES.

The specific project goals and objectives of the project are included in TABLE 5.

TABLE 5

PROJECT GOALS, OBJECTIVES, AND MEASURES AVAILABLE

Goal	Objective	Potential Enhancement Measure(s)
Restore aquatic macrophyte beds and associated invertebrate communities for benefit of migratory waterfowl	Substantially reduce future lake sedimentation	Dredging Dike/Levee 1/ Hillside Sediment Control
	Maintain stable water levels during the growing season	Dike/Levee 1/
	Provide the ability to solidify the lake bottom	Dike/Levee 1/
	Enhance wave control	Interior Closure Islands
	Form smaller independently managed lake units	Interior Closure
Provide habitat for over winter survival of fish	Provide areas of deep water	Dredging
	Allow free movement for fish between river and lake during the late fall/early winter period	Dike/Levee 1/
	Buffer impact of cold water and ice	Dike/Levee 1/
Provide habitat for spawning and rearing of fish	Provide alternate structures so as to assure fish passage	Dike/Levee 1/
Increase overall habitat value for waterfowl and fish	Meet all of the above objectives	All

Feature Code:

1/ Including water control structures

5. **ALTERNATIVES.**

The approach to the development and evaluation of project alternatives was as follows. First, formulation and evaluation criteria were established. Second, various measures were developed to address the project objectives. Third, plans were developed utilizing one or more of the optimized measures, and fourth, the resulting plans along with the no action plan were evaluated for overall potential benefits.

a. Criteria. The four criteria used in formulating and evaluating the project measures and plans were as follows:

(1) **Completeness.** The extent to which an alternative addresses all of the stated project objectives.

(2) **Effectiveness.** The extent to which an alternative alleviates the specified problems and achieves the specified opportunities.

(3) **Efficiency.** The extent to which an alternative is the most cost effective means of alleviating the specified problems and realizing the specified opportunities.

(4) **Acceptability.** The workability and viability of the alternative plan with respect to acceptance by the sponsoring agencies, and compatibility with existing laws, regulations, and public policies.

b. Measures Available. Measures considered to meet objectives were: dredging, dikes/levees, hillside sediment control structures, interior closure structures, water control structures and island groupings. TABLE 5 displays which measures address specific project planning objectives. A general description of each measure and the design requirements established for each is provided by TABLE 6.

c. Measures Evaluated. The following section provides a brief description of the analysis conducted to evaluate and optimize each of the potential project measures. In doing so, various suboptions were developed for each measure. Some of the suboptions affected costs only, while others affected both costs and the physical and biological output of the project. TABLE 7 provides a summary comparison of the enhancement potential of each study measure, and for certain options impacting on output.

(1) Hillside Sediment Control.

(a) Alternative Hillside Programs. Three different programs for hillside sediment control were considered, all including the construction of sediment basins as the primary means of sediment control. These programs were a Corps' upland traps program, a Corps' lowlands traps program, and a partnership program.

The Corps' uplands program would entail the construction of sediment basins in the uplands at strategic locations along the tributary drainage system. Construction at each trap location would consist of building a dam, a discharge pipe, and a spillway. Both large (high efficiency) and moderate (low efficiency) sized traps were looked at. The Corps' lowlands program would treat sedimentation at its destination rather than its source. Under this option, stone fill dams would be placed at the mouth of tributaries having the highest sediment load. Each dam would extend out into the lake, encircling the tributary in a semi-circular fashion.

With the partnership program, various Federal, State, local and private entities would pool their limited resources to achieve the mutually beneficial objectives of hillside soil erosion control, and lake habitat rehabilitation and enhancement. The overall implementation mechanism for the partnership program is depicted in FIGURE 7. The program (which meets the criteria

TABLE 6

DESCRIPTION AND DESIGN REQUIREMENTS FOR STUDY MEASURES

Measure	Description	Design Requirements
1. Hillside Sediment Control	Placement of structures along tributaries as sediment traps	(a) Must substantially reduce amount of hillside sediment reaching lake.
		(b) Must hold Federal dollar and staff requirements for O&M to a low level.
		(c) Should treat soil loss as close to its source as possible.
		(d) Should minimize amount of lake habitat sacrificed for sediment control.
2. Dike/Levee Embankment	Placement of a levee embankment as a physical barrier between the Illinois River and Swan Lake	(a) Must substantially reduce amount of riverside sediment reaching lake.
		(b) Must substantially reduce river's influence on lake water levels during the growing season.
		(c) Must reduce influx of cold water to the lake during the winter and spring seasons.
		(d) Must provide above functions, minimizing impacts to wintering bald eagles.
3. Interior Closures	Placement of a structure at one or more locations across lake to form multiple independently manageable units	(a) Must maintain water levels with minimal seepage under a 4-foot head differential.
		(b) Must be capable of dissipating lake waves up to 1-foot in height.
		(c) Must be protected against potential river flood damage, and against potential changes in the point of tributary discharge.

TABLE 6 (Continued)

Measure	Description	Design Requirements
4. Islands	Placement of wave barrier islands within lake	(a) Must withstand the impact of waves up to 1-foot in height.
		(b) Must be situated in a manner that maximizes wave reduction.
		(c) Should provide habitat values additional to that provided by wave control alone.
5. Dredging	Deepening of existing shallow water areas by hydraulic or mechanical means	(a) Must result in areas with water depths in excess of 7-feet.
		(b) Must be a reasonable method of dredging on a cost-per-unit basis. (considering both the excavation and the disposal of the material).
		(c) Must utilize procedures acceptable for meeting Clean Water Act requirements.
		(d) Must minimize project space devoted to spoil placement.
6. Water Control Structures	Placement of gate and pump structures for maintaining desired water levels within lake management	(a) Gates must discharge excess lake water from a 2-year, 24-hour interior storm event within 10 days time.
		(b) Gates must accommodate fish movement needs.
		(c) Gate housing must be an open channel structure in locations where fish passage is needed.
		(d) Gates must be easy to operate and should minimize staff time required to operate the structure.
		(e) Gates must have safeguards against vandalism.
		(f) Gates must be placed in a manner that minimizes pumping costs.
		(g) Pumps must be able to raise and maintain the lake at 1-foot over normal pool for up to 3 months during the fall and winter seasons.

TABLE 6 (Continued)

Measure	Description	Design Requirements
6. Water Control Structures (Cont.)		(h) Pumps must be able to draw down unit 0.5-foot for 3 months for moist soil plant production. (i) Pumps must be able to cause a near complete drawdown of the unit for an extended period of time during years designated for bottom solidification. (j) Pumps must be able to discharge a 2-year, 24-hour interior storm event within a 20-day time period.

TABLE 7

COMPARISON OF ENHANCEMENT POTENTIAL FOR
VARIOUS STUDY MEASURES AND OPTIONS

Goal	Objective	Unit of Measure 2/	Future Without Project Measure	Future With Project Measure		
				Measure(s) 1/	Enhancement Potential	
					Measurement	Net Change
store aquatic macrophyte beds and associated invertebrate communities for benefit of migratory waterfowl	Substantially reduce future lake sedimentation	Inches of sediment deposition over 50-year project life	15	1.	15	(0)
			15	2.A	10	(-5)
				2.B	8.5	(-6.5)
				2.C	8	(-7)
			15	3.A	12.5	(-2.5)
				3.B	11.5	(-3.5)
				3.C	10.5	(-4.5)
		Mg of sediment/liter	TBD	3.	TBD	
	Maintain stable water levels during the growing season	Frequency of damaging flood events during growing season (events/years)	1 in 2	2.A	1 in 4	
				2.B	1 in 8	
				2.C	1 in 10	
	Provide the ability to solidify the lake bottom	Percentage of time water elevation can be held at or below 416 NGVD	0	2.	60	(+60)
		Percent distribution of rooted vascular plants	<10	2.	>75	(+50)
		Force/unit surface area	TBD		TBD	
	Enhance wave control	Percent reduction in acres of lake exposed to wind	0	4.	50	(+65)
			0	5.A	25	(+25)
				5.B	37	(+37)
		Max wave height (inches)	12	4.	6	(-6)
			12	5.A	9	(-3)
				5.B	8	(-4)
		NTU's during growing season	80	4.	40	(-40)
			80	5.A	60	(-20)
				5.B	70	(-10)
	Form smaller independently managed lake units	Number units	2	4.	3	(+1)
		Maximum compartment size	2,500	4.	1,200	(-1,200)
Provide habitat for over winter survival of fish	Provide areas of deep water	Acres of water >7 feet deep	0	1.A	300	(+300)
				1.B	65	(+65)

TABLE 7 (Continued)

Goal	Objective	Unit of Measure 2/	Future Without Project Measure	Future With Project Measure: Measure(s) 1/	Enhancement Potential: Measurement	Enhancement Potential: Net Change
	Allow free movement for fish between river and lake during late fall period/early winter period	Weeks of fish access allowed	5	2.	5	(0)
	Buffer impact of cold water and ice	Frequency of cold water/ice events during winter & spring (events/years)	2 in 1	2.A 2.B 2.C	1 in 1 1 in 2 1 in 3	
Provide habitat for spawning and rearing of fish	Provide alternate structures so as to assure fish passage	Number of types of structures provided	N/A	2.	2	
Increase overall habitat value for waterfowl and fish	Meet all of the above objectives	Habitat Unit Gain (AAHU's fish and wildlife combined)	0	1.A 1.B	209 47	
				2.A 2.B 2.C	755 954 1,063	
				3.A 3.B 3.C	172 226 294	
				4.	399	
				5.A 5.B 5.C	118 164 182	

N/A = Not Applicable (#) - Net Change from Future Without TBD = To Be Determined

1/ Feature Code:

1. Dredging
   1.A Major Excavation
   1.B Minor Excavation (i.e., By-product of project construction)
2. Dike/Levee (including water control structures)
   2.A 424 NGVD Crown Elevation
   2.B 426 NGVD Crown Elevation
   2.C 428 NGVD Crown Elevation
3. Hillside Sediment Control
   3.A 30 percent hillside sediment reduction
   3.B 45 percent hillside sediment reduction
   3.C 60 percent hillside sediment reduction
4. Interior Closure
5. Islands
   5.A 4,000 linear feet
   5.B 12,000 linear feet
   5.C 28,000 linear feet

1/ Includes primarily physical (non-biological) units of quantification as a basis for the future project performance evaluation.

PARTNERSHIP PROGRAM FOR HILLSIDE SEDIMENT CONTROL--
IMPLEMENTATION MECHANISMS FOR STRUCTURAL LAND TREATMENT

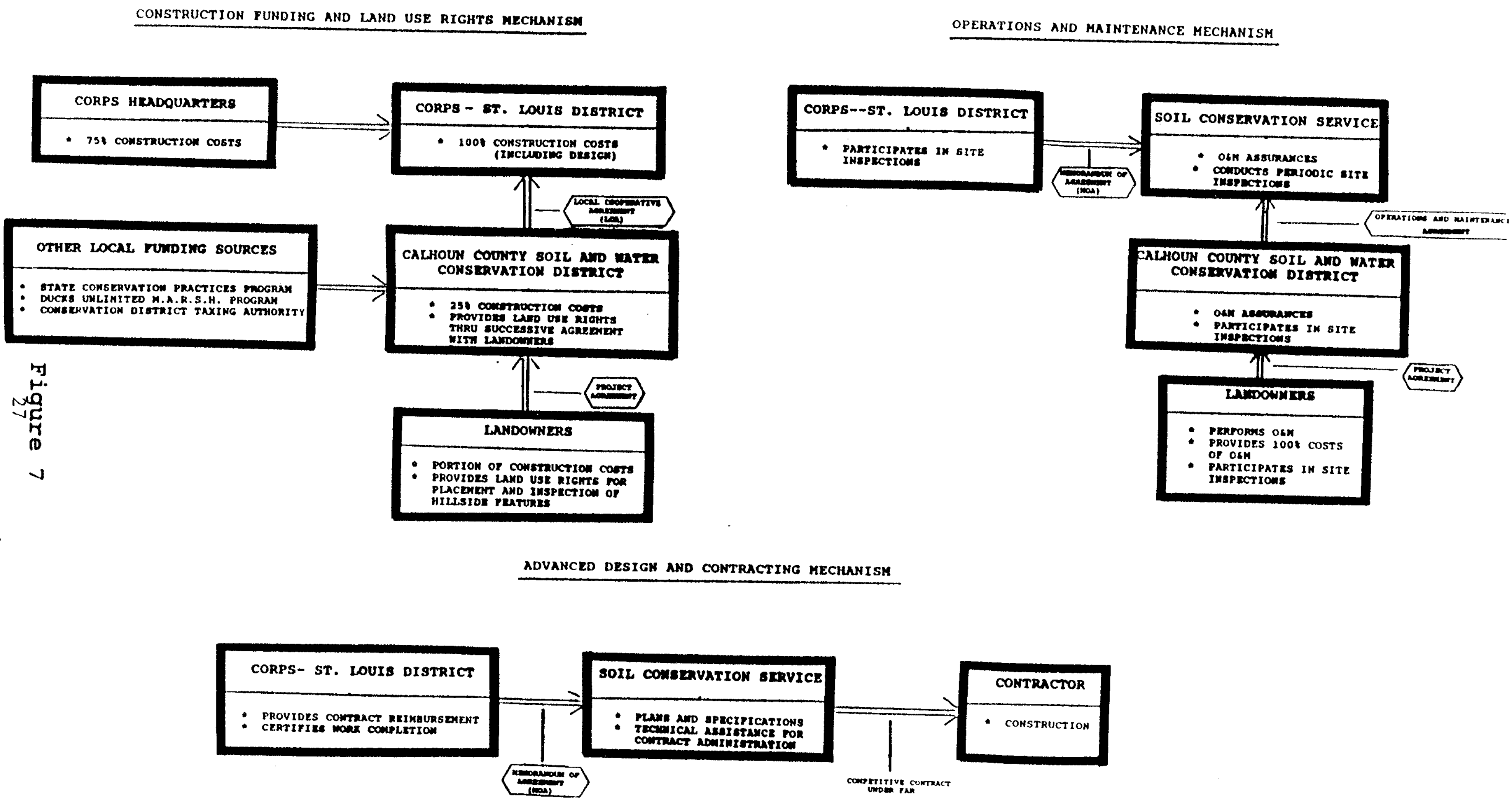


Figure 7

NOTE: FAR = FEDERAL AQUISITION REGULATIONS specified in the 6th Annual Addendum for upland sediment control) has two components, structural land treatment and non-structural land treatment.

The placement of numerous structures, including small sediment basins, terraces and ponds, provides the cornerstone for an effective watershed sediment control program, and would provide a degree of reliability for sediment control not achievable through non-structural land treatment measures alone. On the other hand, the efficiency of structures could be enhanced by non-structural land treatment efforts. To complement the structural components of the project, the sediment control program would provide for an interagency cooperative planning approach to watershed land treatment. This planning effort would support and, where possible, expand existing non-structural land treatment within the watershed.

Structural Land Treatment

Implementation of the structural component of the program involves four key agreements:

Local Cooperative Agreement (LCA). An LCA would be signed between CCSWCD (as the local sponsor) and the Corps. This agreement would stipulate 75 percent Federal and 25 percent non-Federal cost-sharing for construction of the hillside program. The LCA would also require the provision of easements, right-of-way, and rights-of-entry as necessary for the implementation and periodic inspection of the sediment control devices.

Memorandum of Agreement (MOA). An MOA would be signed between the USSCS and the Corps. The agreement would stipulate that the USSCS will provide the Corps with technical assistance during Plans and Specifications and during the advertisement, award and monitoring of contracts for this project feature. Prior to cost reimbursement, the Corps will certify that the construction has been satisfactorily completed. The agreement also stipulates that the USSCS will assure (through successive agreements with the CCSWCD and the landowners) that the O&M for the project is performed as required.

Operations and Maintenance Cooperative Agreement. The O&M Cooperative Agreement would be signed between the CCSWCD and the USSCS. This agreement would assure (through successive agreement with the CCSWCD) that the O&M for the project is performed as necessary at 100 percent non-Federal expense.

Project Agreement. Under the project agreement, signed between the individual landowners and the CCSWCD, the landowner agrees to furnish a portion of the construction costs and 100 percent of the O&M costs (including replacements). The primary responsibility for the actual performance of O&M lies with the landowner on whose property the sediment control practices have been installed. An O&M plan for each practice would be included as part of the project agreement signed by the landowner. This plan describes in very specific terms the operation, maintenance and inspection requirements and procedures. The landowner, CCSWCD, USSCS, and the Corps all have roles in inspecting and assuring that the prescribed practices are adequately operated and maintained.

Non-compliance with O&M responsibilities would result in landowner reimbursement to the Corps for the original non-landowner cost-share of installation of the structure. Returned funds would be used to install a replacement practice elsewhere in the watershed. The reimbursement penalty also applies in the instance where a change of land ownership has occurred for which no provision was made for the transfer of O&M responsibilities for the practices.

Non-structural Land Treatment

This effort would include the following:

Steering Committee. A steering committee would be formed with representation to include, at a minimum, the CCSWCD, SCS, USFWS, Swan Lake Watershed Committee, IDOC and Corps. The SCS District Conservationist would chair the committee meetings, and the USFWS would provide the assistance of its Whitewater Watershed project manager to the Swan Lake project (the Whitewater study was a pilot project, with the goal of strengthening cooperative mechanisms for reducing erosion and sedimentation).

Land Treatment Plan. A report would be prepared that outlines an overall plan for land treatment within the watershed. Development of this plan will be completed prior to the completion of Plans and Specifications.

Accelerated Conservation Planning. Assistance would be provided to farmers in developing conservation plans that specify erosion control measures and implementation deadlines. For example, the retirement of marginal, erodible lands through the Conservation Reserve Program (CRP), and the increased use of conservation tillage practices.

Demonstrations and Workshops. Demonstrations and workshops would be included to encourage the adoption of best management practices.

Computer Assistance. Planning efforts could be aided with the implementation of the geographic information system (GIS) methods.

Cost Sharing Opportunities. One goal of the interagency planning effort would be to seek out additional sources of funding for non-structural land treatment. At the present time, no additional sources of funding exist. Potential future sources of monies that would be explored include the IDOC private lands program and the Illinois Forestry Development Program. However, the amount of funding available from such programs is anticipated to be limited and highly competitive.

(b) Hillside Sediment Programs Evaluation. TABLE 8 provides a summary of the hillside sediment program analysis. More detailed information on this analysis is provided by APPENDICES DPR-O and DPR-S. Of the three programs evaluated, the partnership program was found to be by far the most cost-effective. A 30 percent reduction in hillside sediment contribution would be achieved at a cost of $1.0 million. This low cost is possible since both the real estate and the O&M costs of the project are incurred by the local landowner, not the Federal government. In addition to cost-effectiveness, this program would have a number of other benefits. Habitat benefits for upland wildlife species such as deer, turkey, quail and pheasant would increase by at least 25 percent. Farmland soil losses would be reduced, and the program would create jobs and increase local sales volume. Perhaps the most significant benefit to be gained would be the opportunity to create an important cooperative precedent. The hillside program could serve as a demonstration program of the ability of agencies to work together to increase the efficiency of their operations.

Based on an incremental analysis of several magnitudes of hillside sediment control, i.e., 30, 45 and 60 percent control, a 30 percent level of reduction was determined to be the most cost-effective. Additionally, considering the uncertainty of achieving sediment reduction levels greater than 30 percent, the SCS believes a 30 percent level is a more reasonable target.

TABLE 8

COST COMPARISONS - HILLSIDE SEDIMENT CONTROL PROGRAMS

Program	Total Feature Cost ($ Millions) 1/	Av. Annual Costs ($Thousands) 2/	Av. Annual Habitat Unit Gain (AAHU's) 3/	$/AAHU	Remarks
Corps Uplands Program (low efficiency)	5.1	459	137	3,350	High O&M Costs Land acquisition prohibited
Corps Uplands Program (high efficiency)	3.9	351	137	2,562	High real estate costs Land acquisition prohibited
Corps Lowlands Program	3.3	297	135	2,200	Significant loss of lake habitat
Partnership Program	1.0	90	172	523	Least cost option, no real estate costs, no Federal O&M costs, & meets criteria of EMP 6th Annual Addendum for upland sediment control

1/ Federal costs have been estimated for a 30 percent reduction in hillside sediment input to the lake. Costs include construction, real estate, O&M, and estimated E&D and S&A costs.

2/ Assumes an interest rate of 8.875%, and a feature life of 50 years.

3/ Waterfowl and fish units combined.

TABLE 9 provides an analysis of potential sources of funding for soil and water consrvation. From this analysis **it appears unlikely that a major non-EMP source of funding for soil conservation improvements (of a magnitude to cause major sediment reduction) will occur in the Swan Lake local watershed.** Combined program monies, allocated for conservation practice application, is less than 50,000 per year for Calhoun County. Accordingly, the partnership program would utilize EMP funds for the Federal cost-share.

For the funding of the local cost-share, a number of viable sources exist. EPA 319 funds could be used to support the state's cost-share program under the Conservation Practices Program (CPP). Landowner surveys indicate a high degree of support and willingness to contribute a share of the local costs. In addition, Ducks Unlimited is highly supportive of the hillside feature concept, and has recommended that a proposal be submitted under its M.A.R.S.H. Program.

A general assessment was made of the adequacy of cost-sharing, based on erosion control benefits. For the purposes of this assessment, SCS and the St. Louis District made a subjective judgement that erosion control provides roughly equal benefits to both the private landowner and the Federal lands manager. Erosion control conserves both on-site farmland and off-site fish and waterfowl habitat. Furthermore, SCS estimates that over the life of the project, dollars expended on construction and on O&M would be roughly equal. Thus, $1.0 million would be spent on construction, and $1.0 million would be spent on O&M related activities. TABLE 10 depicts the approximate total Federal and Non-federal costs for combined construction and O&M costs under a typical 75% Federal/25% Non-federal cost-sharing agreement and the Swan Lake proposed agreement. The terms of the proposed cost-sharing agreement are acceptable to the local sponsor.

TABLE 9

SWAN LAKE ALTERNATIVE FUNDING SOURCES FOR SOIL AND WATER CONSERVATION

Alternative Programs	Description of Objectives	Future Funding Potential	Remarks
Federal			
P.L. 566 Watershed Land Treatment	Projects, establish conservation measures on public and private lands. Runoff control measures reduce erosion, siltation, and flooding.	Low	Currently slow progress - 10 years, application backlog, $2 mil appropriated in FY91 with $15 mil in project requests.
Agricultural Conservation Program (ACP)	Annual program, cost-sharing the application of soil and water conservation practices.	Low	County allocation fully utilized - used to accomplish annual program goals.
Water Quality Special Projects (WQSP)	One-year projects, designed to improve water quality and help solve problems caused by agricultural non-point source pollution.	Low	One project funded in IL in 1990, none in 1991. Extremely competitive at Washington level.
Hydrologic Unit Areas (HUA)	Five-year projects, designed to accelerate improvement of water quality in identified agricultural areas.	Low	54 projects funded nationally, 2 in IL. No appropriation for for FY92. Uncertain future.
Demonstration Projects (DEMO)	Five-year projects, designed to accelerate adoption of water quality technology in DEMO areas and to gain experience to extend program activities into other areas.	Low	16 projects approved to date, none in IL. No appropriation FY92, uncertain future.
Conservation Reserve Program (CRP)	Multi-year program, converts highly erodible and other cropland to perennial vegetation.	Low	County allocation fully utilized to support program initiative.
Non-Point Source Program Grants Section 319(h)	Activities that result in demonstrated progress in achieving Congress' goal of controlling and abating non-point source pollution.	High	Wetlands and water quality high priority. Recommended to support state cost share program (CPP) and project hillside feature.
State			
Watershed Land Treatment Program (WLTP)	Multi-year project, provides financial assistance to landusers in highly erosive land areas of selected watersheds, to install erosion control practices.	Low	Funding discontinued pending additional appropriation future highly uncertain.
Conservation Practices Program (CPP)	Annual program, provides financial assistance to landusers to install erosion control practices.	High	Recommended to address water quality as priority issue - proposed to support Section 319 and project hillside feature.

TABLE 9 (Continued)

Alternative Programs	Description of Objectives	Future Funding Potential	Remarks
<u>Local</u>			
Landowner Contribution	Provides cost-share for technical assistance and construction, also provides lands and assumes O&M responsibility through successive agreements with the Conservation District, Soil Conservation Service and Corps of Engineers.	High	Landowner surveys demonstrate high degree of support.
<u>Private</u>			
Ducks Unlimited Matching Aid to Restore States Habitat (M.A.R.S.H.)	Provides for permanent protection and/or restoration of important waterfowl habitat, through funding for selected projects/proposals.	High	Highly supportive of hillside feature concept. Requests proposal for project.

TABLE 10

COST-SHARING ANALYSIS FOR PARTNERSHIP PROGRAM

Funding Arrrangement	Funding Entity	Costs ($1,000's) Construction	O&M	Total
Typical	Federal	750 (75%)	750 (75%)	1,500
	Non-Federal	250 (25%)	250 (25%)	500
	Totals	1,000	1,000	2,000
Proposed	Federal	750 (75%)	0 (0%)	750
	Non-Federal	250 (25%)	1,000 (100%)	1,250
	Totals	1,000	1,000	2,000

(2) Dike/Levee Embankment. A dike/levee embankment would have important functions in both river sediment deflection, and in water control. Design optimization of this project feature included consideration of the method of construction, structure alignment, and structure height.

Two methods were considered for the construction of the peninsula portion of a dike/levee embankment: use of borrow material and use of clamshell dredged lake sediments. The District's analysis of these two options concluded that in any area where it was physically feasible to clamshell dredge to construct the dike/levee embankment, this was the most cost-effective approach. While the cost of constructing a peninsula dike/levee using the clamshell method is greater on a per cubic yard basis than using the borrow method, the total cost of the construction methods must also take into account the project need for a drainage ditch. Regardless of the construction method used, a drainage system is needed. The clamshell method of construction provides this ditch as a by-product of dike/levee construction, while, with the borrow method, a ditch system must be added as an additional project feature. With this point in mind, the overall cost of the clamshell method at $2.0 million is more cost-effective than the borrow method at $2.3 million. This method would be applicable for that portion of the dike/levee extending from the tip of the peninsula northward to the existing IDOC closure. The closure acts as a barrier to dredge equipment, precluding its use beyond this point. Any segment of levee located above the IDOC closure would be constructed using borrow material. A standard 1 on 3 slope was judged appropriate for borrow filled dike/levee segments, while a 1 on 4 slope was considered appropriate for clamshell dredged segments.

Several methods were evaluated for the construction of a lower lake closure. The first two methods would build a closure by placing a soil core structure capped with stone; however, one method would create the core using clamshelled material, while the other would use truck hauled borrow material. The third option would place two parallel stone dikes with a soil wedge of clamshell material placed as an impervious barrier between the two dikes. The District's evaluation indicated the stone dike/soil wedge option ($1.1 million) was nearly twice the cost of the soil core/stone cap method ($0.6 million), and was thus rejected. Building a soil core/stone capped structure using the clamshell method ($0.4 million) was less costly than the borrow method, and was thus the preferred method.

While not examined in detail, conceptually it was assumed the design of a middle lake terminal structure (see discussion under dike/levee alignments) would be very similar to that of the lower lake closure. The construction of an upper Swan/Fuller Lake terminal closure would be accomplished with truck hauled borrow material and stone using an existing nearby recreational access road.

Three major alignment configurations for a dike/levee feature were considered, as shown in FIGURE 8. As indicated by the TABLE 11 analysis, option 3 is the optimal configuration. The analysis shows that regardless of the alignment applied, the relative cost is about the same. However, the number of total habitat units provided by each option varies greatly. It is, therefore, prudent to include as much of the project area with a dike/levee embankment as possible. Truncating the embankment does not decrease its cost due to the increased costs needed for the construction of terminal lake closure segments. When the closures serve merely as interior water control structures, the crown elevation, and the costs of those structures can be kept much lower. Also affecting the cost of a terminal closure in the lake's interior is the increased distance to cross as compared to the location of the lower lake closure.

Three incremental dike/levee heights were considered: 424, 426 and 428 NGVD. A number of factors were evaluated prior to selecting a given structure height. These factors were future sedimentation rate, flood frequency, total

TABLE 11

HABITAT ANALYSIS - RIVERSIDE DIKE/LEVEE ALIGNMENTS

Alignment Option	Total Feature Cost ($ Millions) 1/	Av. Annual Cost ($ Thousands) 2/	Av. Annual Habitat Unit Gain (AAHU's) 3/	$/AAHU 3/
1	2.9	261	380	687
2	2.8	252	534	472
3	2.7	243	954	255

1/ All options assume a system built to a height of 426 NGVD.
2/ Assumes an interest rate of 8.875 percent, and a feature life of 50 years. O&M costs not included. Cost includes preliminary estimates of construction dollars with E&D and S&A.
3/ Waterfowl and fish units combined.

TABLE 12

ANALYSIS FOR DIKE/LEVEE HEIGHT

Option (Crown Elev., NGVD)	Total Feature Cost ($ Millions)	Incremental			% Decrease in River Sediment Input	Adverse Flood Events (Frequency in Yrs)	
		Annual Cost ($ Thousands) 1/	Av. Annual Habitat Unit Gain (AAHU's) 2/	$/AAHU		Growing Season	Coldwater/Ice Period
424	2.0	180	755	238	70	1 in 4	1 in 1
426	2.7	63	199	317	85	1 in 8	1 in 2
428	5.0	207	109	1,899	91	1 in 10	1 in 3

1/ Assumes an interest rate of 8.875 percent, and a feature life of 50 years. O&M costs not included. Costs include preliminary estimates of construction dollars with E&D and S&A.
2/ Waterfowl and fish units combined.

DIKE/LEVEE ALIGNMENT OPTIONS

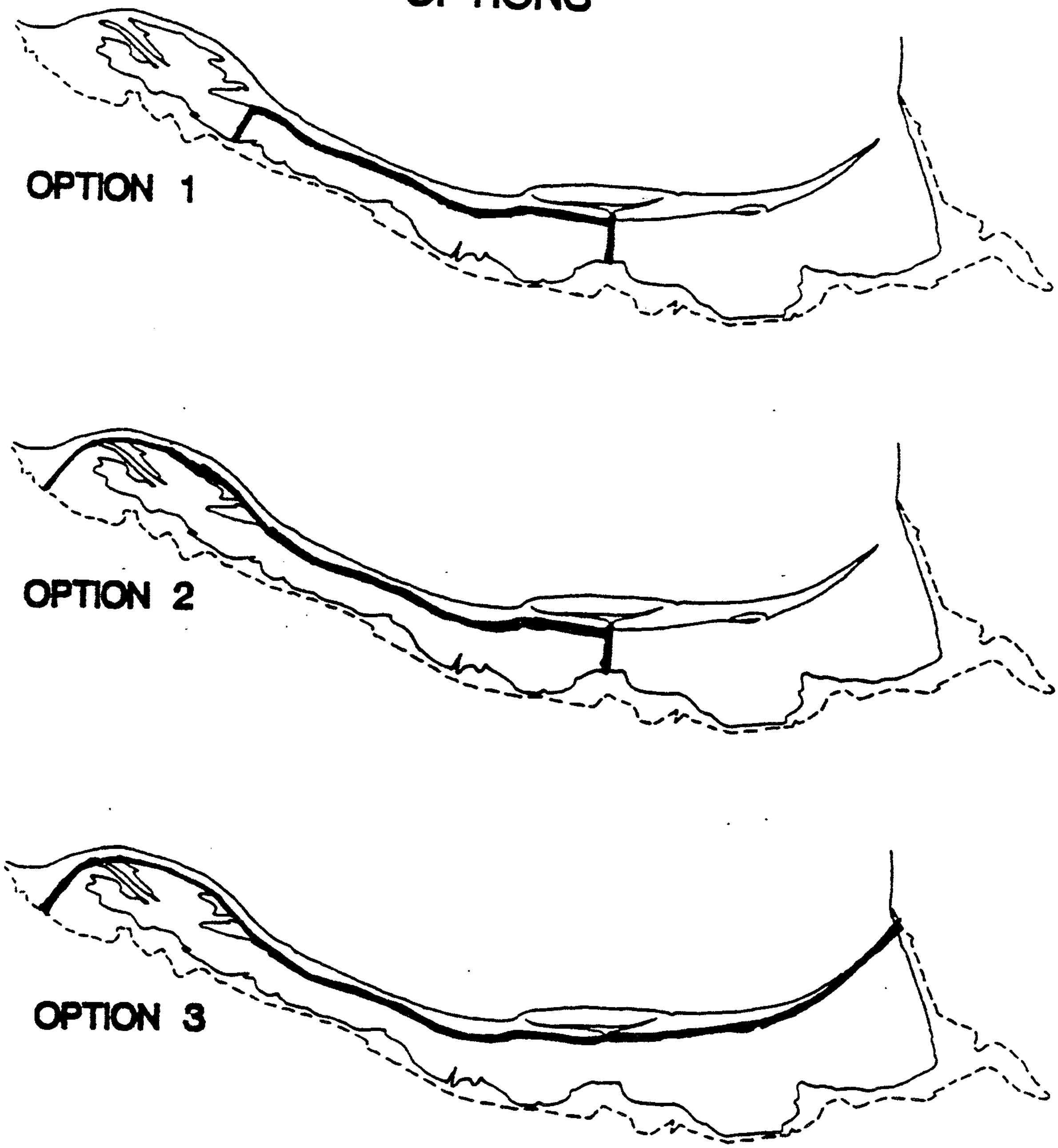


Figure 8

feature cost, total habitat units, and cost per habitat unit. TABLE 12 provides the results of the analysis. In all categories, there appeared to be a substantial incremental gain to be achieved by raising the structure to as high as 426 NGVD, but there appeared to be diminishing returns in raising the structure to 428 NGVD. A dike/levee height of 426 NGVD is also compatible with the dike/levee height selected for the nearby Stump Lake HREP. For the above reasons, elevation 426 NGVD was selected. To adjust for river slope, the actual dike/levee elevation would range from 426.5 NGVD at R.M. 5.2 to 428 NGVD at R.M. 13.0. This would ensure that the structure overtops at the downstream end of the project, before it overtops at the upstream end.

Other Dike/Levee Embankment Considerations.

Road. The crown width of the embankment was set at 10-feet, this is the minimal width needed to accommodate O&M vehicles. The dike/levee would be topped with 6" road coarse. Since the existing recreational access road to Fuller Lake is 18 feet wide (too wide to place at the top of the levee without a significant increase in dike/levee cost), the road will be relocated to run parallel along the inside toe of the levee. Ramps would be provided to get traffic up over the levee.

Runoff. Straw bales will be placed at the toe of the dike/levee to control runoff during construction and from storms prior to turf establishment. After final grading of the structure, it will be seeded and mulched for long-term erosion control.

Stone. To ensure the stability of the lower rock closure, the structure would be covered riverside with B-stone and on top and lakeside with C-stone. The stone would be placed on the sides of the structure to a 1 on 4 slope. The lowermost 2,000 feet of peninsula dike/levee, i.e., the overflow zone, would likewise be armored with stone.

(3) Interior Lake Closures. Design optimization for this feature included consideration of the number of closures, method of construction, alignment, and structure height.

In the interest of lowering total project costs, the USFWS requested only one interior lake closure (subdividing Swan Lake proper into two approximately equal sized compartments) be considered for the refuge portion of Swan Lake. In combination with the existing IDOC closure, the overall Swan Lake project area would be subdivided into a total of three management compartments.

Similar to the lower lake closure, soil core/stone cap and stone dike/soil wedge design configurations were considered. A District analysis showed a soil core/stone capped structure using clamshelled material ($0.3 million) was the more cost-effective to build than either a soil core/stone capped structure using borrow material ($0.6 million) or a stone dike/soil wedge structure ($0.8 million). Accordingly, the stone capped structure with clamshelled lake sediments was selected as the preferred method. Construction of this structure using clamshell material alone with 1 on 6 side slopes was rejected. The District and the sponsor were concerned about potential stability problems in the event of a major Illinois River flood, the discharge effects of tributaries, and the need for adequate wave protection.

The USFWS has indicated that for the early years of site management, a water regulation capability of up to 420.5 NGVD is desired. However, since the project will not prevent all sediment input into the lake, it would be advantageous to be able to adjust water levels to compensate for this uncontrolled deposition. It is estimated that 0.5 feet of water level compensation capability would be needed. This estimate assumes 15 inches of lake sedimentation without a project and 9 inches sediment reduction with a project (at a 60% level of overall lake sediment reduction or 43% from riverside and 17% from hillside). Accordingly, the top elevation for the impervious portion of the middle closure was set as 421.0 NGVD (net grade).

C-stone would form a layer on top of the structure approximately 18 inches deep, bringing the crown elevation of the overall structure to 422.5 NGVD (net grade).

(4) Islands. Design optimization included consideration of construction material, wave protection, island placement and island size.

Soil, rather than rock, was the material of choice for constructing islands. Soil is more economical as a building material, it provides a suitable substrate for the establishment of vegetative cover, and a vegetated island is aesthetically more pleasing. A partial failure of a soil constructed island would not have a catastrophic effect on the overall performance of the project. The obvious source for the soil material is clamshelling. This material is inexpensive, its excavation results in additional deep water fish habitat, enhanced lake drainage, and a channel for boat passage across the lake.

To protect the islands against wave action, a 1 on 6 side slope was judged appropriate. This shallow slope also enhances conditions for shorebirds. A minimum top elevation of 423 NGVD was considered adequate for wave dissipation. To further stabilize the islands, these structures would be immediately vegetated.

To achieve maximal wave dissipation, the islands would be oriented along a plane perpendicular to the direction of the prevailing southeast winds. To further enhance wave reduction, the structures would be placed so as to subdivide wind exposed surface lake acres into units of near equal size. Three increments of combined islands length were considered, 4,000, 12,000 and 28,000 feet. In combination with the interior lake closure, 4,000 feet of islands would serve to subdivide the refuge into 4 units (using 2 island groups) yielding a 75% reduction in lake wave action. Subdividing the lake into 8 units (using 6 island groups) would require 12,000 feet of combined islands length, and would yield an 87% reduction in wane action. Subdividing the lake into 16 units (using 14 island groups) would required 28,000 linear feet of islands for a 93% reduction in wave action. The 4,000 foot length was considerably more cost effective than the 12,000 or 28,000 foot options (TABLE 13). For two reasons, the fine-tuning of island group length at the lower range (i.e. such as 3,000 or 5,000 feet) was not considered critical. First, 4,000 feet had the important benefit of providing two shore-to-shore dredge cuts. These cuts would link up to the main lake ditch dredge cut with the two west shore boat ramps. This would help to offset the boat access problem to the lake caused by the placement of the lowermost lake closure. Second, complete lateral cuts are needed to facilitate drainage from the lake's interior to the main ditch during drawdowns for bottom consolidation.

Islands would be placed no closer than 400 feet from shore to protect against mammalian predation. To reduce the potential for post-project sedimentation joining together individual islands, the islands would be placed no closer together than 200 feet. To eliminate the potential for wave movement in between islands, the islands would be staggered in two rows. Maximum average island size was held at less than 0.5 acres. This size is based on experimental evidence that smaller islands (less than 0.5 acres) support more nesting mallards than do larger islands. Because habitat diversity was of concern to the sponsor, island size, spacing, width, and height would be varied. Island size would be varied from 0.1 to 0.8 acres. Islands would be spaced 200 to 300 feet apart. Island width (i.e., land mass above a 419 NGVD water line) would vary from 60 feet to 100 feet). Island height would vary from 423 to 426 NGVD.

TABLE 13

INCREMENTAL HABITAT ANALYSIS FOR COMBINED ISLANDS LENGTH

		Incremental		
Option (Linear Feet of Island)	Total Feature Cost ($ Millions)	Annual Cost ($ Thousands)1/	Av. Annual Habitat Unit Gain (AAHU's)2/	$/AAHU Gain
4,000	0.3	27	118	229
12,000	0.9	81	46	1,761
28,000	2.1	189	18	10,500

1/ Assumes an interest rate of 8.875 percent, and a feature life of 50 years. O&M costs not included. Costs include preliminary estimates of construction dollars with E&D and S&A.
2/ Waterfowl and fish units combined.

(5) Water Control Structures. Design optimization for the water control structures included gate type, gate distribution, gate sizing, pump number/sizing, pump type, pump site locations, and other considerations.

An agreement was made with the project sponsors that less expensive gated CMP control structures would be used in project locations where fish passage was not a concern, and more costly open-channel structures would be used in locations where fish passage was considered critical. The preference for open-channel structures is based on a concern among fisheries biologists that dark, closed structures may inhibit fish movement.

Four types of gate designs for use with an open-topped system were considered: stop-log, staggered sluice gates, combination sluice gate/stop-log structures, and radial arm gates. A stop-log structure, which is the least expensive gate device, was not acceptable to the sponsor due to operational problems. For making gross water level adjustments, stop-logs can be time consuming and difficult to remove under a head differential. The most expensive gate design is the all sluice gate system. Sluice gates could be staggered with one gate (invert at lake bottom) serving in gross water level adjustment, while other gates set at a higher elevation could serve as an overflow device to deal with minor water level fluctuations. However, use of a gate for overflow purposes is inefficient and expensive. This option was rejected in the interest of reducing overall project costs.

A compromise between the ease of operation of the sluice gate and the cost-efficiency of the stop-log system is a structure combining the two. Under this configuration, one sluice gate and a concrete channel with 4-5 foot wide stop-log bays would accomplish the same task. The structure could be operated in such a manner that a head pressure does not exist when there is an infrequent need to reset the stop-log overflow point. The short width of the stop-logs also facilitates their removal from the structure. The stop-log structure would serve as an overflow for minor lake adjustments, and the sluice gate would be used for gross water level adjustments. In addition, at times when the river and lake levels are roughly equal, the stop-logs could be completely removed to facilitate fish movement. The large sluice gate might also serve to facilitate fish movement at certain times of the year. This configuration was acceptable to the project sponsor.

The concept of a radial arm gate was rejected. Radial gates work with a head differential in one direction, the head differential at Swan would be in two directions.

The distribution of water control structures was fairly fixed, open-topped structures (for direct fish access) between the river and each of the middle and lower Swan Lake compartments, and a gated CMP (no fish access) between the river and the lower end of upper Swan/Fuller Lake. The only distributional variable was whether or not to include a gated CMP through the new interior lake closure. Such a structure would not be needed for fish movement, but at times, it could permit the introduction of additional amounts of water into the lower lake compartment prior to pump activation. This benefit was perceived to be important enough to include this structure as part of the project plan.

At the present time, water is controlled at the upper Swan/Fuller Lake site via a gated CMP through the IDOC closure. The HREP project would diminish the utility of this structure, since the refuge portion of Swan Lake would no longer be dependably connected to the river. Accordingly, a new water control structure, and a drainage ditch, would be needed to drain the lower end of this management unit to the river.

To minimize the cost of ditch dredging, the middle compartment control structure would be placed along the narrowest segment of adjacent peninsula. Likewise, the narrowest location for the placement of a control structure in the lower compartment is at the lower lake closure. That structure would be placed on the Calhoun Point side of the closure to take advantage of the adjacent ground to reduce cofferdam associated costs.

The maximum frequency and duration storm event acceptable to the sponsors is a 2-year, 24-hour storm event with a 10-day discharge duration. Accordingly, water control structures were sized to meet this condition. The upper Swan/Fuller Lake structure would require 1-48 inch gate, the middle and lower Swan Lake compartments would each require 1-72 inch gates. A single 48-inch gated CMP through the new interior closure structure was judged adequate for the purpose of inputting water in advance of pumping.

A pump is proposed for the upper Swan/Fuller Lake compartment. IDOC believes that its present capabilities (4 portable pumps for managing 11 river sites) are insufficient to provide reliable habitat management at this site, and IDOC believes that with a dedicated pump, the certainty of habitat benefits would be assured. Pump sizing desired by IDOC for upper Swan/Fuller Lake is a delivery of 3 feet of water in 10-days, a rate that IDOC says in consistent with its management operations elsewhere. The District's hydraulics analysis indicates that a 20,000 GPM unit would be needed to achieve this capability.

Within both the middle and lower lake compartments, separate pumping facilities would be needed. At times, the pumping need would be for expelling water to the river, and at other times it would be for discharging water to the lake. Four types of pumping situations would exist, recharge, dewatering for plant production, dewatering for bottom solidification, and the discharge of interior runoff when there is a high river stage. The most severe of these situations, and the one given the most weight for pump sizing, is the discharge of interior water. It was determined that a 20,000 GPM pump would discharge in 20 days (assuming gravity drainage is not possible) a water volume equivalent to a 2-year storm event.

Considering the bidirectional need for pumping, pumping needs could be met with either 2-20,000 GPM pumps installed at each compartment (one placed riverside, the other lakeside), or with single, but reversible, 20,000 GPM pumps installed at each of the three compartments. The option of single reversible pumps was selected for reasons of cost-effectiveness.

Several types of pumps were considered; portable Crisafulli, fixed Couch, and fixed submersible. Of these, only the belt driven Couch pump was acceptable to the sponsors. This preference was because of the known reliability of the Couch pump in river management. Sponsor stated drawbacks to the Crisafulli pump are that operationally it requires specially designed ramps, and it is difficult to move around. A major drawback to the submersible pump is that it could become ice damaged.

The most logical location for the placement of the single pump units is at each of the compartment water control unit locations. To achieve its reversible capability, each pump would be permanently mounted within the sluice gate chamber. With the lakeside sliding gate, and a riverside sluice gate, the source of water input to the pump could be altered between the river and lake. With a T-pipe and two valves, the pump discharge would also be reversible. The Couch pump would be mounted vertically and would be set back somewhat from the main chamber.

Other Water Control Structure Considerations.

Vehicle Traffic. Water control units would be provided with a concrete cap over the channel to allow for vehicle movement. The cap would not be sufficiently wide to significantly interfere with lighting.

Stop-Logs. An attempt would be made to design stop-logs that are light weight and provide a fairly water tight seal.

Vandal Proofing. Stop-log storage racks, pump and gate locking devices would be provided to help reduce the potential for vandalism.

Sluice Gate Operation. The sluice gates would be of a design that would allow for both manual and powered gate operation.

Gauges. Both staff gauges and automatic water level gauges would be provided in the vicinity of the water control structures. Staff gages would be placed riverside of all 3 compartments, and lakeside of the middle and lower Swan Lake compartments. Automatic gauges would also be placed lakeside of the middle and lower compartments, but only riverside of the lower compartment. The staff gages would be used as a calibration and a back-up to the automatic gauges and would also provide a direct readout of water level conditions to operations personnel. The automatic gauges would transmit water level information on a continuous basis to a St. Louis District data bank. With the use of a standard PC and a modem, refuge personnel would be able to tap this data at any time of the day for an instantaneous reading on management unit conditions. This system would dramatically reduce the time required to check the site by refuge personnel.

Ditches. The major portion of the site water conveyance system would consist of the main drainage ditch and lateral drainage ditches created during dike/levee and island construction. However, in addition, ditches would need to be cut between the main ditch and the water control structures in the middle Swan Lake and upper Swan/Fuller Lake compartments.

Emergency Repair Provisions. The concrete channels would be equipped with blockouts or slots on either side of the control gates for the insertion of bulkheads, in the event the gate chamber must be drained and the gates serviced.

Fish Screens. The need for fish screens at the project site is difficult to assess. While in actual river management practice, the need for fish screens has been ignored, power plant studies indicate increased entrainment mortality at water velocities greater than 0.3 to 0.5 ft/sec. The water velocities at the Swan Lake project pump units would be about 1.25 ft/sec suggesting that at least some mortality may be possible. Fish screens have been included in the project design, since (1) a potential for entrainment mortality exists, (2) fish screens can be included at low cost, and (3) they provide a unique opportunity to evaluate the potential effectiveness of such structures. In evaluating the design for this feature, two factors were considered: (1) the location of the screen and (2) the sizing of the screen.

The most obvious location to place a fish screen is at the entrance to the pump chamber. Using a chain hoist, a gate (10-foot wide) placed at this location would still be manageable from a maintenance standpoint. The water velocity at this location would be 0.75 ft/sec. To achieve a velocity of 0.5 ft/sec would require wall modifications and a chamber opening of 15 feet. While possible to create such an opening, the design of a screen with a mesh small enough to exclude very small fish, while at the same time not creating a water flow capacity problem, does not appear to be feasible. The District believes that the screen mesh should not be less than 1.5 inches X 1.5 inches or else significant amounts of debris would collect, and this would impede water flow to the pump.

Since fish not able to pass thru a 1.5 inch opening would likely be able to withstand a water velocity of at least 0.75 ft/sec, the most cost-efficient screen would be one placed at the 10-foot wide chamber opening. While unlikely to totally eliminate fish entrainment, it would be hoped that this device would at least lessen the problem.

Pump Pads. A flat concrete pad would be placed alongside each pump location to park the power unit for each pump during use periods.

Power Units/Fuel Tanks. One portable diesel power unit (87 H.P.) would be provided for each Couch pump. Two 1,000 gallon mobile fuel tank units would also be provided.

(6) <u>Dredging</u>. Two types of lake dredging were considered, minor dredging as a by-product of constructing other project features, and major dredging as a project feature in itself.

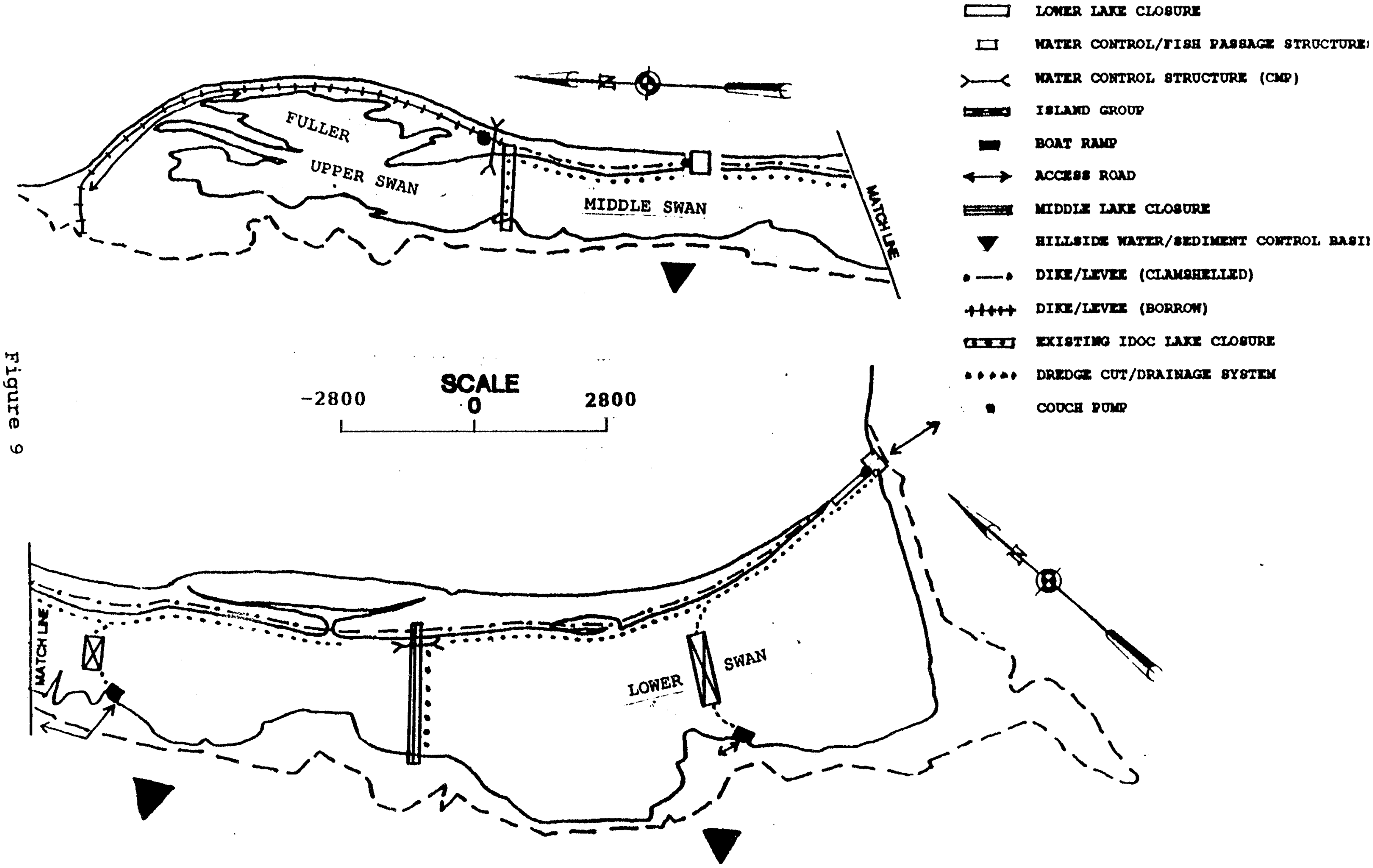
Minor dredging associated with the dike/levee, closures, and islands development was found to be not only the most cost effective way of constructing those features, but it also provided the deep water fish habitat at no additional cost to the project. On the other hand, dredging as a project feature itself was found to be extremely costly, to the extent that the gain in biological benefits was not worth the cost. A 6-foot deep sediment cut over a one-acre area would cost in excess of $30,000 regardless of the dredging method employed.

d. <u>Plans Developed</u>. Three plans were developed for the project. These plans were developed by combining various of the previously described measures to address the overall planning objectives.

(1) <u>Alternative A - No Federal Action</u>. No Federal action would consist of no Federal funds being provided to meet the project purposes.

(2) <u>Alternative B - Wetlands Excavation</u>. This alternative would consist of a single measure, that is, major excavation to deepen selected lake areas, thus rehabilitating areas damaged by past siltation.

(3) <u>Alternative C - Wetlands Protection System</u>. This alternative (see FIGURE 9) would entail the construction of structures to reduce the amount of sediment entering the lake, and to provide features to reduce wind generated wave action. TABLE 14 reflects the decision process used to include or exclude measures for Plan C. This process was accomplished in close coordination with the project sponsors.



SELECTED PLAN

SWAN LAKE

Figure 9

TABLE 14

SUMMARY EVALUATION OF MEASURES FOR INCLUSION
IN PLAN C

Potential Feature	Objectives		Planning Decision/Remarks
Hillside Sediment Control	T	(I)	Recommended a 30 percent hillside sediment reduction program (or a 17% overall reduction in lake sedimentation) Feature is vital to achieving stated objective of substantially reducing future sedimentation Provides important fish and waterfowl benefits to lake Other benefits include reduced farm soil loss, dollars to local economy, improved upland habitat, and an important interagency cooperative precedent Considerable agency and political support exists for such a program
Dike/Levee	T	(I)	Recommend structure extend from Calhoun Point to Hadley Landing with an overall crown elevation of 426 NGVD (net grade). Clamshell derived from tip of peninsula to IDOC closure. Lower closure to consist of clamshelled core with stone cap. Lower closure to consist of clamshelled core with stone cap. Recommended gated CMP's at upper Swan/Fuller Lake and at interior closure, and combination sluice gate/stop-log structures with open-top channels between river and lake in middle and lower lake compartments. Three stationary, vertically mounted, belt driven, 20,000 GPM reversible couch pumps are recommended. Gates would be sized to handle conditions up to 2-year interior storm event. Feature contributes both sediment and water control benefits. Contributes 85 percent reduction in river sediment input or a 43 percent reduction in overall lake sedimentation. Reduces flood event intrusions to 1 in 8 years during growing season and 1 in 2 years during winter and spring period.
Interior Lake Closure	T	(I)	Recommend one closure, with soil core to and stone cap to 423 NGVD to subdivide Swan proper into middle and lower compartments. Increased habitat diversity and habitat units.
Islands	T	(I)	Recommend two island groups be constructed of clamshelled lake sediments. Island size, shape, spacing, width and height varied. Provides significant wave control and habitat benefits.
Dredging	P	(I)	Minor dredging as a by-product of constructing other project features is a no cost item providing additional habitat benefits and should be included. The costs associated with major dredging are too high for the benefits generated and, thus, it should not be included as a feature of the recommended plan.
Other Features	T	(I)	Recommended features associated with the implementation of the above major features include water level gauges, fish screens, pump pads, pump power units and fuel tanks, roads and real estate.

T = Measure is totally compatible with planning objectives.
P = Measure is partially compatible with planning objectives.
I = Measure is incorporated into Plan C.
D = Measure deleted, not further considered.

e. Plans Evaluated. TABLE 15 provides a summary comparison of the various plans in relationship to the project planning goals and objectives. Alternative A was rejected, since it would do nothing to address the stated planning objectives, except for the fish movement objective. However, it is possible that the lower end of the lake may eventually become closed off by sedimentation, and thus even this objective might not be met. Large-scale excavation (Alternative B) was considered unacceptable; except for partially addressing the sedimentation problem, providing a short-term increase in deepwater habitat, and providing short-term fish access/passage, it would not address any of the other stated planning objectives.

Alternative C was found to be fully responsive to the project objectives, and was designated as the Selected Plan. Most importantly, it would provide significant benefits for migratory waterfowl by reducing the sedimentation rate. Waterfowl benefits would also accrue from the establishment of wetland plants whose survival would be enhanced as a result of project features which would directly reduce turbidity and enhance light penetration into the water column, resulting in increased photosynthetic activity and plant production.

TABLE 16 provides a comparison summary of the estimated biological output of each of the three alternatives. For both waterfowl (net gain +986 AAHU's) and fish (net gain +668 AAHU's), Alternative Plan C provides vastly greater output than either Alternative Plans A or B.

TABLE 17 provides an incremental costs summary for Alternative Plans B and C for fish, waterfowl, and fish and waterfowl habitat combined. The analysis was based on preliminary estimates of construction dollars for assessing relative gross cost differences between plan options and plans. Differences in O&M costs were not considered substantial enough to alter conclusions on cost-effectiveness. Clearly, Plan B dredging, at a cost of $15,366/AAHU, cannot be justified. Also clear is that, by comparison, all the measures included in Plan C (TABLE 18) provide a substantial return for the dollar investment. FIGURE 10 shows that from an acreage standpoint alone, Alternative C performs considerably better than the other two alternative plans.

For the above reasons, Plan C was designated as the Selected Plan for the project.

f. Value Engineering Of Project Features. A Value Engineering workshop was conducted on 9-10 October 1990 to examine the proposed HREP Project for Swan Lake. Project efficiency and cost reduction ideas were developed and evaluated by an interdisciplinary team comprised of members from the Corps of Engineers (SLD, NCR, NCD), the Illinois Department of Conservation, and the U.S. Fish and Wildlife Service. In all, 30 different proposals were evaluated. The nature of each proposal and the actions taken are described in APPENDIX DPR-U.

TABLE 15

PLAN RELATIONSHIPS TO PROJECT GOALS/OBJECTIVES

	Restore Aquatic Macrophyte Beds & Associated Invertebrates				Provide Habitat for Wintering Fish			Provide Habitat for Fish Spawning/Rearing
Alternative	Reduce Sedimentation	Maintain Stable Water Levels	Provide Ability to Solidify Bottom	Provide Wave Control	Provide Deep Water	Allow Free Movement for Fish	Buffer Cold Water/ Ice Effects	Provide Alternative Structures for Fish Passage
Plan A No Federal Action	N	N	N	N	N	Y	N	N
Plan B Wetlands Excavation	S	N	N	N	Y	Y	S	S
Plan C Wetlands Protection	Y	Y	Y	Y	Y	Y	Y	Y

N = Little or no contribution to planning objective
S = Some contribution to planning objective
Y = Important contribution to planning objective

TABLE 16

PLAN COMPARISONS SUMMARY -
AVERAGE ANNUAL HABITAT UNITS (AAHU'S)

	AAHU's 1/ 2/								
	Plan A (No Action)			Plan B (Wetlands Excavation)			Plan C (Wetlands Protection)		
Habitat	Waterfowl	Fish	Total	Waterfowl	Fish	Total	Waterfowl	Fish	Total
Non-Forested Wetland	690	1,287	1,977	783 (+93)	1,402 (+115)	2,185 (+208)	1,711 (+1,021)	1,955 (+668)	3,666 (+1,689)

1/ (#) = Net Change
From No Action Plan

2/ AAHU = Average Annual Habitat Unit

TABLE 17

PLAN COMPARISONS SUMMARY -
TOTAL HABITAT COSTS

Evaluation Factor	Waterfowl Plan B	Waterfowl Plan C	Fisheries Plan B	Fisheries Plan C	Total Plan B	Total Plan C
Annual Cost ($ Thousands) 1/	1,429	405	1,429	405	1,429	405
AAHU's Gain	93	1,021	115	668	208	1,689
$/AAHU's Gain	15,366	397	12,426	606	6,870	240

1/ Annualization assumes an 8.875 percent interest rate, and a 50-year project life.

TABLE 18

PLAN COMPARISONS SUMMARY -
INCREMENTAL HABITAT COSTS SUMMARY

Alternative Feature	Cummulative Annual Cost ($ Thousands) 2/	Incremental Annual Cost ($)	Average Annual Habitat Gain (AAHU's) Total	Average Annual Habitat Gain (AAHU's) Incremental	Average Annual Cost/Habitat Gain ($/AAHU) Total	Average Annual Cost/Habitat Gain ($/AAHU) Incremental
Waterfowl						
Plan B						
Large-scale Excavation	1,429	1,429	93	93	15,366	15,366

TABLE 18 (Continued)

Alternative Feature	Cummulative Annual Cost ($ Thousands) 2/	Incremental Annual Cost ($)	Average Annual Habitat Gain (AAHU's) Total	Average Annual Habitat Gain (AAHU's) Incremental	Average Annual Cost/Habitat Gain ($/AAHU) Total	Average Annual Cost/Habitat Gain ($/AAHU) Incremental
Waterfowl (Continued)						
Plan C						
Riverside Dike/Levee 1/	243	243	643	643	383	383
Hillside Sediment Control	351	108	739	105	475	1,029
Interior Closure 1/	378	27	974	235	388	115
Islands	405	27	1,021	47	397	574
Fisheries						
Plan B						
Large-scale Excavation	1,429	1,429	116	116	12,319	12,319
Plan C						
Riverside Dike/Levee 1/	243	243	320	320	759	759
Hillside Sediment Control	351	108	387	67	910	1,612
Interior Closure 1/	378	27	551	164	686	165
Islands	405	27	622	71	651	380
Dredging	405	0	669	47	605	0

TABLE 18 (Continued)

Alternative Feature	Cumulative Annual Cost ($ Thousands) 2/	Incremental Annual Cost ($)	Average Annual Habitat Gain (AAHU's) Total	Average Annual Habitat Gain (AAHU's) Incremental	Average Annual Cost/Habitat Gain ($/AAHU) Total	Average Annual Cost/Habitat Gain ($/AAHU) Incremental
Waterfowl & Fisheries Combined						
Plan B						
Large-scale Excavation	1,429	1,429	209	209	6,837	6,837
Plan C						
Riverside Dike/Levee 1/	243	243	954	954	254	254
Hillside Sediment Control	351	108	1,126	172	312	628
Interior Closure 1/	378	27	1,525	399	248	68
Islands	405	27	1,643	118	247	229
Dredging	405	0	1,690	47	240	0

1/ Water control structure costs included

2/ Annualization assumes an 8.875 percent interest rate, and a 50-year project life.

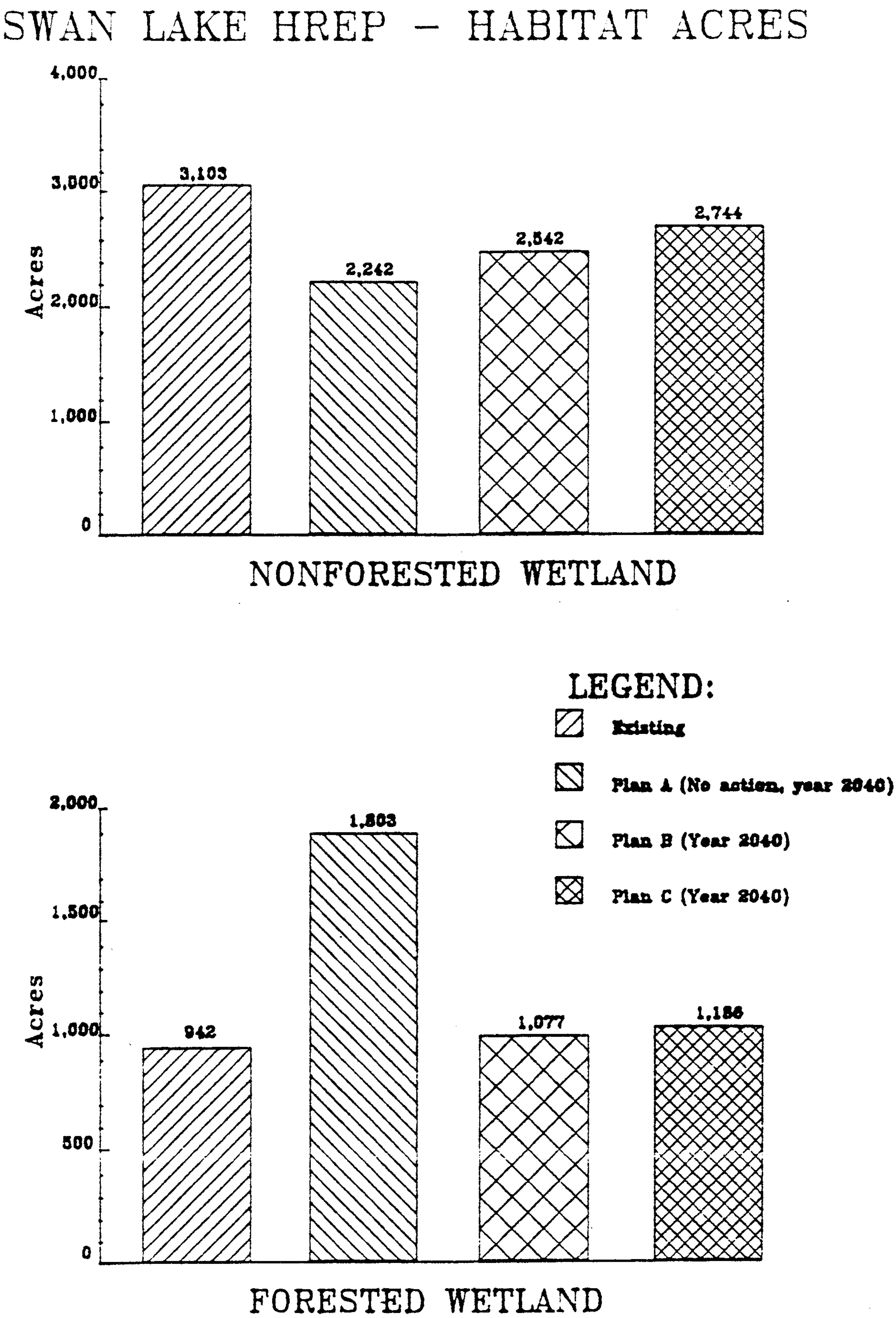

SWAN LAKE HREP - HABITAT ACRES
4,000
3,000
2,000
1,000
0
Acres
3,103
2,242
2,542
2,744
NONFORESTED WETLAND
LEGEND:
Existing
Plan A (No action, year 2040)
Plan B (Year 2040)
Plan C (Year 2040)
2,000
1,500
1,000
500
0
Acres
942
1,803
1,077
1,156
FORESTED WETLAND

Figure 10

6. SELECTED PLAN WITH DETAILED DESCRIPTION.

a. Plan Components. The following is a general description of the Selected Plan. Specific features of the plan are listed in TABLE 19 and are depicted in FIGURE 9 and Plates 2 and 3.

To retard the deposition of sediment into the project area, a riverside dike/levee and a hillside sediment control program would be put in place. The dike/levee would be constructed along the narrow band of land that separates Swan Lake from the Illinois River. Hillside sediment traps would be placed in those sections of the west shore watershed most severely affecting the middle and lower sections of lake.

To control water levels for waterfowl and fish management, and to periodically resolidify the lake bottom, the dike/levee would function in combination with gated water control structures and pumps.

To facilitate water drainage and to create deepwater lake habitat, a drainage system would be created as a by-product of constructing the dike/levee, closures and island structures.

To further subdivide the lake into independently manageable units, a closure structure would be placed across the lake to separate middle and lower Swan Lake. This closure, in addition to creation of island groups on the lake, would contribute to decreased wave action and, thus, reduced turbidity levels.

To offset the loss of fishermen access to the lake caused by the construction of closures, boat ramps and access roads would be provided along the west lake shore. An existing recreational access road to Fuller Lake would be obliterated during dike/levee construction. This road would be relocated along the lakeside toe of the dike/levee. To provide access to the dike/levee at its tie-in to Calhoun Point, a short road would be built to connect to the nearby county road.

To provide sufficient borrow material for the upper most segment of dike/levee and for access road development, a limited number of borrow site locations have been tentatively selected.

The project design will provide the physical conditions necessary for creating a wide spectrum of strategies for waterfowl and fisheries management. The precise manner in which the lake will be managed will evolve during the initial years of the project. This fine tuning of the management plan will take into account the results of biological response analyses (see Appendix DPR-Q) to access alternative water control regimes.

b. Design Considerations.

(1) Substrate Exploration Data.

(a) Initial Hand Auger And Push Sampler Borings. A number of overwater borings were made at predetermined locations in Swan Lake. The lake sediment soils were classified as primarily clays from the top of the borehole to the bottom. A boring was taken at the lower end of the lake on the peninsula of land between Swan Lake and the Illinois River. Soils here were generally clays. Groundwater was encountered at approximately 2 feet below the ground surface. A boring at the proposed lower lake closure structure indicated a sand layer at a depth of 10 feet. Field logs were kept for soil classifications based on visual observations. Atterberg limit tests and water contents were run on all general samples obtained. Field logs are presented in APPENDIX DPR-F.

TABLE 19

COMPONENTS OF THE SELECTED PLAN 1/

1. Hillside Sediment Control Program

   ° Construction of 95 water and sediment control basins 55 ponds, and 40 terraces.

   ° Impoundments generally less than 5 acres with 24-hour release rate.

   ° O&M costs and real estate are the responsibility of the local landowners.

2. Dike/Levee

   ° Structure in 3 segments totaling 46,700 feet.

   a. Lower Closure Segment

      ° Segment lies between River Miles 5.0 and 5.5 totaling 2,000 feet.

      ° Impervious core with an exterior protective stone covering.

      ° Stone covering consists of B-stone riverside, and C-stone lakeside and on top.

      ° Top elevation of core is 425.5 NGVD (net grade), crown elevation of structure with stone is 427 NGVD. Soil core and stone would be placed with 1 on 4 side slopes.

      ° Top of closure topped with 6-inch aggregate road course.

      ° Crown width of completed structure is 10-foot.

   b. Lower Peninsula Segment

      ° Segment is located lakeside of peninsula between River Miles 5.5 and 10.6, totaling 29,100 feet.

      ° Segment constructed of clamshell excavated lake sediments from adjacent lake shore. After drying, material graded to 1 on 4 side slopes.

      ° Overall crown width 10-feet (8-feet in sections with road bedding material).

      ° Structure slopes from crown elevation 425.5 NGVD (net grade) at R.M. 5.5 to 426.6 NGVD at R.M. 10.6.

      ° Height of segment varies between 3 and 6 feet.

      ° Lowermost 2,000 feet of segment serves as overflow structure, and is protected by C-stone.

   c. Upper Peninsula Segment

      ° Segment extends along peninsula adjacent to Fuller Lake, between River Miles 10.6 and 13.0, totaling 15,600 feet.

      ° Segment constructed of borrow material.

      ° Crown elevation varies from 426.6 NGVD (net grade) at R.M. 10.6 to 427.1 NGVD at R.M. 13.0.

      ° Side slopes 1 on 3, with crown width of 8-foot.

      ° Levee topped with aggregate road course.

      ° Typical height varies from 3 to 6 feet.

      ° Willow plantings at toe of levee and at river bank to provide levee with protection from river floods.

3. Interior Lake Closures

   a. New Lake Closure

      ° Closure developed opposite R.M. 7.2 to subdivide refuge into middle and lower lake compartments.

      ° Structure also serves as wave barrier.

      ° Structure includes an impervious inner core with 1 on 3 side slopes, a crown width of 10 feet, and top elevation of 421 NGVD (net grade).

TABLE 19 (Continued)

- Structure protected with an 18-inch layer of C-stone.

b. Old Lake Closure

- Existing IDOC closure is generally acceptable as an interior lake closure.
- Some vegetation removal and rip-rap repair may be required.

4. Water Control Structures

a. Lower Swan Lake Control Structure

- Control unit located at downstream end of lower lake closure for regulating water levels and fish passage
- Unit consists of 20-foot wide segment of open-topped concrete channel, with 4 spans of 5-foot wide stop-log bays.
- Unit includes 10-foot wide segment of open-topped concrete channel with a 72 inch sliding gate lakeside, and a 72-inch sluice gate riverside.
- Same chamber houses single 20,000 GPM Couch pump, adapted for bidirectional pumping between river and lake.
- Fish screen would be provided at pump station.
- Pump would be driven by 87 HP portable diesel power plant, and fueled from 1,000 gallon portable fuel tank.
- Top of control unit with concrete roadway for vehicle passage, and a concrete pad for parking power plant and fuel tank.
- Elevation of concrete channel floor would be 412 NGVD.
- Water levels monitored with staff gauges and automatic gauges located riverside and lakeside of water control unit.

b. Middle Swan Lake Control Structures

- Unit identical in design to unit described for lower lake.
- Unit located along constricted portion of peninsula at R.M. 9.8.
- A 30-foot wide, 300-foot long ditch would be excavated to elevation 412 NGVD for water conveyance.
- Staff gauges placed riverside and lakeside of control unit, and an automatic gauge placed lakeside.
- Through new interior lake closure would be a single 48-inch gated CMP (invert 416 NGVD).
- Structure would allow additional water input to lower compartment from middle compartment prior to pump activation.

c. Upper Swan Lake/Fuller Lake Control Structures

- A 48-inch gated CMP would drain management unit to Illinois River at R.M. 10.6.
- Pipe invert would be 416 NGVD.
- Pump (20,000 GPM reversible couch pump) driven by 87 HP portable diesel power plant, and fueled from 1,000 gallon tank.
- A 10-foot wide, 800-foot long ditch excavated to elevation 416 NGVD would serve to convey water to and from this control structure.
- Fish screen provided at pump station.
- A staff gauge would be placed riverside of the water control unit.

5. Islands

a. Lower Lake Compartment Island Group

- Island group would be 3,000 feet in length, situated opposite R.M. 5.9 and oriented perpendicular to prevailing winds.

TABLE 19 (Continued)

- Islands, created from clamshell excavated material, would be placed in two staggered rows.
- Minimum crown elevation for islands is 423 NGVD, but varying up to 426 NGVD.
- Islands would have 1 on 6 side slopes for wave protection and a width ranging from 60 to 100 feet. Shoreline willow plantings would further stabilize the island shoreline.
- Spacing of islands would vary from 100 to 500 feet, and length varying from 200 to 500 feet. No above water disposal of material to occur closer than 500 feet from lake shores.
- Islands would be vegetated to grass cover initially, and subsequently managed with some islands in herbaceous cover and some in forested cover.
- Deepwater dredging cut for island construction would connect main drainage ditch with the proposed lower lake west shore boat ramp location.

b. <u>Middle Lake Compartment Island Group</u>

- Island group (located opposite R.M. 9.2) similar in design to that for lower lake, except group would span a distance of only 800 feet. To the extent possible, these borrow areas will placed and configured so as to enhance wetlands value.
- Deepwater dredge cut for this island group would connect main drainage ditch to the middle compartment west shore boat ramp area.

6. <u>Other Features</u>.

a. <u>Borrow Areas</u>

- Approximately 20 acres of Federally owned lands have been designated for use as borrow areas during project construction. To the extent possible, these borrow areas will be placed and configured so as to enhance wetlands value.

b. <u>Boat Ramps</u>

- Two 12-foot wide boat ramps would be constructed along west lake shore, one opposite R.M. 5.9 and the other opposite R.M. 9.2.
- Each ramp would have 8 inches of aggregate base stone.

c. <u>Parking Lots</u>

- A small parking lot would be provided at each of the two boat ramp locations (R.M. 5.9 and R.M. 9.2). Both lots would accommodate 5 vehicles. (USFWS judgmental estimate of minimal vehicle capacity needed to offset lost boat access to lake from river.)
- Parking area at R.M. 5.9 would require an 18 inch CMP and some minor ditching to accommodate local drainage at this site.

d. <u>Roads</u>

- In addition to the dike/levee road, certain other road provisions are needed. Associated with boat launch areas, a 1,200-foot long road opposite the R.M. 5.9 location, and a 1,250-foot long road opposite the R.M. 9.2 location. Both roads 12-feet wide, built to minimal elevation 424 NGVD, and topped with 6 inches of aggregate road course.
- Extending between the IDOC hunter parking lot at R.M. 12.2 and Hadley Landing public access road, would be an 18-foot wide road running along the lakeside toe of the dike/levee. This road would be 3,800 feet long and would be covered with a 6-inch topping of aggregate road course.
- A road would be constructed on Federal lands connecting lower lake closure (from R.M. 5.0) to the nearby county road. Road 1,900 feet long, 12 feet wide and capped with aggregate stone. A 25-foot long apron (consisting of asphalt or concrete) would connect proposed stone road and county road. An 18-inch culvert would be placed under the apron to facilitate the existing drainage.

1/ See also FIGURES 9 and Plates 2 and 3.

(b) Vane Shear Tests Program. Vane shear tests were performed along Swan Lake adjacent to the peninsula. Strength data obtained from these tests will be instrumental in confirming the feasibility of constructing a dike/levee embankment from lake sediments. In addition, undisturbed samples were obtained. Consolidation tests will be performed on these samples to verify overbuild assumptions. Results from the vane shear tests program are presented in the geotechnical appendix of this report.

(2) Earthen Dike/Levee Embankment. The design for the earthen dike/levee embankment was evaluated for stability and gross settlement. Results of these evaluations are presented in APPENDIX DPR-F. Specific design details for slope, width, etc. are presented in TABLE 19. The lower 5 miles of embankment will have 1-foot of overbuild for anticipated settlement. All borrow material for the embankment will come from an excavation trench in the lake, approximately 50 feet from the lakeside toe of the dike/levee. The upper most 3 miles of embankment will be obtained as local borrow material.

An AT&T cable crossing exists within the project area. The District's assessment is that the cable does not pose a design problem; however, the District will continue to coordinate closely with AT&T during the final phases of the project.

(3) Closures.

(a) Lower Closure. The proposed design of the lower clay/rock closure will meet specific project requirements. These requirements include closing the opening between Swan Lake and the Illinois River, and building a control structure. The clay/rock dike was analyzed for stability, settlement and underseepage; this data will be included in APPENDIX DPR-F. A gross foundations analysis for the area under the closure structure was performed to determine the allowable bearing capacity. This analysis is included in the appendix. Based on the results of this analysis, it is anticipated the closure will be constructed on a shallow spread footing.

Between the lower clay/rock closure and the earthen dike/levee embankment is a clay/rock overflow section. This device will assure ample backwater filling prior to dike/levee embankment overtopping during major river floods. As with the earthen levee, 1-foot of overbuild will be included in the final grade for anticipated settlement of the overflow section.

(b) New Interior Closure. The proposed design for the new interior closure consists of a clay/rock structure and gated CMP. The clay/rock closure will have a soil core covered with C-stone on the crown and side slopes.

(4) Islands. The proposed design for the man-made islands consists of lake sediments with varying height and width. The purpose of the islands is to break the wave fetch caused by wind moving across the lake.

(5) Historic Properties.

All parties agreed to the Programmatic Agreement (PA) approach during the first round of consultation in July and August 1991. The PA approach had been strongly recommended by the Illinois State Historic Preservation Officer (SHPO) and the first draft was modified from an example provided by that agency. Informal comments on the first draft PA were relayed by the Illinois SHPO and the Advisary Council on Historic Preservation (ACHP) in telephone conversations; a letter was received from the USFWS, which will be a concurring party. The revised second draft PA incorporated all these comments. In their review of the Final DPR dated 6 August 1992, the Illinois SHPO again stated that the PA would "adequately address all compliance issues and concerns...", however they would not concur in the signing of the FONSI prior to signing of the PA.

The second draft was sent to the Illinois SHPO on 15 September 1992. On 17 September 1992 the SHPO's office responded with minor comments which were incorporated into a third draft. The third draft was sent to the USFWS 29 September 1992; on 2 October 1992 the USFWS staff accepted it without revisions. The third draft was sent to the ACHP on 6 October 1992 and the ACHP staff responded on 22 October 1992 with a number of questions and requested that background information on the St. Louis District EMP project be provided to assist in their review. The ACHP staff also offered to write some specific sections of the PA. It is expected that this ACHP consultation will take about two months or until about 15 January 1993. District review is expected to be completed by 1 February 1993. Formal review and signing is expected to be completed by 15 April 1993.

As discussed below, due to dense vegetation, much of the lowland surveys will be conducted during construction (initial ground clearing). However, preliminary assessment of the potential of certain landforms to contain archaeological sites will be conducted by first examining historical documents indicating recent soil deposition and then utilizing subsurface geologic coring. Cores will be examined by a geomorphologist and an archaeologist to determine the presence of cultural material or the potential for such material to occur. Results will be used in conducting a landscape analysis to predict areas of high, medium, low and no probability of site occurrence. This analysis will document areas of recent (less than 50 years old) soil disposition which will not require cultural resources investigation.

During the initial planning stage of this project the decision was made to conduct historic properties compliance on the Swan Lake project and its sister project, Stump Lake, during the construction phase. Two reasons led to this decision. First, the complexity of the projects might lead to changes during the design phases which would necessitate additional, unprogrammed fieldwork if the fieldwork already had been conducted. Secondly, the areas under consideration are too densely vegetated for effective shovel testing. Survey and any subsequent steps in such areas are more cost-effective if conducted after vegetation clearance associated with initial construction has occurred. Both the Illinois SHPO and the ACHP agreed to this approach during consultation on the draft PA in 1991. However, given the concerns raised by the Washington Level Review Center (WLRC) review, for future EMP projects, where the above problems do not exist, survey work will be initiated during the earlier phases.

At the beginning of the construction phase, a plan to conduct a cultural resources reconnaissance survey will be developed and coordinated with the USFWS and the Illinois SHPO. The lowland landscape analysis developed during the design phase will be used to determine areas to be investigated by walkover survey and shovel testing. The walkover survey and shovel testing will be conducted where possible prior to construction. However, in the remaining areas of dense vegetation which prohibit survey initially, the survey will be conducted in conjunction with the initial land clearance.

Project features potentially impacting on archaeological properties include the upland sediment control basins and ponds, dike/levee embankment, pump/control structures borrow sites, roads, boat ramps and parking lots. Prior to construction, all areas of potential disturbance associated with this project will be investigated. The procedures used (and the external coordination required during the conduct of these investigations) shall be outlined in the PA. Signatures to this agreement shall include the St. Louis District, the Illinois SHPO, the USFWS, and the ACHP.

In the upland areas the proposed detention basins, ponds and terraces will be surveyed as soon as they have been designated by the USSCS. Cultural resources surveys of the basins, etc. planned by the USSCS will be conducted by the St. Louis District since the Corps is the lead agency and is transferring funds to USSCS to construct the basins. The District's responsibility for historic property compliance is included as item IV. B. 6. in the draft MOU for the Swan Lake project between the SCS and the District. USSCS is not included as a party to the PA because they will not have any responsibilities associated with historic properties. Cultural resources surveys following the procedures given in the PA will be conducted prior to construction. In the event that the District's cultural resources survey finds historic properties at the proposed basin location, that location will be abandoned and a new one surveyed for cultural resources. Current plans call for the USSCS basins, etc. to be built over a 5 year period, in which case the District's cultural resources survey may be conducted over a similar period.

c. Construction Considerations.

(1) Earthen Dike/Levee Embankment. For the lower embankment section of the project, trench excavation will be accomplished using a barge mounted clamshell/dragline operation or some approved equivalent method.

It is anticipated that using the lake sediments will take an estimated 6 to 9 months to drain the moisture from the soil and become usable for compaction and final grading. Therefore, construction of the embankment will be in two phases; (1) to excavate and drain the soil, (2) to compact and shape the soil.

Approximately 250 feet of the embankment (near R.M. 7.5) will be constructed across six mile slough. In order for the levee to continue through this slough, the structural design for this segment would be similar to that of the lower lake closure.

(2) Island. A barge mounted dragline will be used to construct these islands.

(3) AT&T Cable Crossing. The AT&T crossing at Swan Lake was discussed with representatives of AT&T during the preparation of the DPR. AT&T has provided exact locations and elevations of the cable crossing, which was installed in 1962. The cable will not have to be relocated; and, therefore, no monetary contingency for such a provision is needed. AT&T has indicated that, if dredging does not come closer than 10 feet horizontally and 4 feet vertically from the cable, no cable relocation is required. The district is able to meet these criteria, without impairment to project function. Very little deep water fisheries habitat would be sacrificed, and sufficient depth would still exist to accomplish a drawdown for bottom consolidation. AT&T, when notified, will have a representative at the site during construction.

(4) Endangered Species.

(a) Wintering Bald Eagles. Most construction activities would likely take place outside of the winter months. In addition, consideration (in coordination with the USFWS) will be given during the preparation of Plans and Specifications to sequencing construction activities in a manner that minimizes impacts to eagles. Specific restrictions relative to any sequencing will be included as part of the contract specifications. The contracting officer will ensure appropriate compliance.

(b) Indiana Bat. Special conditions on the contracted work will require that tree clearing activities be scheduled outside the period May 1 - August 31 when Indiana bats are known to inhabit summer habitat. If for any reason tree clearing activities have to be carried out during the period May 1 - August 31, a site visit will be conducted first by a team of biologists to determine if any roost trees are among those proposed to be removed. If none are found, tree clearing activities could resume. If removal of a roost tree is proposed during the period May 1 - August 31, then the District must enter into section 7 consultation with the U. S. Fish and Wildlife Service to determine if the proposed action is likely to jeopardize the continued existence of the Indiana bat.

(5) Waterfowl. Consideration will be given during the preparation of Plans and Specifications to sequencing construction activities in a way that minimizes the disruption of resting and feeding waterfowl during the fall and early winter period.

(6) Historic Properties. Under the provisions of the draft Programmatic Agreement a professional archaeologist would monitor all earthmoving activities in areas which could not be investigated previously due to dense vegetation for the presence of archaeological remains. If such remains are observed during this inspection, all earthmoving activities in the vicinity of the remains would be postponed until an archaeological investigation can be conducted. The written results of this evaluation would be forwarded to various state and Federal review entities.

(7) Permits. Appendix DPR-C provides a Clean Water Act Section 404(b)(1) Evaluation Report for the Swan Lake project. This documentation is also being forwarded to the Illinois Environmental Protection Agency, along with a request for the state's Section 401 Water Quality Certification. A request for a permit to open air burn trees at the site will be submitted to the state prior to construction. An Illinois Department of Transportation permit was issued to the District 8 June 1992.

d. Operation, Maintenance And Rehabilitation.

(1) Project Uplands. The specific operations, maintenance and rehabilitation responsibilities for the hillside sediment control program are presented in the various agreements between the partnering agencies. These responsibilities are described in general terms in Section 5 of the report and are described in detail in APPENDIX DPR-A.

(2) Project Lowlands. The responsibilities of the USFWS and IDOC for their respective management units are described below. Maintenance is defined as the repair and replacement associated with hydrologic events (including minor storm and flood events) that do not exceed the level of design for the project. For Swan Lake, this level of design has been designated as the top elevation of the dike/levee structure (elevation 425.5 NGVD at R.M. 5.7). (In the project reach of river, river stages would remain at or below this level more than 85 percent of the time.) Consequently, such operation and maintenance responsibilities shall include, but are not limited to, the following:

(a) The sponsors (including representation from the IDOC Division of Fisheries) shall prepare annual management plans which incorporate operational activities including water control and manipulation, plantings, day-to-day project observation, inspection, record keeping, visitor monitoring, vegetation control and planned maintenance activities. (The Plans shall be mutually agreed upon between the sponsors and the U.S. Army District Engineer in charge of the administration of the project and may be amended as necessary.) A site regulation plan for water control is provided by APPENDIX DPR-P. This planning effort will give consideration to both waterfowl and fisheries benefits. This plan will undergo further coordination and refinement.

(b) The sponsors (including representation from the IDOC, Division of Fisheries shall operate project features (such as the gates and pumps) to insure accomplishment of the Management Plan.

(c) The sponsors shall not collect any fees for public use of these lands for hunting or fishing.

(d) The sponsors may use the project for the production of crops exclusively to provide food for wildlife, as permitted by current agreements regarding General Plan Lands.

(e) The sponsors shall provide all operation and maintenance of project features in accordance with manufacturer data and Corps of Engineers recommendations. (The Corps of Engineers will provide manufacturer O&M requirements for all manufactured components of the project, as well as "As Built" drawings and shop drawings for all facilities constructed, as soon as possible after construction is complete.)

(f) The sponsors will perform routine dike/levee and closure maintenance, which includes mowing the levee (to 10 feet beyond the levee toe) once a year, in the fall; removal and/or control of unwanted vegetation from the levees; removal of all debris; some rock material repair, unwanted reshaping of the surface of the existing levee slopes to eliminate gullies, and/or shallow depressions resulting from the normal "peeling action" that occurs from overtopping and/or wave action; rodent control; inspection; and litter removal.

(g) The sponsors shall provide routine structural maintenance, which includes painting of metal items; removal of vegetation from expansion, contracting, and monolith joints; day-to-day inspection; sealing and caulking of various joints; vandalism obliteration; and road grading.

(h) The sponsors shall provide routine mechanical/electrical maintenance, which includes lubrication, oil changes, inspections of equipment, touch-up painting, testing of equipment, record-keeping, and vandalism repairs.

The Corps of Engineers will inspect the project at least annually to determine the status of operation and maintenance being performed by the sponsors. Representatives of the sponsors will be invited to attend. The inspection will follow procedures outlined in the latest issue of DIVR 1130-2-304 entitled "Project Operations - Maintenance by Local Interests." The report following this inspection will serve as a basis for the sponsors and/or Corps of Engineers (in the case of rehabilitation) to make required repairs and/or changes to the Operation and Maintenance procedures. In addition, the Corps of Engineers may also make periodic inspections at various intervals for the purpose of determining compliance with the approved Annual Management Plan by the sponsors.

The Corps of Engineers and the sponsors will cost share 75/25 percent any mutually agreed to rehabilitation of this project. Rehabilitation shall be considered any reconstructive work needed in excess of estimated annual O&M as a result of specific storm or flood events which exceed the design event. For the Swan Lake project, rehabilitation features consist of the following:

(1) Interior drainage ditch dredging consisting of subsurface excavation of sediment deposited as a result of hydrologic events exceeding the design event and necessary for wildlife habitat and other environmental features of the original project design;

(2) Dike/levee and closure structure repair of damaged areas within the zone of riprap protection which requires the purchase of new riprap and/or bedding material, and;

(3) Earthen embankment repair consisting of repair of damaged areas that extend into the compacted impervious portion of the levee and including the obtaining, placement and compaction of suitable impervious material in the damaged areas. (Damaged areas extending less than four inches below the "as-designed" surface of the earthen embankment are considered routine levee maintenance.)

The lowlands portion of the project (4,600 acres) is located on lands managed as a National Wildlife Refuge. All of the lake area, and a portion of the surrounding non-lake lowlands are managed by the USFWS and IDOC under Cooperative Agreement with the Corps. The USFWS Regional Director and the District Commander will sign a Memorandum of Agreement for Enhancing Fish and Wildlife Resources addressing the relationships, arrangements, and general procedures under which the USFWS and the Department of the Army will operate in constructing, operating, maintaining, repairing, and rehabilitating the project.

Upon completion of construction, an Operation and Maintenance Manual will be prepared and signed by both the USFWS and the District Commander. This manual will provide specific requirements for operation, maintenance, repair, and rehabilitation of the project; as-built drawings; shop drawings; manufacturer's operation and maintenance manuals; and, specific procedures for project review and inspection, rehabilitation, abandonment, improvements or alteration.

The Corps of Engineers recognizes that this HREP project is experimental in nature and that its operation contains an inherent element of uncertainty. While the joint formulation of this project with the USFWS and IDOC has ensured that most problems have been addressed, the current state-of-the-art is going to leave some questions unanswered until project operation begins. This is one of the HREP program's strengths - the fact that there is latitude to try things which are new and untested. In the same vein, if the operation of the project as set forth in the DPR proves unworkable, the St. Louis District will work with the sponsors to correct the problem through structural alteration of the project, or to modify the management approach. The project's Operation and Maintenance Manual will also provide for the worst case as follows: "... upon mutual agreement by the parties involved, and when costs of operation, maintenance, repair and rehabilitation are substantially in excess of the DPR's estimates, the project shall be abandoned."

e. Project Performance Evaluation Plan. The purpose of this section is to summarize the performance evaluation aspects of the project. The principal types, purposes, and responsibilities of project evaluation are presented in TABLE 20. The plan for post-construction qualitative field observations and quantitative measurements are presented in TABLES 21 and 22, respectively. To the extent possible, methods will be standardized with the methods used for other Habitat Rehabilitation and Enhancement Projects, and with the Upper Mississippi River System - Long-Term Resource Management program, in general.

f. Biological Responses Analysis. In addition to evaluations of the physical and chemical outputs under the project performance evaluation, Swan Lake is one of two District HREPs that have been selected for the programmatic analysis of biological outputs as well. The purpose of the programmatic analysis is to determine the validity of assumptions used in designing the project. The analysis focuses on project features that will provide feedback on design criteria for future projects throughout the UMRS. The detailed draft proposal for the biological responses analysis is provided as APPENDIX DPR-Q. A summary of the design assumptions to be tested is provided by TABLE 23.

g. Real Estate Requirements.

(1) General. Real estate needs for the hillside sediment control program will be filled by the local landowners and the Calhoun County Soil and Water Conservation District (CCSWCD). The CCSWCD will then provide the Corps with temporary land easements necessary to construct that portion of the project, at no cost to the Federal government.

Other project features would be located on Federally-owned public lands which were acquired by the Corps of Engineers in fee for the nine-foot navigation project. These lands were later designated as General Plan lands. The General Plan, dated 8 March 1961, was approved jointly by the Assistant Secretary of the Army, the Secretary of the Interior and the District, or the Illinois Department of Conservation (IDOC); and as prescribed in a Cooperative Agreement, dated 14 February 1963, between the Department of the Army and the Department of the Interior. The principal objective of this General Plan and Cooperative Agreement is to provide optimum habitat for wildlife species. Secondarily, the General Plan lands provide water-related recreation opportunities such as sport fishing, waterfowl hunting and trapping. The Upper Swan/Fuller Lake portion of these lands are managed by IDOC in accordance with said plan.

The periodic closure of Swan Lake from the river and its subsequent habitat management will result in an altered lake hydrology. At times, local watershed runoff will result in lake water surface elevations higher than what would have occurred in the absence of a project. This altered hydrology necessitates a fee purchase of lands along the western lake shore to elevation

TABLE 20

MONITORING AND PERFORMANCE EVALUATION MATRIX

Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
Sedimentation Problem Analysis	System-wide problem definition. Evaluates planning assumptions.	USFWS	USFWS (EMTC)	LTRM	Leads into pre-project monitoring; defines desired conditions for plan formulation.
Pre-project Monitoring	Identifies and defines problems at HREP site. Established need for proposed project features.	Sponsor	Sponsor	Sponsor	Attempts to begin defining baseline. See DPR Sections 2 and 3.
Baseline Monitoring	Establishes baselines for performance evaluation.	Corps	Field station or sponsor thru Cooperative Agreements or Corps.	LTRM	Appendix DPR-L shows the locations of and sites for physical/chemical data collection. Actual data collection will be accomplished during P&S phase. For biological baseline information, see Appendix DPR J.
Data Collection for Design	Includes identification of project objectives, design of project, and development of performance evaluation plan.	Corps	Corps	HREP	Comes after the fact sheet. This data aids in defining the baseline. See DPR Sections 4-7 and 13.
Construction Monitoring	Assesses construction impacts; assures permit conditions are met.	Corps	Corps	HREP	Environmental protection specifications to be included in construction contract documents. Inter-agency field inspections will be accomplished during project construction phase.
Performance Evaluation Monitoring	Determines success of project as related to objectives.	Corps (quantitative) (field observations).	Field station or sponsor thru sponsor Cooperative Agreement, sponsor thru O&M, or Corps.	LTRM	Comes after construction phase of project. See DPR Section 13.
Analysis of Biological Responses to Projects	Determine critical impact levels, cause-effect relationships, and effect on long-term losses of significant habitat.	USFWS	USFWS (EMTC)	LTRM	Problem Analysis and Trend Analysis studies of habitat projects.
	Demonstrates success or failure of habitat	Corps	Corps/USFWS/(EMTC)/Others	LTRM	Biological Response Study tasks beyond scope of Performance Evaluation, Problem Analysis, and Trend Analysis.

TABLE 21

ANNUAL POST-CONSTRUCTION FIELD OBSERVATIONS FOR PROJECT PERFORMANCE EVALUATION 1/

Goals	Objectives	Unit of Measure 2/	Enhancement Feature	Field Observation
Restore aquatic macrophyte beds and associated invertebrate communities for the benefit of migratory waterfowl	Substantially reduce future lake sedimentation	Inches of sediment deposition over 50-year project life	Riverside Dike, Hillside Traps	Evidence of recent sediment deposition
		Mg of sediment/ liter	Hillside Traps	N/A
	Maintain stable water levels during the growing season	Frequency of damaging flood events during growing season	Riverside Levee, Water Control Structures	Observations of levee overtopping Survival of wetland plants
	Provide the ability to solidify the lake bottom	Percentage of time water elevation can be held at or below 416 NGVD	Riverside Levee, Water Control Structure	Evidence of crust formation on surface of lake bottom
		Percent distribution of rooted vascular plants		Evidence of increased plant anchorage
		Force/unit surface area		N/A
	Enhance wave control	Reduction in acres of lake compartment size exposed to wind	Interior Closure, Islands	N/A
		Reduce max. wave height		Visual estimation of wave heights and shore impacts
		NTU's during growing season		Visual clarity of lake
	Form smaller independently managed lake units	Number units Maximum compartment size in acres	Interior Closure	Observations on success of differential plant production between the management units
Provide habitat for over winter survival of fish	Provide areas of deep water	Acres of water >7 feet deep	Dredging	N/A
	Allow free movement for fish between river and lake during late fall/early winter period	Weeks of fish access allowed	Water Control Structures	Note time periods gates left open
	Buffer impact of cold water and ice	Frequency of cold water/ice events during winter and spring (events/year)	Riverside Levee	Observations of spring cold water/ ice intrusion on the lake

TABLE 21 (Continued)

Goals	Objectives	Unit of Measure 2/	Enhancement Feature	Field Observation
Provide habitat for spawning and rearing of fish	Provide alternate structures so as to assure fish passage	Number of types of structures provided	Sluice Gate/Stop-log Structures	Provide any observations relating to differential use of structures by fish
Increase overall Habitat value for waterfowl and slackwater fishes	Meet all of the above objectives	Habitat Units (HU's)	All	Apparent gross changes in waterfowl numbers and use FWS commercial fishing survey Interviews with sport fishermen

1/ Observations to be submitted to the Corps of Engineers by the USFWS with the annual management report for the Cooperative Agreement Lands

N/A = Not Applicable

2/ Includes primarily physical (non-biological) units as a basis for project performance evaluation

TABLE 22

POST-CONSTRUCTION QUANTITATIVE MEASUREMENTS FOR PROJECT PERFORMANCE EVALUATION

Goals	Objectives	Unit of Measure 1/	Enhancement Feature	Monitoring Plan	Monitoring Intervals (Years) 2/
Restore aquatic macrophyte beds and associated invertebrate communities for the benefit of migratory waterfowl	Substantially reduce future sedimentation	Inches of sediment deposition over 50-year project life	Riverside Dike Hillside Traps	Performs survey cross-sections for lake sedimentation using same locations as [illegible]er survey	1, 5, 10
		Mg of sediment/liter	Hillside Traps	Tributary flow/ sediment concentration analysis	-1, 1, 5, 10
	Maintain stable water levels during the growing season	Frequency of damaging flood events during growing season	Riverside Levee	Stage Hydrograph analysis for lake interior using data input from automatic gauge stations	-1, 1 thru 10
	Provide the ability to solidify the lake	Percentage of time water elevation can be held at or below 416 NGVD	Riverside Levee	Stage duration curve developed for lake interior. Input data taken from automatic gauge readings	(Consolidation Years) 1, 8
		Percent distribution of rooted vascular plants		Perform vegetation assessment of annual transect survey information provided by refuge and LTRM personnel	-1, 1, 2, 3, 5, 10
		Force/Unit surface area		Consolidation Tests	(Consolidation Years) 1, 8
	Enhance wave control	Reduction in acres of lake compartment size exposed to wind	Interior Closure Islands	Determine functional acres achieved	1
		Reduced max. wave height		Routine parameter included in LTRM water quality monitoring	(Weekly) -2, -1, 1, 2, 3
		NTU's during growing season		Routine parameter included in LTRM water quality monitoring	(Weekly) -2, -1, 1, 2, 3
	Form smaller independently managed lake units	Number units	Interior Closure	Note number of functional units	1

TABLE 22 (Continued)

Goals	Objectives	Unit of Measure 1/	Enhancement Feature	Monitoring Plan	Monitoring Intervals (Years) 2/
	Maximum compartment size in acres		Interior closure	Determine functional acres achieved	1
Provide habitat for over winter survival of fish	Provide areas of deep water	Acres of water >7 feet deep	Dredging	Determine functional deep water acres	1, 8 (Consolidation Years)
	Allow free movement for fish between river and lake during late fall/early winter period	Weeks of fish access allowed	Water Control Structures	Sponsor provides data on periods gates were left open each year	1, 2, 3
	Buffer impact of cold water and ice	Frequency of cold water/ice events during spring and winter (events/year)	Riverside Levee	Stage hydrograph analysis	1, 2, 3
Provide habitat for fish spawning and rearing	Provide alternate structures to allow for fish passage	Number of types of structures	Sluice Gate/Stop-structures provided	Determine number of structures movement studies	1
Increase overall Habitat value for waterfowl and slackwater fishes	All	Habitat Units (HU's)	All	With assistance from FWS, IDOC and Corps will perform a habitat analysis using the AHAG and WHAG analyses	1, 5, 10

1/ Includes primarily physical (non-biological) units as a basis for project performance evaluations.

2/ 0 = Construction year
-# = Preproject year
+# - Postproject year

N/A = Not Applicable

TABLE 23

SUMMARY OF BIOLOGICAL RESPONSES ANALYSIS GOALS, OBJECTIVES AND ASSUMPTIONS TO BE TESTED

Goal	Assumptions to be Tested
Fisheries Responses	1. Fish community diversity within overall project area will increase.
	2. Fish community diversity will differ between lake compartments.
	3. Population structure within overall project area will change to reflect successful reproduction and recruitment.
	4. Population structure will differ between lake compartments.
	5. Differing plant distribution patterns between compartments will result in differential habitat utilization by fish.
	6. Amount of lake-river fish movement for the overall project area will change.
	7. Amount of lake-river fish movement will differ between the three lake compartments.
	8. Type of water control structure will influence extent of lake-river fish movement.
	9. Suitable overwintering habitat for fishes within the overall project area will increase.
	10. Availability of overwintering habitat for fishes will differ between the lake compartments.
Wildlife Responses	11. Total numbers and species composition of waterfowl using overall project area will increase.
	12. Relative numbers of dabbler versus diving ducks using each lake compartment will differ.
	13. Presence and abundance of special interest wetland bird species within overall project area will increase.
	14. The presence and abundance of special interest wetland bird species will differ between lake compartments.
	15. Waterfowl movements, habitat use, and behavior pattern for overall project area will improve.
	16. Waterfowl movements, habitat use, and behavior patterns will differ between the three lake compartments.
Vegetation/ Invertebrate Responses	17. Availability and distribution of aquatic vegetation within overall project area will increase.
	18. Availability and distribution of aquatic vegetation will differ between lake compartments.
	19. Vegetation community, in overall project area will improve.
	20. Vegetation biomass and production in overall project area will increase.
	21. Vegetation community, will differ between the three lake compartments.
	22. Vegetation biomass and production will differ between the three lake compartments.
	23. Aquatic invertebrate biomass within overall project area will increase.
	24. Aquatic invertebrate taxonomic composition, within overall project area will improve.
	25. Aquatic invertebrate taxonomic composition, will differ between the three lake compartments.
	26. Aquatic invertebrate biomass will differ between the three lake compartments.
Management Strategies	27. A water level management strategy can be developed for the project that maintains ecological functions and optimizes benefits to fish and waterfowl.
	28. Project's biological response analysis results has implications for future EMP projects.

424 NGVD. Approximately 92 acres comprising minor portions of a number of private ownerships will be required adjacent to the outside perimeter of existing Federal ownership. It should be noted that while there is a chance that property located between elevation 424 ft. NGVD (acquisition line) and 425.5 ft. NGVD (top of levee) could be adversely affected by a rare flood event, these lands will more often benefit from the protection by the levees against Illinois River flood flow up to the 2 to 3 year events. The protection provided from both flooding and siltation could outweigh adverse effects from interior flooding. If structures are operated properly during an interior flood event, there should be minimal adverse effects.

In addition to access areas to be used on existing Federally-owned lands, approximately four (4) acres of permanent road easement would be required on private lands. This access is required for construction, O&M needs, and recreation access.

The U.S. Fish and Wildlife Service has submitted a letter of intent to acquire with its own funds all private lands that would be affected by high water or that are needed for access. This acquistion is also included in the Service's preliminary project proposal for the expansion of the Mark Twain National Wildlife Refuge. Because of this, the Service would have pursued acquistion of the area even if the EMP project had not been developed. The Service is interested in coordinating with the Corps to ensure that Public Law 91-646 requirements are met. These interests are more fully described in APPENDIX DPR-R (pages R1-R16).

(2) Operation, Maintenance And Rehabilitation Agreement. The USFWS, IDOC, and SCS (via successive agreements with CCSWCD and landowners) will assure that operation and maintenance (including repair and replacement) will be accomplished in accordance with Section 906 (e). The total estimated annual operation and maintenance cost for the project is $61,050. The estimated distribution of this cost to the individual project sponsors is $30,800 for USFWS, $10,250 for IDOC, and $20,000 for SCS. An Operation, Maintenance and Rehabilitation Agreement will be developed during the construction phase of the project which will more specifically define the operation and maintenance requirements for the lake area. In addition, the operation and maintenance agreement documentation for the hillside program will be finalized and signed.

This final DPR (APPENDIX DPR-A) provides the following:

1. a letter from USFWS which expresses support for the project, and assures that O&M will be accomplished;

2. a letter from IDOC indicating support for the project, and a statement that the agency will cooperate with USFWS to assure the O&M is accomplished as described in the DPR;

3. a letter from the CCSWCD indicating support for the hillside sediment control feature, and of its intent to operate and maintain that feature as outlined in the draft O&M agreement between USSCS and the CCSWCD;

4. a letter from the USSCS indicating its intent to provide the Corps with assurances for the performance of the O&M requirements by way of a signed Memorandum of Agreement with the Corps;

5. a draft OM&R Agreement between the District Commander, St. Louis District and the Regional Director, USFWS;

6. a draft Memorandum of Agreement between the District and the USSCS;

7. a draft O&M Agreement between the USSCS and the CCSWCD; and

8. a draft Project Agreement between the CCSWCD and the landowners.

h. Cost Estimates.

(1) Construction.

(a) General. An estimate of the initial construction costs is presented in TABLE 24, and a more detailed breakdown of costs is provided by APPENDIX DPR-T. Project costs were optimized through careful consideration of construction costs versus the environmental benefits of each potential project feature. This process included consideration of dike/levee alignment, height, and construction method; closure alignment, number and construction method; type, number and placement of gated water control structures and pumps. The total project construction cost differs from that indicated in the original project fact sheet. A major reason for this difference is that the costs presented in the addendum were developed by the sponsor based on preliminary design information. The present estimate was developed using current designs and quantity take-offs, recent bid abstracts for projects in the area, detailed cost estimates and estimator judgement. A PC spreadsheet program was used to prepare the baseline cost estimate with an appropriate contingency that was applied to each line item cost. The price level for this estimate is October 1991. While the project cost has increased substantially since the original fact sheet, a 14 March 91 project prioritization meeting with the sponsors reaffirmed the project's high priority for implementation. The agencies were fully cognizant of the fact that increasing a dollar allocation to Swan Lake would mean fewer dollars being allocated for other HREP projects within the District.

The cultural resources cost estimate was developed consistent with past procedures for estimating cultural resources costs for planning studies. The estimate was based on estimated project-impacted acreage, assumptions about site density based on topography, how long it would take to survey the area, and the costs of previous contracts. A detailed breakdown on costs is provided in APPENDIX DPR-T and APPENDIX DPR-G.

TABLE 24

PROJECT COST ESTIMATE SUMMARY

Cost Account No.	Description of Item	Estimated Cost
04.-.-.-	Dam	$ 882,000
06.-.-.-	Fish and Wildlife Facilities	47,000
08.-.-.-	Roads, Railroads and Bridges	39,000
11.-.-.-	Levees and Floodwalls	3,248,000
13.-.-.-	Pumping Plant	1,493,000
18.-.-.-	Cultural Resource Preservation	142,000
30.-.-.-	Planning, Engineering and Design	1,196,000
31.-.-.-	Construction Management	807,000
	Total Project Cost	$7,854,000

(b) Discussion.

1. Reliability of Designs, Quantities, and Unit Prices. For the most part, the levees and floodwalls work has been adequately quantified. However, some aspects are inherently difficult to quantify, and for that reason they have been assigned a higher contingency value. Items falling into this category include dewatering, sluice gates, and embankment. Since the time of year for construction is not yet known, there is uncertainty as to the amount of dewatering that will be required. Embankments are features typically subject to many changes during project development. The haul distances for embankment material are not yet well defined, and the wetness and difficulty of moving the material could affect cost.

2. Variable Contingencies. The cost estimate on this project includes contingencies ranging in value from 10 to 25 percent. Assigned contingencies are based on the inherent difficulties in visualizing and quantifying certain types of work, such as dewatering, embankment, etc. Generally a contingency of about 20 percent was utilized for this project, which was felt to be reasonable at this stage of project development.

(2) Operation, Maintenance and Rehabilitation. A detailed estimate of operation, maintenance, and rehabilitation costs is presented in TABLE 25. These quantities and costs may change during final design. Site operation will involve the regulation of gates and pumps. Maintenance costs are here defined as those costs of repair and replacement associated with hydrologic events that do not exceed the level of design for the project. On this basis, the principal maintenance features of the project consist of pump repair, pump replacement, gatewell maintenance, culvert repair and cleaning, culvert replacement, structures inspection/reporting, road resurfacing, and a portion of the rip-rap repair, and embankment repair. Rehabilitation is here defined as reconstructive work needed in excess of estimated annual O&M as a result of specific storm or flood events. For the Swan Lake project, rehabilitation features consist of interior ditch dredging, and a portion of the rip-rap and embankment repairs.

Dredging is expected to be minimal, consisting of redredging the drainage ditch system perhaps once in 25 years.

Since on a portion of this project (i.e., upper Swan/Fuller Lake) the USFWS has entered into a cooperative management agreement with the state of Illinois, the state will continue to be responsible for the operation and maintenance of that area in accordance with the cooperative agreement.

(3) Performance Evaluation Monitoring Plan. TABLE 26 provides an estimate of costs related to the project's performance evaluation monitoring.

(4) Biological Responses Analysis - TABLE 27 provides a preliminary estimate of costs related to the project's biological responses analysis.

i. Construction Schedule. TABLE 28 presents a schedule of project completion steps.

TABLE 25

ESTIMATE OF ANNUAL OPERATION AND MAINTENANCE COSTS (OCTOBER 1990 PRICE LEVELS) 1/, 2/, 3/

Item	Interval					Average Annual Cost ($)	
	Years	Quantity	Unit	Price ($)	Cost ($)	Operation	Maintenance
Lake O&M - USFWS							
Pump Operation (Fuel)	Annual	2,500	HR	5	12,500	$12,500	-
Pump Operation (Labor)	Annual	200	HR	15	3,000	3,000	
Pump Repair	Annual	Sum	Job	-	600	-	600
Pump Replacement	1 in 25	2	EA	30,000	60,000	-	600
Gauge Maintenance	Annual	3	EA	1,000	3,000		3,000
Culvert Operation	Annual	140	HR	15	2,100	2,100	-
Culvert Repair & Cleaning	Annual	Sum	Job	-	1,000	-	1,000
Culvert Replacement	1 in 25	Sum	Job	-	20,000	-	200
Structures Inspection & Repair	Annual	Sum	Job	-	800	-	800
Rip-Rap Repair	Annual	50	Ton	25	1,250	-	1,250
Embankment Repair	Annual	75	C.Y.	10	750	-	750
Gatewell Maintenance	Annual	4	EA	1,000	4,000	-	4,000
Road Resurfacing	Annual	Sum	Job	-	1,000	-	1,000
			USFWS Total O&M			$17,600	$13,200
			USFWS Grand Total O&M			$30,800	
Lake O&M - IDOC							
Pump Operation (Fuel)	Annual	1,250	HR	5	6,250	$ 6,250	
Pump Operation (Labor)	Annual	100	HR	15	1,500	1,500	
Pump Repair	Annual	Sum	Job	-	300	-	300
Pump Replacement	1 in 25	1	EA	30,000	30,000	-	300
Gatewell Maintenance	Annual	1	EA	1,000	1,000	-	1,000
Rip-Rap Repair	Annual	10	Ton	25	250	-	250
Embankment Repair	Annual	25	C.Y.	10	250	-	250
Road Resurfacing	Annual	Sum	Job	-	400	-	400
			IDOC Total O&M			$ 7,750	$ 2,500
			IDOC Grand Total O&M			$10,250	
Hillside O&M - USSCS							
Sediment Control	Annual	Sum	Job	20,000		-	20,000
			USSCS Grand Total			$20,000	
	Total all O&M = $61,050						

1/ Maintenance costs are defined as those costs of repair and replacement associated with hydrologic events (including minor storm and flood events) that do not exceed the level of design for the project. For example, at Swan Lake, this level of design has been designated as the top elevation of the dike/levee structure. In the project reach of river, river stages would remain at or below the top of these structures about 85 percent of the time. On this basis, at least some rock material and earthen dike/levee material is expected to be lost during minor flood events and from ice damages.

2/ Consistent with other UMRS-EMP projects, no estimates of rehabilitation costs are provided in this table. Any costs presented would be based on so little historical data as to be highly unreliable and misleading. Any mutually agreed upon rehabilitation work would be cost shared (75 percent Federal, 25 percent non-Federal). Rehabilitation is here defined as reconstruction work needed in excess of estimated annual O&M, as a result of specific storm or flood events. For the Swan Lake project, water elevations above 425.5 NGVD occur less than 15 percent of the time. Any interior ditch filling is expected to occur during this time period. Also during this period, most of the dike/levee damages are expected from currents overtopping the structures.

3/ Annualization based on an 8.875 percent interest rate, and a 50-year project life.

TABLE 26

ESTIMATE OF PERFORMANCE EVALUATION MONITORING COSTS (OCTOBER 1991 PRICE LEVELS) 1/

Item	Monitoring Years	Quantity Per Year	Unit	Unit Cost ($)	Total Cost Per Year ($)	Average Annual Cost 3/ ($)
Lake Sediment Survey	1, 5, 10	3	x-Sections 4,000′ ea.	3,670	11,000	1,979
Hillside Sediment Monitoring	-1, 1, 5, 10	1	Station	5,000	5,000	1,389
Water Control Analysis	-1, 1 thru 10	3	Days	500	1,500	1,026
Habitat Analysis						
WHAG/AHAG	1, 5, 10	5	Days	500	2,500	449
Cover Type Survey	-1, 1, 2, 3, 5, 10	2	Days	500	1,000	423
Water Quality Readings	-2, -1, 1, 2, 3	4 (Quarterly)	Collections	1,800 2/	7,200	3,117
Consolidation Test	1, 8	1	Test	5,000	5,000	641
				TOTAL		$9,024

1/ Per current guidance, the cost of performance evaluation monitoring will be charged to the UMRS-EMP LTRM account.

2/ Includes $800 for labor, $1,000 for laboratory analysis work.

3/ Assumes an interest rate of 8.875 percent, and a project life of 50 years

TABLE 27

ESTIMATE OF BIOLOGICAL
RESPONSES ANALYSIS COSTS 1/

Analysis Component	Cost ($1,000's)
Fish and Community Sampling	100
Fish Population Structure Sampling	111
Lake/River Fish Movement Data Collection	0
Fish Movement vs Structure Data Collection	78
Fish Over-Wintering Data Collection	40
Waterfowl Counts	20
Waterfowl Habitat Utilization Data Collection	80
Vegetation Mapping	0
Vegetation Sampling	31
Invertebrate Sampling	61
Reports	10
	TOTAL 531

1/ These costs are preliminary and thus subject to change.

TABLE 28

PROJECT IMPLEMENTATION SCHEDULE

Requirements	Scheduled Date 1/
Submission of Draft Definite Project Report (DPR) to Corps of Engineers, Lower Mississippi Valley Division, North Central Division, agencies, and public for review	Mar 91
Submit final DPR to North Central Division	Dec 91
North Central Division submission of final report to Chief of Engineers	Jun 92
Receive plans and specifications funds	Jul 92
Obtain construction approval by Assistant Secretary of the Army (Civil Works)	Jan 93
Submit final plans and specifications to Lower Mississippi Valley Division for review and approval, and to participating agencies for review	May 93
Obtain approval of the plans and specifications	Jun 93
Advertise contract	Jul 93
Complete construction	Sep 96

1/ Schedule execution could be impacted by public and agency opinion during the review of the Final DPR, as well as the availability of funds.

7. ENVIRONMENTAL EFFECTS OF THE SELECTED PLAN.

The following section presents a discussion of the environmental impacts of the Selected Plan. TABLE 29 is an environmental assessment matrix which summarizes the analysis.

a. Natural Resource Effects.

(1) Physiography-Topography. With the construction of the project, the topography of the Swan Lake area will be altered. The construction of a dike/levee closure and islands represents a permanent change in topography for the area. Overall sedimentation rates will be reduced by 60 percent, and the life span of the lake will be increased.

(2) Hydrology/Hydraulics. The project would alter existing circulation and flow patterns. Except during very high water and periods during critical fish movement, Swan Lake would be closed off from the Illinois River by the riverside levee and lower lake closure. In addition, the lake will be divided into three major compartments separated by two interior closures. The riverside levee and lower rock closure would prevent flow through the lake during minor flood events, except by way of the water control structures. The riverside levee would be overtopped by larger flood events, with recurrence intervals of about once in 3 years or greater. Water level regulation will be possible by a system of water control structures and pumps. At times, local watershed runoff will result in lake water surface elevations higher than what would have occurred in the absence of a project. With a lower lake closure installed, the relative importance of sediment input from the river versus the hillside, will shift from an existing 67% river/33% hillside to a 50% river/50% hillside contribution.

(3) Water Quality. Except for short-term localized increases in turbidity, project construction should result in little impact to the overall quality of lake's water. The mechanical dredging operation for the construction of the dike/levee embankment, closures and islands would be contained by impervious curtains hung from floatational collar devices. The curtains would contain any bottom sediments and associated compounds from reaching other areas of the lake. A curtain would not be removed until the quality of water within the interior of the curtain approximates water conditions on the outside of the curtain. Runoff water from the placement of the dike/levee embankment or from early post-construction storm events would be filtered by straw bails placed at the lakeside toe of the structure. The dike/levee embankment would be seeded and mulched immediately after final grading to reduce erosion potential. The island slopes would be hydro-seeded after construction. A Clean Water Act Section 404(b)(1) evaluation prepared for the project is included in APPENDIX DPR-C. APPENDIX DPR-C also provides the State's Section 401 Water Quality Certification (with conditions) for the project.

The completed project with its sediment, water, and wave control is expected to result in long-term reduction in overall lake turbidity (i.e., increase clarity).

The use of interior water control gates and pumps provides the ability to flush or maintain deeper water in the management units. The ability to increase water depth could reduce the chances for low dissolved oxygen levels when the lake becomes ice covered. In addition, deep areas tend to have more stable winter temperatures. During warmer months of the year, water in newly created deeper areas of the lake would be relatively cool and less affected by high air temperatures. By use of the upstream pump and downstream water release structure, during summer stagnation, the compartments could be flushed with fresh river water. This will increase dissolved oxygen levels and lessen problems associated with algae blooms.

TABLE 29

SWAN LAKE
ENVIRONMENTAL IMPACT ASSESSMENT MATRIX

Parameter	Magnitude of Net Impact: Increasing Beneficial Impact – Significant	Substantial	Minor	No Appreciable Impact	Increasing Adverse Impact – Minor	Substantial	Significant
A. Social Effects							
1. Noise Levels					X		
2. Aesthetic Values			X				
3. Recreational Opportunities			X				
4. Public Health and Safety				X			
5. Transportation				X			
6. Community Cohesion				X			
7. Community Growth/Development				X			
8. Business/Relocations				X			
9. Controversy				X			
B. Economic Effects							
1. Property Values				X			
2. Tax Revenues				X			
3. Public Facilities/Services				X			
4. Regional Growth				X			
5. Employment				X			
6. Business Activity				X			
7. Farmland/Food Supply				X			
8. Commercial Navigation				X			
9. Energy Needs and Resources				X			
10. Flooding Effects				X			
C. Natural Resource Effects							
1. Air Quality					X		
2. Terrestrial Habitat				X			
3. Wetlands	X						
4. Aquatic Habitat	X						
5. Habitat Diversity and Interspersion	X						
6. Biological Productivity			X				
7. Surface Water Quality				X			
8. Water Supply				X			
9. Groundwater				X			
10. Soils		X					
D. Historic Properties				X			

(4) Air Quality. Project construction would result in a temporary increase in exhaust fumes from equipment. Additional short-term impacts to air quality are expected from the mining, hauling, and placement of crushed stone for the rock dike. Contractors will be required to submit an environmental protection plan to include protection methods and procedures providing for air pollution prevention. Overall, no long-term impacts are expected.

(5) Noise. Construction activities will include the use of heavy equipment and chainsaws, which will result in periodic increases in noise levels in the general vicinity of the project area. No long-term impacts to noise are expected.

(6) Prime Farmland. The project will directly impact 33 acres of prime farmland.

(7) Wetlands. A total of 106 acres of wetlands will be directly impacted by the project. Measures have been proposed to offset the loss of these wetlands.

Ninety-five acres of forested wetland will be cleared for the construction of the dike/levee structure, and represents a permanent loss of habitat and the wildlife which it supports. Additional permanent losses of forested wetland include 1 acre for the construction of drainage ditches, and 2 acres for boat access roads. Project-induced impacts on forested and nonforested wetlands are addressed in detail in Sections II and III of APPENDIX DPR-J. In this appendix, the project's effect on the ability of forested wetland to support wildlife has been evaluated and quantified using a habitat-based method developed for the lower Mississippi River Valley. It is expected that the dike/levee structure will increase habitat quality of interior forest by allowing the regeneration of mast-producing trees, such as oaks. On balance, however, the construction of project features is expected to result in a net loss of forest habitat value.

To offset this net loss, the project sponsors (IDOC and USFWS) have proposed to implement a forestry management program for improving wildlife habitat in existing forest. The program is not part of the project recommended in this report. The plan consists of mast tree plantings and enhancement of groundcover and understory coverage on a minimum of 33 acres. Implementation of these measures will occur during the construction process and will offset the net loss of habitat value by a ratio of 1 to 1.5. With these measures implemented, there will be no need to provide mitigation for the loss of 106 acres of forested wetland.

About 8 acres of nonforested wetlands will be permanently lost to construction of the closure structures. On the other hand, about 20 acres of new nonforested wetland habitat will be created from shallow borrow areas needed for project construction. As the project will result in a net gain in acres of nonforested wetland, no mitigation is necessry for this wetland habitat type.

The SCS estimates the borrow pits and ponding that result from construction of the upland sediment control features will furnish 70 new acres of wetlands habitat.

Indirect losses of forested wetland are also addressed in APPENDIX DPR-J. Compensatory measures for these losses was determined not to be required.

(8) Waterfowl. The project will benefit waterfowl by reducing sediment input, by reducing water level fluctuations, by reducing turbidity levels, and by increasing water depths in certain locations.

The dike/levee embankment, in combination with the hillside treatment program, will substantially reduce the input of sediment to the lake. This reduction in sedimentation will slow down the ongoing water to land conversion process that results in a quantitative loss of habitat. Sediment reduction will promote food plant production by reducing the build-up of the soft lake bottom that inhibits plant anchorage, and by reducing the quantity of material contributing to high turbidity levels and indirectly reduced plant photosynthesis.

The dike/levee embankment, in combination with the water control structures (i.e., gates and pumps), will reduce water level fluctuations during the growing season. Moist-soil plant production areas will benefit the most from this water control, since these areas are fairly intolerant of flooding during the growing season. While the low profile levee provided by the project would not eliminate all adverse flood intrusions from the lake, it would reduce the frequency of such events to about 1 in 8 years. The production of aquatic and marsh plants would also benefit from water control. Past research (Belrose et al., 1979) suggests that the more lakes are separated from the river, the more extensive their aquatic and marsh plant beds.

However, past research also suggests that controlling water level fluctuations alone will not likely guarantee increased aquatic and marsh plant production. Belrose et al. (1979) indicates that increases in water turbidity and bottom softness, stemming from sedimentation are also key factors controlling plant production in the Illinois River Lakes. In this regard, the dike/levee and water control structures will also help reduce turbidity by permitting the middle and lower lake units to be periodically drawndown. With a drawdown, bottom solidification is possible. The resulting firmer lake bottom is less prone to the wave disturbance that resuspends sediments into the water column.

As added controls on turbidity, the interior closure and islands would serve to dampen the wave action that resuspends bottom sediments.

The provision for pumps at Swan Lake will ensure water depths can be manipulated to make the food produced available to waterfowl at the time and in the amounts needed.

Diving ducks show a preference for deep water areas for feeding. In this regard, the project's dredged channels should enhance habitat for this waterfowl group.

Overall, dabbling ducks would profit the most from areas of the project devoted to moist-soil plant production, while diving ducks would profit the most from the restoration of native aquatic plant beds with its associated invertebrate community. The canvasback, a diving duck, illustrates well the importance of aquatic plant bed zones. Longleaf pondweed, sago pondweed, duck potato, coontail, wild celery and midge larve were once the principal foods consumed by canvasbacks in the Illinois River Valley. When these plants largely disappeared, canvasback populations declined drastically. In its management of Swan Lake, the Service will be giving special emphasis to the needs of canvasbacks. An attempt will be made to regulate the middle and lower lake compartments for wild celery production. Also, an item of management emphasis will be the increased production of fingernail clams. This clam was once a very important food source for diving ducks, especially for the lesser scaup.

The habitat analysis for the project indicates an anticipated net +148 percent (+1,021 AAHU's) gain for waterfowl. This is a shift of 690 AAHU's in the future without project condition to 1,711 AAHU's in the future with a project.

(9) Fishes. Construction of the dike/levee system will reduce free movement of fishes between Swan Lake and the Illinois River. A new closure structure dividing the lower lake into two compartments will also affect movement patterns of fishes within the lake. However, any negative impacts to fishes are expected to be insignificant relative to the benefits of the project. Fish will still be able to move between the river and lake compartments via the water control/fish passages during critical times of the year (these times to be more clearly delineated by ongoing and future research) and the utility of the lake as fish habitat will be greatly increased. At least initially, more emphasis will be given to the lower lake compartment relative to fish movement needs.

Construction of a riverside dike/levee embankment and a program for soil conservation in the local watershed would reduce the rate of sedimentation. Therefore, the expected life span of the lake would be significantly increased.

The Swan Lake refuge compartments (2,563 acres) would be managed for fish to the extent possible within the guidelines under which the refuge was established. The Service has voiced considerable flexibility in this regard. It has been agreed between the agencies that while waterfowl management remains the primary focus of this EMP project, that major emphasis will also be given to the fisheries resource, particularly in the lower lake compartment. The precise manner in which the lake compartments will be managed, will evolve during the initial years of the project. This fine tuning of the management plan will take into account the results of biological response studies to access alternative water control regimes.

Approximately 50 acres of lake will be deepened by clamshell operations in lower and middle Swan Lake, as a result of dike/levee embankment construction and island creation. These newly created deep areas will provide both resident populations of fishes, as well as river fishes, refuge from harsh or extreme temperatures. Deep water areas are characterized by a more stable water temperature regime. The riverside levee and closure will also reduce the influx of colder river water into the lake.

Overall, the aquatic habitat diversity of the lake will be significantly increased by the project. Clamshelling will add deep water areas. Rocks of different sizes will be used to protect both the exterior and interior closure structures; large rocks underwater will provide new microhabitats such as hard surfaces and crevices for small and medium-sized fishes, as well as sites for various aquatic invertebrates. The islands will provide additional protected shallow shore habitat for juveniles and small fishes. The management emphasis at upper Swan/Fuller Lake will be directed, as in the past, exclusively to moist-soil plant production for dabbling ducks. As such, most of the lake will be drawn down annually. The utility of this area to fish is assumed to be minimal.

Most of lower and middle Swan will be periodically dried (every 8-10 years), in order to solidify the lake bottom. It is expected that some fish will be trapped and die as the water levels are lowered. However, the solidification will ultimately promote increased future plant growth, and fish will once again have access to a reflooded lake. When reflooded, these areas will also provide rich sources of fish prey in the form of aquatic invertebrates. The vegetation will also provide diverse habitat for spawning fish and function as a nursery area for juvenile fishes. Thus, the project is expected to increase the overall productivity of aquatic species in the lake complex.

The habitat analysis for the project indicates an anticipated net +52 percent (+669 AAHU's) gain for fish. This is a shift from 1,287 AAHU's without a project to 1,955 AAHU's with a project.

(10) Other Biota. An improved Swan Lake will contribute to an overall increase in the productivity and diversity of the riverine ecosystem. In addition to waterfowl and large slackwater fish, a vast array of wetlands' dependent species will benefit. Habitat conditions for many endangered and threatened species will improve. As one example, it has been suggested that with the project's provision of clean water, food and cover, that the reintroduction or natural repopulation of this area by river otters may become possible. The hillside sedimentation control program will enhance upland wildlife habitat by providing water at reservoirs, permanent vegetative cover at sediment detention basins, trees planted at bank stabilization areas, and grasses and legumes planted on areas disturbed by construction.

(11) Historic Properties. Archaeological investigation conducted prior to and during construction (in cases where vegetation or water levels preclude earlier fieldwork) will ensure that any significant remains will be located, excavated or protected. Using this mechanism, the District, in coordination with the Advisory Council on Historic Preservation, the state of

Illinois and the Soil Conservation Service, concludes that the effect of the undertaking would not be adverse.

(12) Recreation. Direct access to Swan Lake by fishermen from the Illinois River will no longer be available. Closures constructed at the lower and middle lake will prevent boat traffic from entering Swan Lake from the Illinois River. In order to maintain access to the lake for sport and commercial fishing, roads will be constructed along with two new boat launch sites and parking areas. The improvement of fish habitat should greatly benefit fishing activities over the long-term.

(13) Aesthetics. Clearing of trees for levee embankment construction, and construction of closures and roads are expected to have a somewhat negative impact on the aesthetic quality of the area. Construction activities would have a short-term impact on the aesthetic value of the area. The overall project should enhance the fish and wildlife by improving the habitat quality and increasing the lake's lifespan. Thus, there should be a net benefit to the overall aesthetic quality of the site.

b. Economic and Social Impacts. The hillside sediment control program will reduce the loss of farm land soils. This will contribute to the long-term socio-economic health of the county. The Soil Conservation Service estimates that about 40 jobs will be created in Calhoun County because of the program. The project would enhance fish habitat, thus improving commercial fishing conditions.

c. Relationship of the Proposed Project to Land-Use Plans. The present land use of the project area is for the management of fish and wildlife with emphasis on migratory waterfowl. This project is compatible with this land use and is designed to enhance and promote these land-use plans with direct and subsequent benefits to fish. The USFWS has determined that the proposed project is compatible with existing refuge goals and objectives.

d. Adverse Effects Which Cannot Be Avoided. The clearing of approximately 95 acres of bottomland forest during construction is unavoidable. Approximately 8 acres of aquatic habitat will be lost as a result of the placement of the rock dikes and water control structures. Twenty acres of existing farmland will be used for borrow material.

e. Short-Term Use Versus Long-Term Productivity. The proposed project would improve both the short- and long-term productivity of fish and waterfowl habitat. The project would provide reliable long-term feeding habitat for waterfowl, and long-term spawning, rearing, and wintering habitat for fish.

f. Irreversible or Irretrievable Resource Commitments. Aside from the commitment of funds, labor and construction materials, there would be no permanent loss of natural resources, except for the loss of habitat (95 acres of forested wetlands and 14 acres of nonforested wetlands) necessary for the installation of project features.

g. Compliance With Environmental Quality Statutes. The selected plan was subjected to a review of its degree of compliance with applicable environmental guidelines. The proposed action was found to be in partial or full compliance with applicable guidelines, as indicated in TABLE 30. Full compliance will be achieved as noted.

TABLE 30

COMPLIANCE OF THE SELECTED PLAN WITH WRC - DESIGNATED ENVIRONMENTAL STATUTES

Guidance	Degree of Compliance
Federal Statutes	
Archaeological and Historical Preservation Act, as amended, 16 U.S.C. 469, et seq.	PC (3)
Clean Water Act, as amended, 42 U.S.C. 7401, et seq.	FC
Clean Water Act, as amended, 33 U.S.C. 1251, et seq.	PC (2)
Endangered Species Act, as amended, 16 U.S.C. 1531, et seq.	PC (1)
Farmland Protection Policy Act, 7 U.S.C. 4201, et seq.	FC
Federal Water Protection Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq.	PC (1)
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq.	PC (1)
Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601, et seq.	PC (1)
National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq.	FC
National Historic Preservation Act, as amended, 16 U.S.C. 470a, et seq.	PC (3)
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	NA
Executive Orders, Memorandum, etc.	
Flood Plain Management, E.O. 11988	FC
Protection of Wetlands, E.O. 11990	PC (1)
Analysis of Impacts on Prime and Unique Farmlands, CEQ Memorandum, August 11, 1980	FC

FC = Full Compliance   PC = Partial Compliance   NA = Not Applicable

TABLE 30 (Continued)

(1) Full compliance will be attained after review and comment on the combined DPR/Environmental Assessment.

(2) A Clean Water Act, Section 404(b)(1) evaluation has been prepared. A Conditional 401 Water Quality Certification has been received from IEPA, and the District has determined that it will be able to comply with these conditions. A joint Section 404(b) Section 10, public notice was circulated for public review. No major issues surfaced as a result of that review. This review process will be completed in the near future in order to achieve full compliance with the Clean Water Act.

(3) Full compliance will be attained after signing a historic properties Programmatic Agreement and completion of requirements contained therein.

8. FEDERALLY ENDANGERED SPECIES.

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested from the USFWS a listing of Federally threatened or endangered species that could be present in the project area. The USFWS responded with a list of two species, the bald eagle and the Indiana bat. The District then prepared an Endangered Species Biological Assessment for these species. This assessment is provided as APPENDIX DPR-I.

Based on the assessment, it is the St. Louis District's perspective that the habitat enhancement of Swan Lake, in conjunction with certain measures to avoid conflicts with bald eagles and Indiana bats, would have no effect on Federally endangered species or their critical habitat. The USFWS in its Fish and Wildlife Coordination Act report, dated 7 August 1991, concurs with that conclusion. However, the service noted that since dredging during cold weather might disturb bald eagles, this aspect needs to be further coordinated during the development of Plans and Specifications.

9. IMPLEMENTATION RESPONSIBILITIES AND VIEWS.

a. U.S. Corps of Engineers. The St. Louis Corps District, is responsible for the Swan Lake project's overall management, and its coordination with other agencies. The St. Louis District prepares and submits the DPR; programs funds; finalizes the Plans and Specifications; completes all National Environmental Policy Act requirements; advertises and awards a construction contract; performs construction contract supervision and administration. The District is also responsible for the gathering of quantitative measurements for both the project's performance evaluation monitoring and the biological responses analysis.

b. U.S. Fish and Wildlife Service. The USFWS is responsible for the project's refuge compatibility, endangered species determination, and fish and wildlife planning coordination. This planning coordination includes consideration of problem identification, the evaluation of planning assumptions, and the analysis of physical, chemical and biological responses.

The Service has determined that the project is compatible with the purposes for which the Mark Twain National Wildlife Refuge was established (see APPENDIX DPR-H refuge compatibility statement). In its Fish and Wildlife Coordination Act report, the Ecological Services Office--Rock Island also concurs with the planned project features, and indicates that the project will have no effect on Federally listed threatened or endangered species.

The views of the USFWS on implementation responsibilities, as understood by the North Central Division, are contained in the Fourth Annual Addendum, III.A.1 page 9. In the future, the USFWS will ensure that all lake related O&M activities are conducted in a manner compatible with refuge objectives and management strategies, and will ensure that the O&M is performed in accordance with Section 906 (e) of the Water Resources Development Act of 1986 and the Operation, Maintenance and Rehabilitation Agreement.

c. U.S. Soil Conservation Service. The USSCS has worked closely with Corps on the Swan Lake project, and it believes that the proposed partnership program for hillside sediment control would yield substantial benefits of soil erosion control and fish and wildlife habitat improvement. The USSCS believes that this program is not only the most economically feasible solution to the hillside sedimentation problem, but it also provides a unique opportunity to foster interagency cooperation. It is the intent of the USSCS to sign into a Memorandum of Agreement with the Corps for hillside sediment control portion of the project. Under this agreement, with funding provided by the Corps, the USSCS would provide technical assistance for the advanced design and construction of the hillside feature. Also under this agreement, and in accordance with the Water Resources Development Act of 1986, the USSCS agrees to be responsible for the maintenance agreement between the USSCS and the CCSWCD. Furthermore, the USSCS's intends to provide technical assistance, to the CCSWCD as requested by the CCSWCD.

d. Calhoun County Soil and Water Conservation District. The CCSWCD fully supports the hillside sediment control partnership program, and its mutually beneficial outputs of erosion control and habitat rehabilitation and enhancement. The CCSWCD intends to serve as the sponsor for that project feature, providing a 25 percent cost-share for construction and 100 percent of the costs for O&M. Further, it will carry out its O&M responsibilities as outlined in an O&M agreement between the SCS and the CCSWCD. This agreement will be accomplished in accordance with the Water Resources Development Act of 1986. Any mutually agreed to rehabilitation will be cost shared on a 75 percent Federal and 25 percent local sponsor basis.

e. Illinois Department of Conservation. IDOC has participated in the identification and definition of problems, needs, opportunities, measures, plans, and monitoring at the Swan Lake HREP site. IDOC is prepared to serve (through the USFWS) as the non-Federal sponsor (contributing a 25 percent cost-share for O&M) for the upper Swan/Fuller Lake area, and will cooperate with the USFWS to assure that O&M activities, as described in the DPR, and any mutually agreed upon rehabilitation, will be accomplished in accordance with the Water Resources Development Act. In addition, the Department will provide field observations for the upper Swan/Fuller Lake portion of the site (via the annual management report for Cooperative Agreement Lands) for the project's performance evaluation monitoring.

10. COMPARISON: DPR SELECTED PLAN VERSUS ORIGINAL FACT SHEET CONCEPT.

a. Location. The original fact sheet defined the project area as the 2,400 acre Mark Twain National Wildlife Refuge. The acreage for the portion of Swan Lake managed directly by the USFWS has been corrected to 2,600 acres. It was necessary, for hydraulics and cost-effectiveness reasons to add the 500 acre IDOC managed upper Swan Lake/Fuller Lake area to the project. Thus, the immediate project area consists of 3,100 acres of lake habitat, and 950 acres of bottomland forest and 550 acres of cropland surrounding these lakes. Also included for planning purposes was the adjacent 30 square mile local watershed drainage area.

b. Resource Problem. The original description of the resource problems affecting Swan Lake was understated. Lake sedimentation is due, not only to river floods, but to a large degree from hillside runoff as well. Water level fluctuations and the importance of soft sediment deposits on the lake bottom were not explained in the original fact sheet.

c. Proposed Project. The need for a riverside dike/levee to control the sediment and water level influence of the Illinois River was not foreseen during development of the original concept. The hydrological impacts of refuge management on the adjacent IDOC managed site were not foreseen at the outset. Thus, dike/levee and water control structures needed at upper Swan Lake/Fuller Lake were likewise not foreseen. No provisions were made in the original concept for hillside sediment control, since the importance of this influence was not recognized. The refuge was broken up into two, rather than three management units as a cost-savings measure. Islands rather than wing dams were used for fetch control, since islands would additionally provide optimal habitat conditions for nesting mallards. Boat access areas were included to offset impacts to existing access areas.

d. Proposed Outputs. The project outputs originally envisioned for the project will be achieved. Additional biological benefits will also be achieved by the inclusion of the 500 acre upper Swan Lake/Fuller Lake area.

e. Financial Data. While the general design cost remains at about 8 percent of total project cost, the total project cost has increased. This cost change is related to an inadequate initial cost estimate, and to an under scoping of the complex problems affecting the site. The initial fact sheet estimate was not adjusted to take into account costs associated with engineering and design, supervision and administration, contingencies, and inflation. All project changes were coordinated with, and approved by, the project sponsors. Due to the critical biological importance of this project, the sponsors have maintained its high priority in spite of higher than anticipated costs.

ORIGINAL FACT SHEET

CELMS-PD-F1

23 October 1987

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM
FACT SHEET

SWAN LAKE, ILLINOIS
ILLINOIS RIVER (Mississippi River Backwater)

LOCATION: Swan Lake is located on 2,400 acres of the Mark Twain National Wildlife Refuge along the west bank of the Illinois River between river miles 5 and 10.

RESOURCE PROBLEM: Sediment deposited by floods and turbidity due to wind action have dramatically reduced the habitat value of this area. Between 1955 and 1985 waterfowl use days declined from 21 million to 3 million. The quality of the fishery has also declined as the shallower water has allowed higher temperatures and reduced dissolved oxygen concentrations during the summer months.

PROPOSED PROJECT: Three low level riprapped dikes with stop log structures and pumping facilities would be provided so that water levels could be manipulated as required for moist soil and fisheries management. The two upstream compartments would be managed for waterfowl. The downstream compartment would be managed for fisheries. Deeper channels would be dredged to improve water characteristics and to provide a winter fish refuge. Wing dams would be constructed to extend into the lake, thereby reducing the fetch and decreasing wave action and also providing shelter for juvenile fish.

PROJECT OUTPUTS: Some 2,400 acres would be restored to prime fish and wildlife habitat. Under pre-existing conditions, the luxuriant plant growth nourished many species of marsh and water birds. The fish population included goodly numbers of bass, crappie and channel catfish. The area was also an important feeding ground for bald eagles.

FINANCIAL DATA: General design and construction costs are estimated to be $200,000 and $2,640,000, respectively. Because the project would be located on lands of the National Wildlife Refuge System, all implementation costs would be 100 percent Federal. A draft Local Cooperation Agreement with the Illinois Department of Conservation, providing for the State to assume 25 percent of the O&M costs, would be processed with the Definite Project Report.

REVISED FACT SHEET

CELMS-PM-M

25 November 1991

NAME OF PROJECT: Upper Mississippi River system--Environmental Management Program (UMRS-EMP), Swan Lake Habitat Rehabilitation Project.

LOCATION: The Swan Lake Project is located adjacent to the west bank of the Illinois River between river miles 5 and 13. The immediate project area consists of 2,900 acre Swan Lake, 200 acre Fuller Lake, and approximately 950 acres of bottomland forest and 550 acres of cropland surrounding these lakes. Also included in the project area is the local watershed adjacent to Swan Lake's west shore.

RESOURCE PROBLEM: Sedimentation, water level fluctuation and wind induced wave action have severely degraded the habitat value of Swan Lake. Current sedimentation rates indicate that 30 percent of the lake surface acreage will be lost over the next 50 years from the flood waters of the Illinois River and from hillside runoff. This will result in a direct loss of wetland habitat for both waterfowl and fish. Fluctuating water levels have negatively affected fish spawning, rearing, and wintering as well as the availability of plants to waterfowl. Wind generated wave action has caused high turbidity levels that have limited aquatic plant production at the site.

PROJECT: The project includes, (1) a riverside dike/levee, to retard the deposition of river sediment, and to reduce the influence of river stage fluctuations, (2) an interior lake closure to subdivide the lake's refuge into independently managed compartments, (3) water and sediment control basins and ponds to reduce sediment from the hillside, (4) island groups to reduce turbidity levels by serving as barriers to wind generated wave action, (5) a gated corrugated metal pipe at upper Swan/Fuller Lake, and a combination sluice gate/stop-log structure with an open top channel between river and lake, to help regulate water levels, (6) couch pumps to meet recharge and dewatering needs, and (7) boat access areas to mitigate for impacts to existing access areas.

PROJECT OUTPUTS: The proposed project will eliminate approximately 60 percent of future sediment deposition into the lake. The dike/levee, closures, gated structures, and pumps will provide a significant degree of water control which will permit greater production of food plants. Islands will reduce the wave action that presently limits plant photosynthesis and plant anchorage. Enhanced habitat and food production will result for both fisheries and waterfowl.

FINANCIAL DATA: The total estimated cost of this project is $7,854,000. The estimated annual operations and maintenance cost is $61,050. The hillside program would take place on lands made available through the program's local sponsor (i.e., the Calhoun County Soil and Water Conservation District). Construction costs for the hillside feature would be 75 percent Federal and 25 percent non-Federal. All other project features are on Corps of Engineers-owned General Plan lands. These lands are "managed as a national wildlife refuge" by the U.S. Fish and Wildlife Service and the Illinois Department of Conservation under a Cooperative Agreement with the U.S. Fish and Wildlife Service and the Corps of Engineers. Under Section 906 (e) of the 1986 WRDA, implementation costs are 100 percent Federal. Annual operation and maintenance requirements will be satisfied through agreement with the U.S. Fish and Wildlife Service and the Illinois Department of Conservation.

11. COORDINATION, PUBLIC VIEWS, AND COMMENTS.

The Federal, state and local agencies receiving the Definite Project Report and Environmental Assessment are listed in APPENDIX DPR-D.

Numerous joint field reconnaissance trips and study meetings have been conducted by representatives of the St. Louis District, USFWS, IDOC, USSCS and CCSWCD. Representation from the USFWS included refuge, ecological services, fisheries assistance, and EMP personnel. Representation from IDOC included personnel from the land management, planning and fisheries divisions. In addition, various coordination meetings have also involved the Illinois EPA, Illinois Department of Agriculture, USEPA, Corps' Waterways Experiment Station, Southern Illinois University-Carbondale, Illinois Natural History Survey, Ducks Unlimited and Partners for Wetlands.

Additional coordination was carried out as a result of public and agency review of the Draft DPR/Environmental Assessment/Draft Finding of No Significant Impact. During the 30-day public review period, a public workshop was held. The general public was notified via news releases, and public notices sent via mail and postings at key public facilities. Planning team members and the project sponsors were in attendance to discuss the project. Displays were provided to further enhance the public's understanding of the project.

The St. Louis District's responses to the Draft DPR review comments is provided as APPENDIX DPR-B to this report, and a brief summary of the comments and responses is provided by TABLE 31. The USFWS has provided comments in a letter (see APPENDIX DPR-H), which constitutes its Fish and Wildlife Coordination Act Report as compliance with Subsection 2(b) of the Fish and Wildlife Coordination Act, and Section 7 consultation requirements of the Endangered Species Act of 1973, as amended. The Service concurs with the APPENDIX I (biological assessment) that the project will have no effect on Federally listed threatened or endangered species. However, as recommended by the Service, the actual dates and locations of cold weather dredging will be closely coordinated with the Service during the Plans and Specifications phase of the project. The District agrees with the Service's letter report recommendations for the development of a detailed project monitoring plan and an operations manual during the construction phase of the project.

In July 92, the Final DPR, signed FONSI, and Public Notice for Section 404/Section 10 regulatory compliance was released to the public. The comments were generally minor, and no unresolvable issues were identified. Six letters of comment were received during the public review period. Five of the letters were from agencies and one from a private organization, the Golden Eagle Wildlife Preserve.

The wildlife preserve made an inquiry as to the possible effect of the Swan Lake project on its operations. After investigating these concerns, the District concluded that the project would have no adverse influence on the preserve. IDOC mentioned a couple of concerns regarding potential construction related impacts to bald eagles. The District clarified its agreements with the USFWS regarding this Federally endangered species. The USFWS provided a letter concurring in the issuance of permit for the project. Letters of comment were received from both the Kansas City and Chicago regional offices of the USEPA, both agencies were supportive of the project. No new issues were raised by the Kansas City regional office and the District's responses were directed more at points of clarification. The Chicago office raised issues regarding the mitigation method of analysis, and the level and location of mitigation. The District believes that these issues have now been adequately addressed by the revised Final DPR report. The Illinois SHPO provided a letter concurrence with the Programmatic Agreement, and indicated that it would accept the FONSI once all involved parties have signed that agreement.

TABLE 31

SUMMARY OF DRAFT DPR COMMENTS AND ST. LOUIS DISTRICT ACTION TAKEN

Comment	Action Taken
Public Meeting Comments	
1. Project Needed	District concurs
2. West lake shore lands acquisition by easements preferred over fee title purchase	This decision resides with USFWS
3. More detailed information desired on west lake shore lands acquisition	USFWS will initiate a landowners information meeting in near future
4. Concerned about potential for upstream flooding impacts	HEC model indicates no impacts expected
5. O&M impacts would be more effective with a Federal dollar contribution	District disagrees, O&M agreements developed will assure effective O&M
6. Need to consider potential impacts to AT&T cable crossing	District will coordinate closely with AT&T during P&S phase
Corps' Comments	
1. Levee scour protection needed at upper end of project	District concurs, buffer zones will be created with tree plantings
2. Hillside sediment control program has implementation mechanics problems	Mechanism has been revised to address these concerns
3. West lake shore lands impacted by water level changes can't be acquired using EMP funds	USFWS will acquire the lands using non-EMP funds
4. Bottomland forest habitat losses must mitigated	DPR now includes a mitigation analysis and proposed mitigation
Agency Review Comments	
1. Need a mitigation methodology not biased towards wetlands species	HES community-based analysis was used for forest habitat mitigation analysis
2. Concern over future hydrology impacts on bottomland forest habitat on project interior	Hydrology change is expected to be beneficial to forested habitat

TABLE 31 (Continued)

Comment	Action Taken
3. Soil conservation in addition to structural improvements is needed	District concurs and supports SCS future pursuits and steering committee to enhance non-structural conservation measures
4. Concern over potential primary water quality impacts	Additional literature research and analysis indicates that proposed procedures to safeguard lake's water quality are sufficient
5. Concern over potential secondary water quality impacts	The District believes that any secondary impacts will be minimal
6. A pump unit is needed at the upper Swan/Fuller Lake unit	A pump at this location is now included in the project plan
7. Borrow pits at upper Swan/Fuller Lake unit should be configured to optimize wetlands habitat value	District concurs
8. Water management plan wording	Text changes have been made throughout the DPR
9. The need for fish screens should be assessed	Fish screens are now included in project plan
10. Culvert pipe invert at upper Swan/Fuller Lake should be lowered by one foot	District concurs
11. Post-project Corps hosted coordination meetings needed to reassess water management plan	District concurs
12. Swan Lake interior closure should be moved south to original alignment position	District concurs
13. An Illinois Department of Transportation permit is required	A permit application has been completed and submitted to IDOT
14. Concerned about potential impact of project on upstream flooding	HEC model analysis indicates no impacts
15. Need to assess impacts of project on navigation	No impacts anticipated
16. Need to assess project encroachment on lake	No encroachment anticipated
17. Need to assess impacts on rights, interests or uses	Project will enhance intended purposes of the refuge. USFWS will acquire real estate rights for land affected by future lake water level management

TABLE 31 (Continued)

Comment	Action Taken
	Organization's Comments
1. Borrow pits should be configured to optimize wetland's benefits	District concurs
2. Road surfacing needed along Swan Lake interior closure to the water control structure	District concurs
3. A pump unit is needed at upper Swan/Fuller Lake	District concurs
4. Project cost-cutting measures and lack of agreement with SCS on hillside program will make project less than top notch	SCS and the District are in agreement on the hillside program. Cost-cutting efforts have been accomplished without compromising project objectives
5. Additional fisheries sampling data is available	The new data has been incorporated into the DPR
6. Disagree with management goals wording in DPR text	Wording adjustments have been incorporated into the DPR
7. The needs of fish need to be considered in the project in addition to waterfowl	Considerable focus has been given to the fisheries, as evidenced by the many fisheries related features and interagency flexibility with regard to the lake's management
8. Certain text statements are ambiguous/contrary	Referenced statements have been re-examined
9. A diversity of island plantings is needed	The District concurs, and the USFWS proposed management for that area will assure such diversity
10. Shoreline erosion protection is needed for the islands	The District concurs, and shore stabilization using woody vegetation will be employed
11. Biological response monitoring scope of work should be included in the report	The District's draft proposal for the biological response analysis is now included in the DPR

12. CONCLUSIONS.

Sedimentation, water level fluctuations, and waves have hampered past habitat management efforts at the Swan Lake site. Sedimentation is causing a rapid conversion of aquatic habitat to terrestrial habitat with a resulting long-term quantitative loss of fish and waterfowl habitat. Fluctuating water levels at the site have impacted the productivity of the site via effects on fish spawning, rearing and wintering, and on the production of plants and their availability to waterfowl. Wind generated wave action has caused high turbidity levels that have limited aquatic plant production at the site.

Swan Lake has been recommended to the Corps of Engineers, St. Louis District, by the Fish and Wildlife Service and the Illinois Department of Conservation for priority inclusion in the UMRS-EMP.

The proposed project would eliminate approximately 60 percent of future sediment deposition into the lake (43 percent via the riverside dike/levee and 17 percent via hillside sediment traps). This sediment reduction would enhance both the longevity and productivity of Swan Lake as fish and wildlife habitat. The dike/levee embankment and closures, in combination with the gated water control structures and pumps, would provide a significant degree of control over water levels. This control will enable a greater productivity and availability of food plants and associated invertebrates for migratory waterfowl. Cover for fish will also increase in response to water control. Water control will provide the ability to solidify the lake bottom, and this will stimulate increased plant production. The barrier afforded by the dike/levee against cold water intrusion, and the potential use of the dike/levee as a means of increasing winter water depth, will help reduce physiological stress on fish. The subdivision of the lake into multiple units will allow for increased habitat diversity. The construction of islands will help to reduce the wave action that presently limits both plant photosynthesis and anchorage. Only Alternative C, a wetlands protection system, was found to meet all of the planning objectives and is compatible with the refuge management objectives.

13. **RECOMMENDATIONS.**

I have weighed the accomplishments to be obtained by implementing this habitat rehabilitation and enhancement project versus the costs, and have also considered the scope and the special locational factors associated with the project. In my judgment, implementing the proposed project would entail a justified expenditure of Federal funds.

I recommend that the Secretary of the Army, under the provisions of Public Law 99-662, approve this project for habitat rehabilitation and enhancement at Swan Lake in Calhoun County, Illinois. Letters of Intent have been furnished by the U. S. Fish and Wildlife Service and the Illinois Department of Conservation. I further recommend that an Operations, Maintenance, and Rehabilitation Agreement be approved for execution. The total estimated cost of this project is $7,854,000. The CCSWCD would incur construction related costs in the amount of $262,500 for the hillside sediment control program. All other project construction costs ($7,591,500) would be entirely a Federal cost according to the provisions of Public Law 99-662. Of this amount, I ask that $356,000 be allocated so that Plans and Specifications phase work can be initiated as soon as possible.

for Richard Bartol Maj, Act CDR
James D. Craig
Colonel, U.S. Army
District Engineer

14. LITERATURE CITED AND GENERAL REFERENCES

Bellrose, F. C., S. P. Havera, F. L. Paveglio, Jr., and D. W. Steffeck. 1983. The fate of lakes in the Illinois River valley. Illinois Natural History Survey Biological Notes No. 119. 27 p.

Bellrose, F. C., F. L. Paveglio, Jr., and D. W. Steffeck. 1979. Waterfowl populations and the changing environment of the Illinois River valley. Illinois Natural History Survey Bulletin 32(1): 1-54.

Cahill, R. A., and J. D. Steele. 1986. Inorganic composition and sedimentation rates of backwater lakes associated with the Illinois River. Environmental Geology Notes 115. Illinois Department of Energy and Natural Resources, State Geological Survey Division, Champaign, Illinois. 61 p.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Fish and Wildlife Service, Biological services program; FWS/OBS-79/31, U. S. Department of the Interior, Washington, D.C.

Havera, S. P. 1985. Waterfowl of Illinois: Their status and management. Final report, Surveys and Investigations Projects, Illinois, Federal Aid Project No. W-88-R-1-5, Cooperative Waterfowl Research. Illinois Natural History Survey. 752 p.

Havera, S. P., and F. C. Bellrose. 1985. The Illinois River: A lesson to be learned. Wetlands 4: 29-41.

Illinois Natural History Survey (INHS). (no date). The Illinois River: A lost resource or a recoverable one? Mimeograph, 2 pages.

Karr, J. R., L. A. Toth, and D. R. Dudley. 1985. Fish communities of midwestern rivers: A history of degradation. BioScience 35: 90-95.

Klein, W. M., R. H. Daley, and J. Wedum. 1975. Environmental inventory and assessment of Navigation Pools 24, 25, and 26, upper Mississippi and lower Illinois rivers: a vegetational study. Missouri Botanical Garden. Final report to U.S. Army Corps of Engineers, St. Louis District. DACW39-74-0088.

Lee, M. T., and J. B. Stall. 1982. Sediment conditions in backwater lakes along the Illinois River - Phase 1. State Water Survey Division Contract Report 176A. Surface Water Section at the University of Illinois, Champaign, Illinois. 73 p.

Lewis, M. M., and L. Bodensteiner. 1986. State of health and impingement of freshwater drum at Quad Cities station. Final Report to Commonwealth Edison Company, Chicago, Illinois.

Mills, H. B., W. C. Starrett, and F. C. Bellrose. 1966. Man's effect on the fish and wildlife of the Illinois River. Illinois Natural history Survey Biological Notes No. 57. 24 p.

Sheehan, R. J., W. M. Lewis, L. R. Bodensteiner, D. E. Logsdon, P. and S. Wills. 1988. Winter habitat requirements and overwintering of rivering fishes. Annual Performance Report F-79-R-1, Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois.

Sheehan, R. J., W. M. Lewis, L. R. Bodensteiner, D. E. Logsdon, P. and S. Wills. 1989. Winter habitat requirements and overwintering of riverine fishes. Annual Performance Report F-79-R-2, Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois.

Smith, P. W. 1979. The fishes of Illinois. University of Illinois Press. Urbana, Illinois. 314 p.

Solomon, R. C., D. R. Parsons, D. A. Wright, B. K. Colbert, C. Ferris, and J. E. Scott. 1975. Environmental inventory and assessment of Navigation Pools 24, 25, and 26, upper Mississippi and lower Illinois rivers: Summary report. U.S. Army Waterways Experiment Station, Vicksburg, Miss. Technical Report Y-75-1.

Sparks, R. E. 1974. An electrofishing survey of the Illinois River. Final report prepared for the U.S. Army Corps of Engineers, Waterways Experiment Station. Vicksburg, Mississippi. 84 p.

Sparks, R. E. 1975. Environmental inventory and assessment of navigation Pools 24, 25, and 26, Upper Mississippi and lower Illinois rivers: An electrofishing survey of the Illinois River. Contract report No. Y-74-4 for St. Louis District, U.S. Army Corps of Engineers, St. Louis.

Sparks, R. E. 1984. The role of contaminants in the decline of the Illinois River: Implications for the Upper Mississippi. Pages 25-66 in J. G. Wiener, R. V. Anderson, and D. R. McConville (editors). Contaminants in the Upper Mississippi River, Proceedings of the 15th Annual Meeting of the Mississippi River Research Consortium. Butterworth Publishers, Stoneham, Maine.

Sparks, R. E., and W. C. Starrett. 1975. An electrofishing survey of the Illinois River, 1959-1974. Illinois Natural History Survey Bulletin 31(8): 317-380.

Terpening, V. A., J. R. Nawrot, M. J. Sweet, and D. L. Damrau. 1975. Environmental inventory and assessment of Navigation Pools 24, 25, and 26, upper Mississippi and lower Illinois Rivers: Flood plain animals and their habitats. Southern Illinois University, Carbondale. Final Report U.S. Army Corps of Engineers, St. Louis District. DACW39-74-0107.

U. S. Fish and Wildlife Service (USFWS). 1987. Refuge management plan, Calhoun District, Mark Twain National Wildlife Refuge, Burssels, Illinois.

Wang, W. and D. J. Brabec. 1969. Nature of turbidity in the Illinois River. Journal American Water Works Association 61: 460-464.

15. LIST OF PREPARERS.

The Corps staff members primarily responsible for preparing this document are listed in TABLE 32.

TABLE 32

**DEFINITE PROJECT REPORT/
ENVIRONMENTAL ASSESSMENT PREPARERS**

Name	Expertise/Discipline	Experience
Clarence Buel	Soil Conservationist Interagency Liaison	13 yrs Watershed Planning 3 yrs Program Management
Sharon Cotner	Project Manager, EMP	9 yrs Planning - Study Manager 2 yrs Project Mgmt, SLD
Ron Dieckmann	Hydrologic/Hydraulic Engineering	18 yrs Hydrology/Hydraulic Design
Greg Dyn	Civil Engineering Technician/Cost Estimator	9 yrs Engineering Division, SLD
Dave Gates	Study Manager, Habitat Planning Analysis	10 yrs Wildlife Biologist, 2 yrs Natural Resource Planner (Study Management), SLD
Tim George	Wildlife Biology; WET Analysis, Clean Water Act Compliance, Habitat Mitigation Analysis	10 yrs Wildlife Biologist
Suzanne Harris	Archaeology/Historic Sites	20 yrs Archaeologist 6 yrs Archaeologist, SLD
Clyde Hopple	Geotechnical	12 yrs Engineering Division, SLD 9 yrs Geotechnical Design, SLD
Diane Jones	Realty Clerk/Tehnician Realty Specialist	14 yrs Acquisition Branch 6 yrs Planning Control, RE
David Leake	EMP Coordinator Planning Division	17 yrs Planning - Study Mgmt, SLD 1 yr Structural Design 2 yrs Construction Contract Mgmt
Ida Morris	Secretary	17 yrs Corps of Engineers, SLD
Roger Myhre	Hydrologist/Limnologist	16 yrs Water Quality/ Environmental Quality
Gary Lee	Civil Engineering/Design	5 yrs Quality Assurance and Construction Management 2 yrs Facility Engineering and Design, Operations Division 2 yrs Civil/Structural Engineering Design, SLD
Leo Nico	Fisheries/Ecology; Environmental Assessment, Endangered Species, Clean Water Act Compliance	5 yrs Fishery Biologist, SLD Ph.D. Candidate

TABLE 32 (Continued)

Name	Expertise/Discipline	Experience
F. Terry Norris	Archaeology/Historic Sites	13 yrs Archaeologist, SLD
Riley Pope	Civil Engineering Technology/Civil Engineering Technician	19 yrs Engineering Division; Design Branch, Civil & Structural Sections, SLD 4 yrs Planning Division; Plan Formulation Branch
Chuck Rhoads	Civil Engineering Technician/ Cost Estimate	17 yrs Engineering Division, Cost Engineering Branch, SLD 13 yrs Consulting Engineering Firm

The staff of other agencies making major contributions to the preparation of this document are listed in TABLE 33.

TABLE 33

Definite Project Report/ Agency Contributors

Name	Agency	Role
Patti Meyers	USFWS - MTNWR	Swan Lake Site Manager
Leroy Sowl	USFWS - MTNWR	Refuge EMP Coordinator
Mike Bornstein	USFWS - MTNWR	Refuge EMP Coordinator
Bruce Stebbings	USFWS - ES, Marion, IL	Ecological Services
Tom Groutage	USFWS - ES, Marion, IL	Ecological Services
Chuck Davis	USFWS - Rock Island, IL	Ecological Services
Bob Stratton	USFWS - MTNWR	MTNWR Manager
Chuck Surprenant	USFWS - Carterville, IL	Fisheries Assistance
Jenny Rundell	USFWS - LTRM Field Sta	Field Sta Representative
Chuck Thieling	USFWS - LTRM Field Sta	Field Sta Representative
Rick Wright	USFWS - LTRM Field Sta	Field Sta Representative
Pam Thiel	USFWS - EMTC	HREP Monitoring Coordinator
Ken Labinski	USFWS - EMTC	Problem Analysis Coordinator
Bill Donels	IDOC - Springfield, IL	Planning
Neil Booth	IDOC - Rosedale, IL	Field Office Manager
Butch Atwood	IDOC - Greenville, IL	Fisheries

TABLE 33 (Continued)

Name	Agency	Role
Deck Major	IDOC - Alton, IL	Region IV, Wildlife Administrator
Dave Harper	IDOC - Alton, IL	District Wildlife Biologist
Chris Borden	USSCS - Hardin, IL	District Conservationist
Richard Macho	USSCS - Edwardsville, IL	Area Soil Conservationist
Gary Parker	USSCS - Champaign, IL	Asst. State Conservationist
Bruce Yurdin	IEPA - Springfield, IL	Water Quality
Ken Friedel	CCWSCD	District Chairman
Bob Sheehan	SIU-C	Fisheries Biologist
Bob Gates	SIU-C	Wildlife Biologist
Rip Sparks	INHS	Fisheries Biologist
Steve Havera	INHS	Waterfowl Biologist

16. FINDING OF NO SIGNIFICANT IMPACT

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

(1) I have reviewed and evaluated the documents concerning the proposed rehabilitation and enhancement of Swan Lake.

The purpose of the project is to rehabilitate and enhance wetland habitat at Swan Lake for both migratory waterfowl and fish. This is to be done by reducing sediment deposition from river flooding and hillside runoff, by controlling interior water levels, and by reducing wind generated wave action. The project would be funded under the provisions of Public Law 99-662.

(2) Prior to my decision, I evaluated other pertinent data and information which addresses the various practicable alternatives. As part of that evaluation, I considered:

a. the "No Action" alternative,

b. a "Wetlands Excavation" alternative,

c. the proposed or recommended plan, referred to as the "Wetlands Protection" alternative, and

d. various alternative component features leading to the recommended plan (e.g., various dike and levee heights and alignments, various hillside sediment control programs, etc.).

(3) These alternatives have been studied, and major findings of this investigation include the following:

a. The "No Action" alternative was evaluated but subsequently rejected. This alternative would do nothing to address study objectives relating to sedimentation control, water level control, bottom solidification, wave control, management unit subdivision, deep water needs, and cold water buffering.

b. The "Wetlands Excavation" alternative was also found to be unacceptable. It would not alter future sedimentation, it would not provide a means of regulating water levels, it would not allow for bottom solidification, wave control, management unit size reduction, nor would it provide the ability to buffer the river's cold water effects during the winter and spring. The plan would provide a short-term increase in deepwater habitat, and would provide short-term fish access/passage.

c. The "Wetlands Protection" alternative represents an innovative approach to wetlands management and was found to be fully responsive to the project objectives, and was designated as the Selected Plan. Most importantly, it would greatly reduce the sedimentation rate, it would provide: a reliable means of water control, a means of periodically resolidifying the lake bottom, and a means of reducing wave action. It would subdivide the lake into smaller management units, it would provide limited deep water habitat for wintering fish, it would provide opportunity for fish movement during the fall, it would buffer cold water effects on wintering fish, and it would provide alternate structures so as to assure fish passage. Specific options considered in detail included: dike/levees, lake closures, water control/fish passage structures, hillside sediment control structures, dredging, and islands creation.

(4) The possible consequences of the recommended plan have been studied for physical, environmental, cultural, social and economic effects. Major conclusions of this study are as follows:

a. The construction of the project represents a permanent change in the topographic and hydrographics of the Swan Lake area. These changes are necessary for water, sediment, and wave control.

b. The project is in compliance with the requirements of the Clean Water Act Section 404(b)(1) guidelines. State water quality certification under Section 401 has been received. The proposed project would likely have minimal adverse impacts on water quality.

c. No project effects are expected on upstream river elevations during floods. Any project induced bank erosion is expected to be minimal.

d. There would be a major benefit to waterfowl and fish. The project would result in an estimated net gain of +1,021 non-forested wetland average annual habitat units (AAHU's) for waterfowl and +669 AAHU's for fish. To make these non-forested wetland benefits possible, a total of 95 acres of forested wetland would have to be cleared as part of project construction.

e. A professional archaeologist would monitor construction activities for the presence of archaeological remains. If such remains are found, construction will be postponed until an archaeological investigation is conducted.

f. Fishing at Swan Lake proper and hunting at Fuller Lake is expected to improve as a result of project habitat improvements. A loss of direct access to Swan Lake by fishermen from the Illinois River is partly offset by the inclusion of two west lake shore boat access areas.

g. It is anticipated that the proposed action will have little or no adverse impact on air quality, noise, socioeconomic resources and aesthetics.

h. A loss of 33 acres of prime farmland will occur as a result of the project.

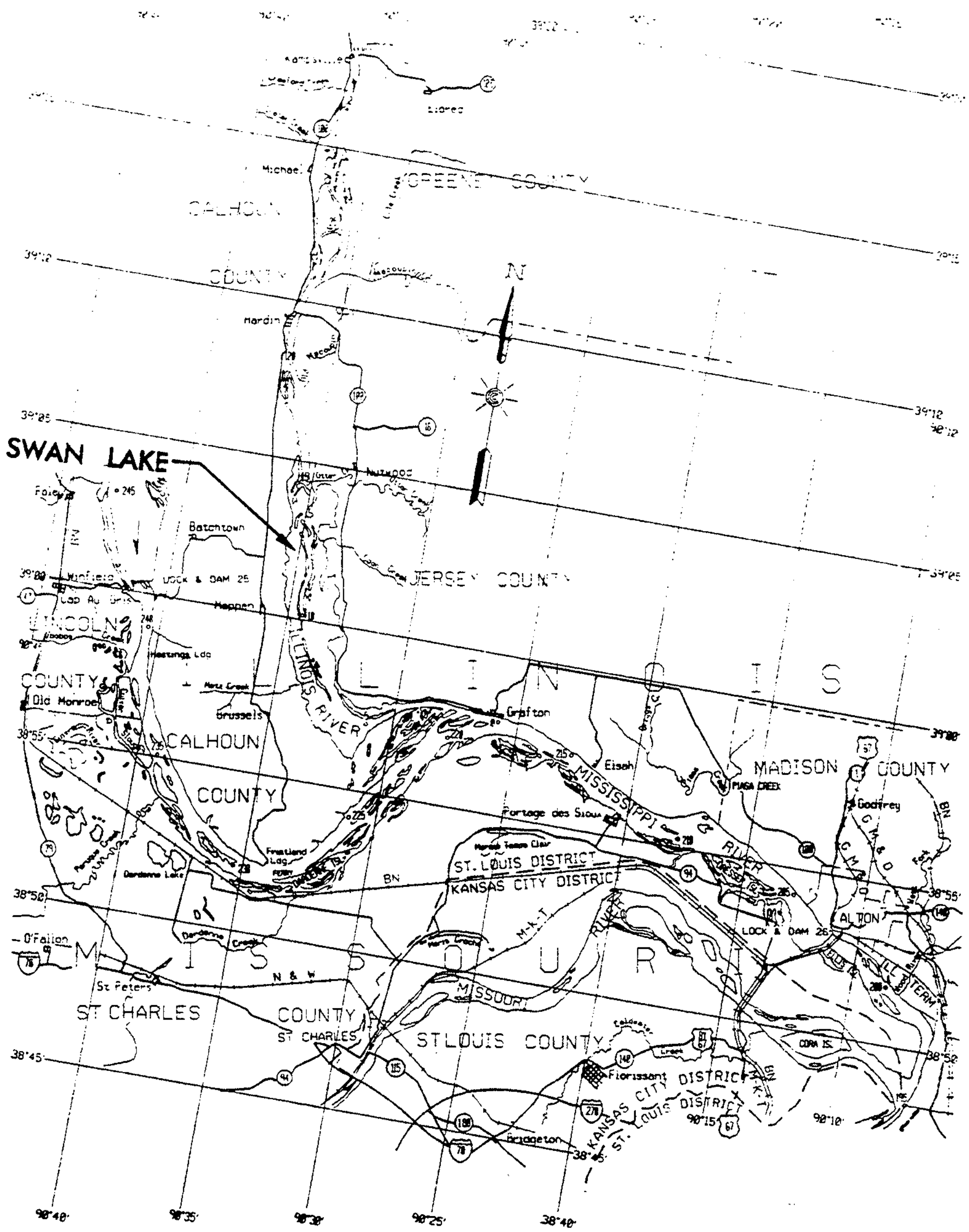
i. No Federally listed endangered species will be adversely affected by the proposed action.

(5) Based on my analysis and evaluation of the alternative courses of action presented in the Environmental Assessment, I have determined that the rehabilitation and enhancement of Swan Lake will not have major adverse environmental effects, but will have important beneficial effects on the quality of the environment. Therefore, No Environmental Impact Statement will be prepared prior to proceeding with this action.

15 Jan 93
Date

for James D. Craig
Colonel, U.S. Army
District Engineer

PLATES



PROJECT LOCATION

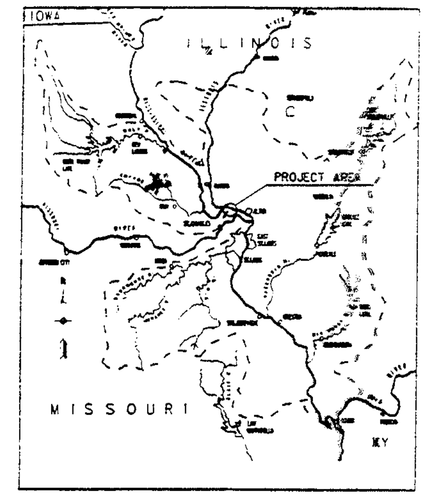
APPROX. SCALE IN MILES

LEGEND

District Boundary

DRAWING INDEX

PLATE *	SHEET	TITLE
1	1 OF 25	PROJECT LOCATION, DRAWING INDEX AND VICINITY MAP
2	2 OF 25	SITE PLAN
3	3 OF 25	SITE PLAN
4	4 OF 25	LEVEE SITE PLAN
5	5 OF 25	LEVEE SITE PLAN
6	6 OF 25	LEVEE SITE PLAN
7	7 OF 25	LEVEE SITE PLAN
8	8 OF 25	LEVEE SITE PLAN
9	9 OF 25	LEVEE SITE PLAN
10	10 OF 25	LEVEE SITE PLAN
11	11 OF 25	LEVEE SITE PLAN
12	12 OF 25	LEVEE SITE PLAN
13	13 OF 25	LEVEE PROFILE STA. 0+00 TO STA. 200+00
14	14 OF 25	LEVEE PROFILE STA. 200+00 TO STA. 400+00
15	15 OF 25	LEVEE PROFILE STA. 400+00 TO STA. 485+29
16	16 OF 25	CHANNEL NO. 1 PROFILE STA. 0+00 TO STA. 200+00
17	17 OF 25	CHANNEL NO. 1 PROFILE STA. 200+00 TO STA. 333+40
18	18 OF 25	LOWER BARRIER ISLANDS PROFILE AND CHANNEL NO. 2 PROFILE
19	19 OF 25	INTERIOR CLOSURE PROFILE AND CHANNEL NO. 3 PROFILE
20	20 OF 25	UPPER BARRIER ISLANDS PROFILE AND CHANNEL NO. 4 PROFILE
21	21 OF 25	INTERIOR CLOSURE 48" DIA. DRAINAGE STRUCTURE PLANS AND SECTIONS
22	22 OF 25	PUMP STATION / CONTROL STRUCTURE AND DRAINAGE STRUCTURE DETAILS
23	23 OF 25	PUMP STATION/CONTROL STRUCTURE STA. 349+50
24	24 OF 25	MISCELLANEOUS SECTIONS AND DETAILS
25	25 OF 25	MISCELLANEOUS SECTIONS AND DETAILS



VICINITY MAP

APPROX. SCALE IN MILES

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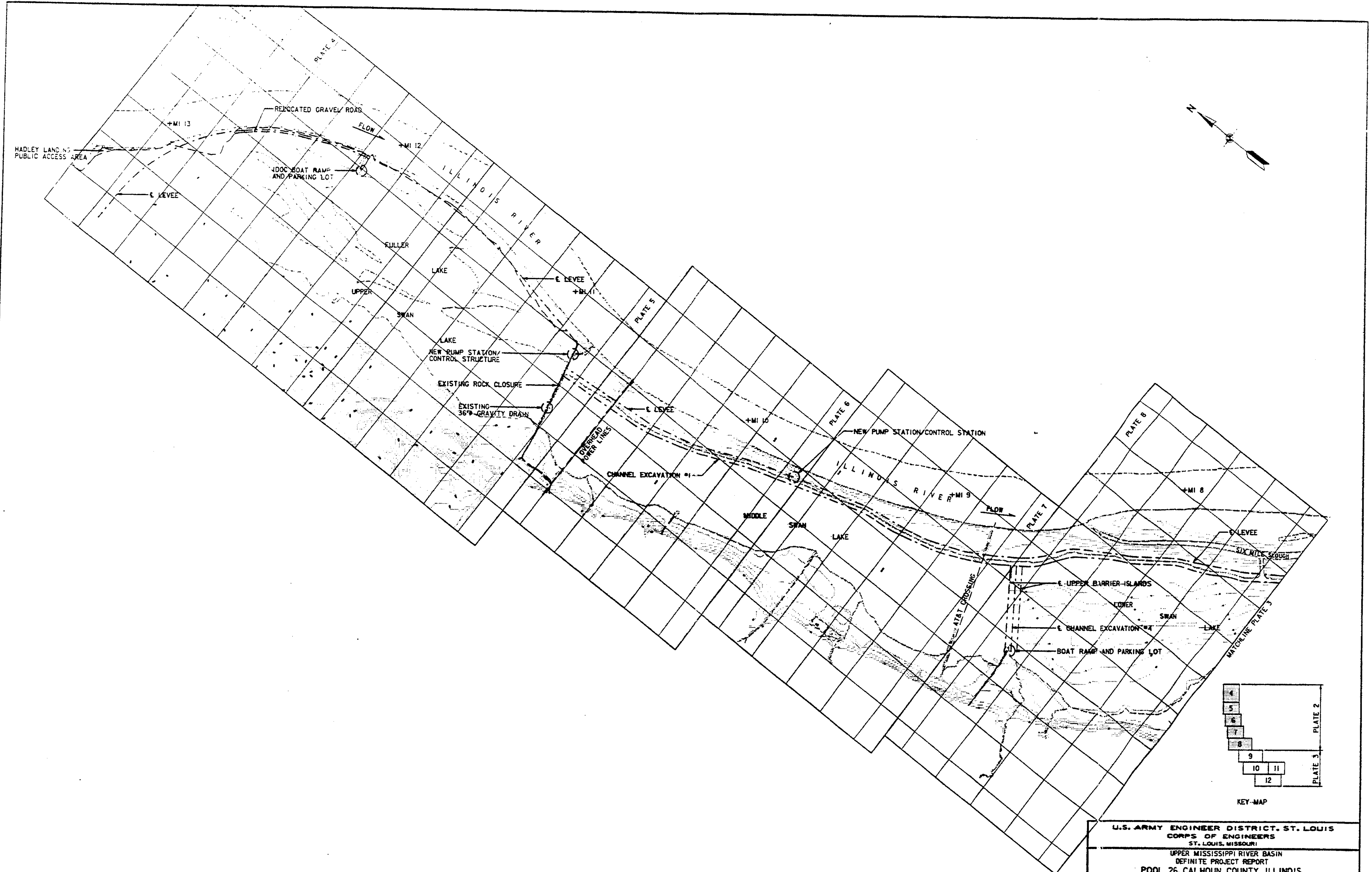
PROJECT LOCATION,
DRAWING INDEX AND
VICINITY MAP

DESIGNED BY: G. LEE		DESIGN FILE: plate1.dgn	PLATE 1
DATE: 8-91	PLOT SCALE: 1	SHEET NO. 1 OF 25	



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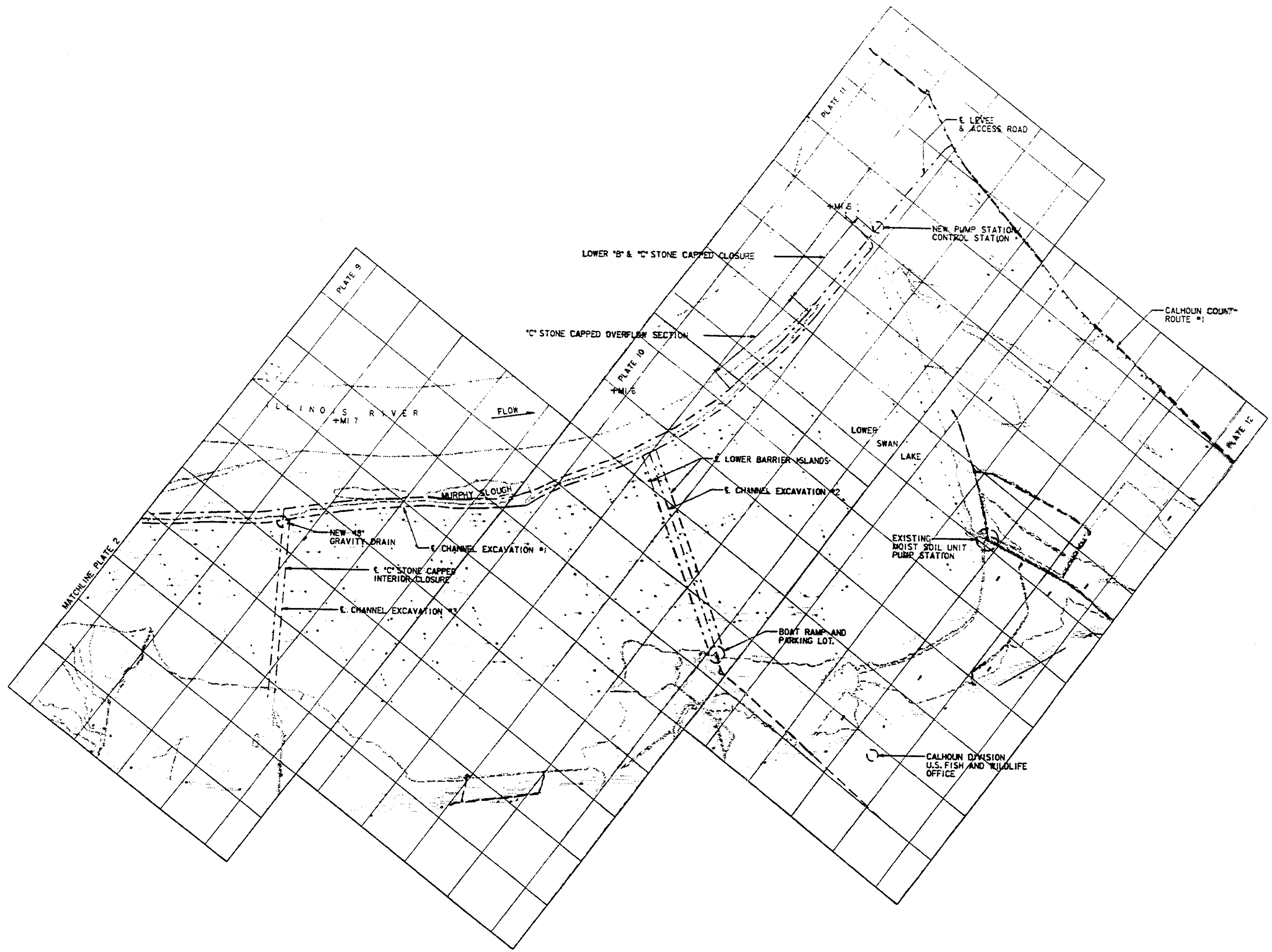
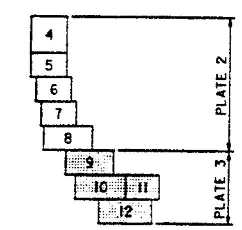
SITE PLAN

DESIGNED BY: G.LEE	DESIGN FILE: plate2.dgn	PLATE 2
DATE: 8-91 SCALE: 800	SHEET NO. 2 OF 25	





KEY MAP

SCALE: 1" = 800'
800 0 800

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
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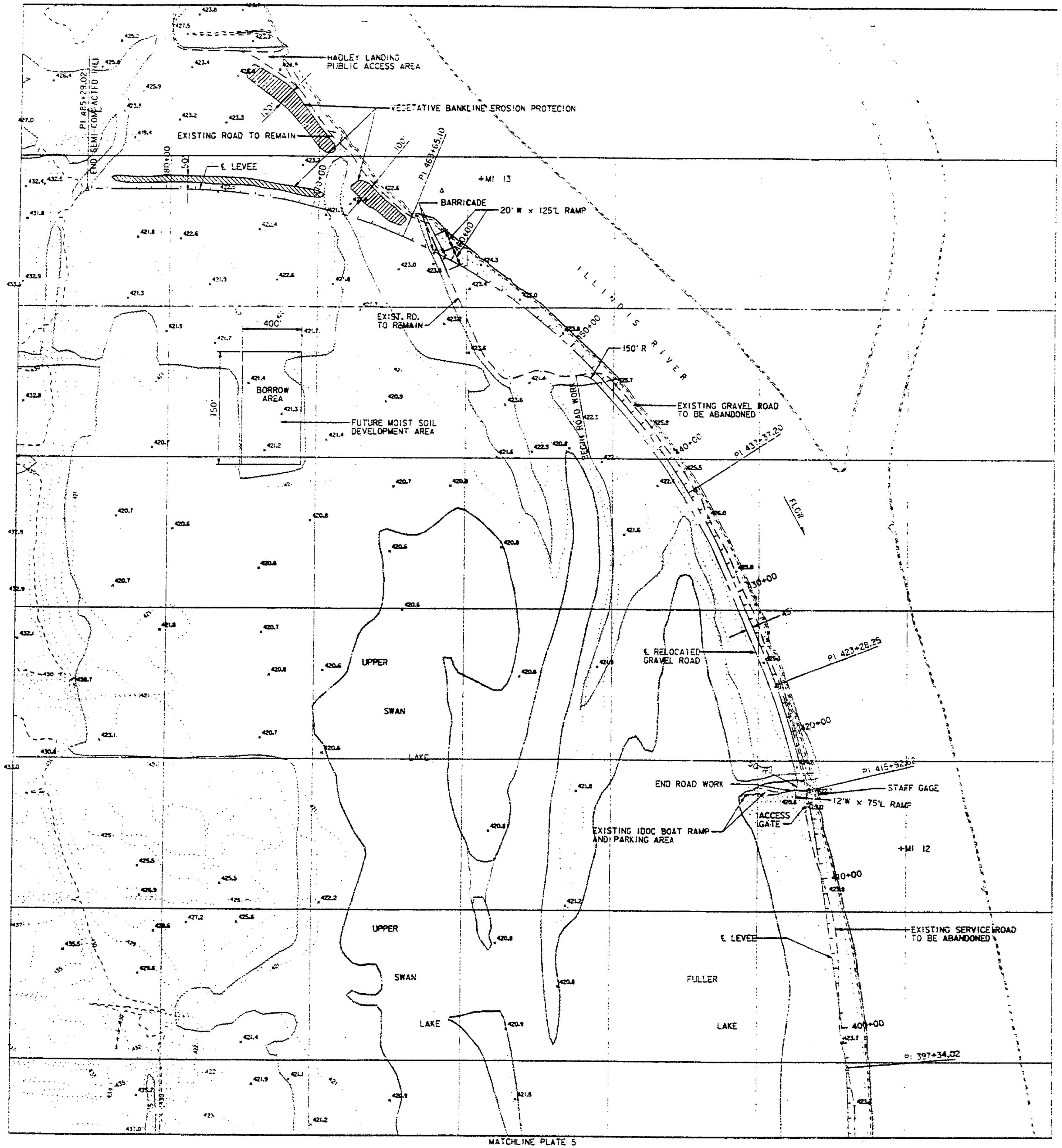
SITE PLAN

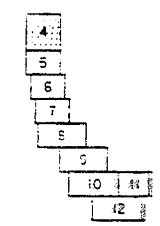
DESIGNED BY: G. LEE		DESIGN FILE: plate3.dgn	PLATE 3
DATE: 8-91	SCALE: 800	SHEET NO. 3 OF 25	



SCALE: 1" = 300'

NOTES:

1. FOR DETAILS ON STAFF GAGE SEE PLATE 25.
2. FOR DETAILS ON ACCESS GATES SEE PLATE 25.
3. FOR DETAILS ON BARRICADES SEE PLATE 25.



KEY MAP

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
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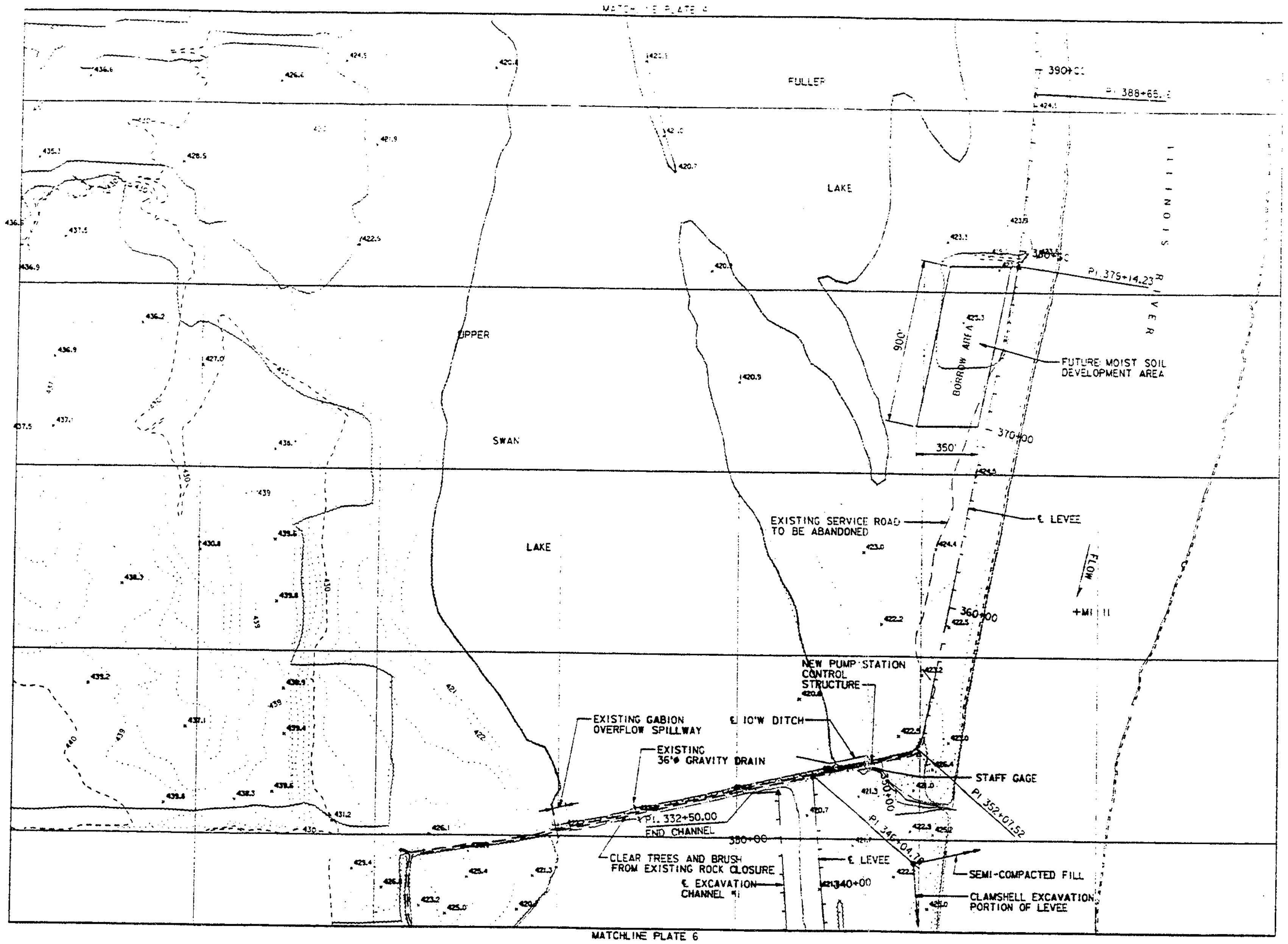
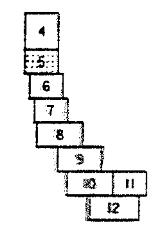
LEVEE SITE PLAN

DESIGNED BY: G. LEE		DESIGN FILE:	PLATE 4
DATE: 8-91	SCALE: 300	SHEET NO. 4 OF 25	

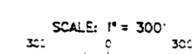


NOTES:

1. FOR DETAILS ON PUMP STATION/ CONTROL STRUCTURE SEE PLATE 23.
2. FOR DETAILS ON STAFF GAGE SEE PLATE 25.
3. FOR DETAILS ON DITCHING SEE PLATE 24.



KEY MAP



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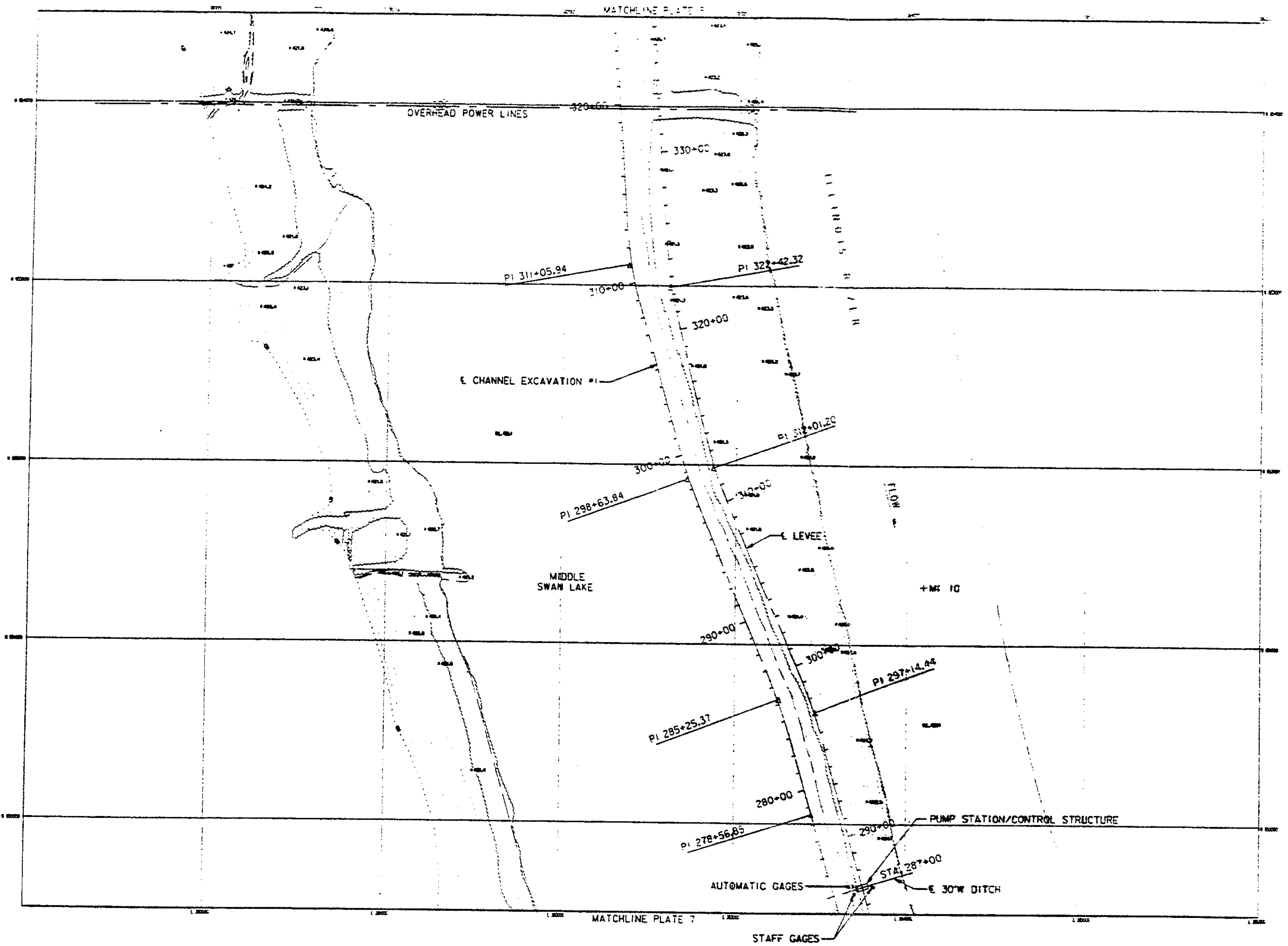
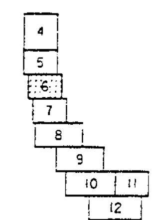
LEVEE SITE PLAN

DESIGNED BY: G. LEE	DESIGN FILE:	PLATE 5
DATE: 8-91 / SCALE: 300	SHEET NO. 5 OF 25	



NOTES:

1. FOR DETAILS ON PUMP STATION/ CONTROL STRUCTURE — SEE PLATE 22
2. FOR DETAILS ON DITCHING — SEE PLATE 24



KEY MAP

SCALE: 1" = 300'

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
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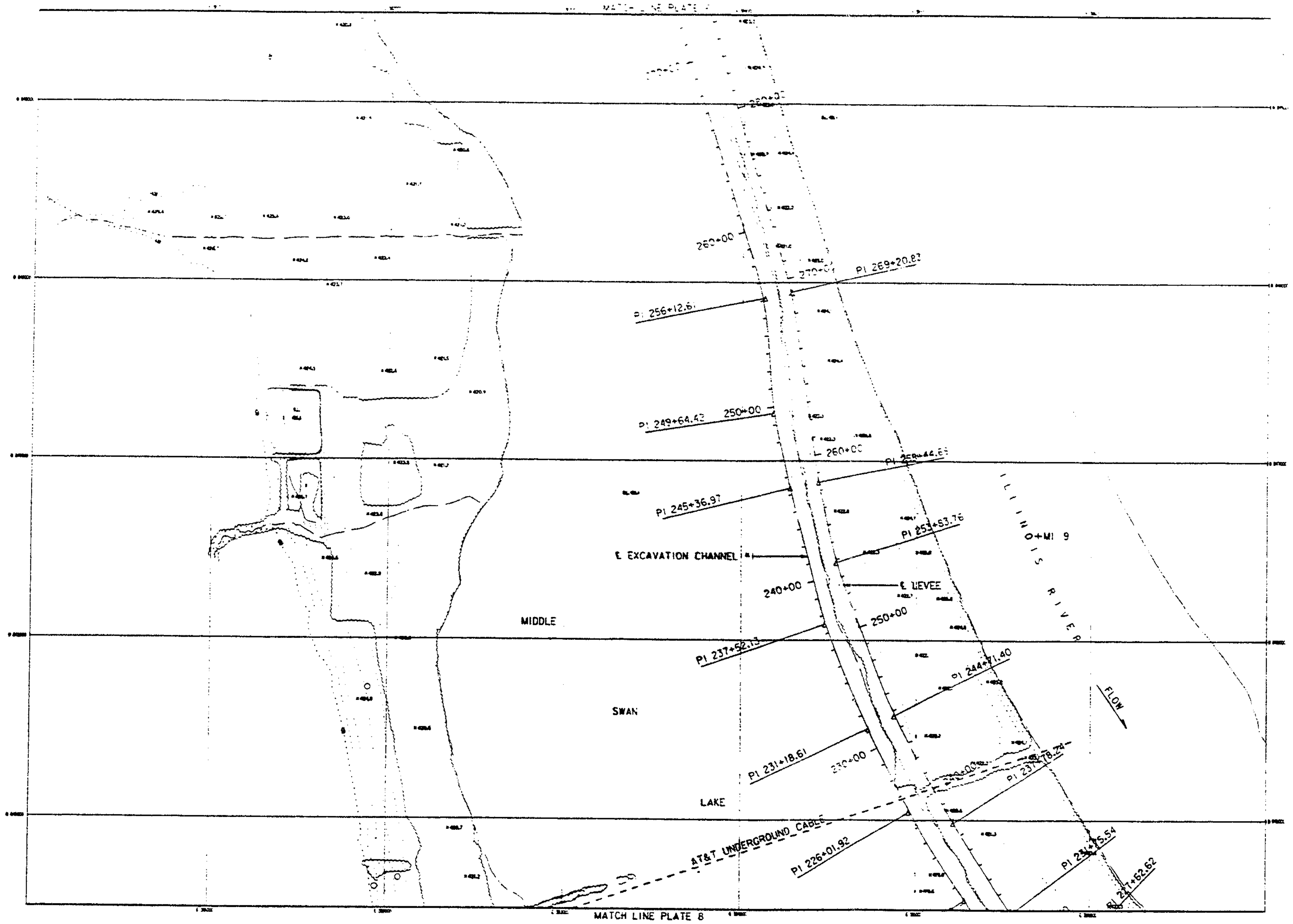
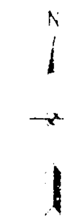
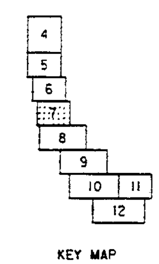
LEVEE SITE PLAN

DESIGNED BY:	DESIGN FILE: plate6.dgn	PLATE 6
DATE: 8-91 / SCALE: 300	SHEET NO. 6 OF 25	







NOTE: AT&T CABLE LOCATION TO BE VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 300'

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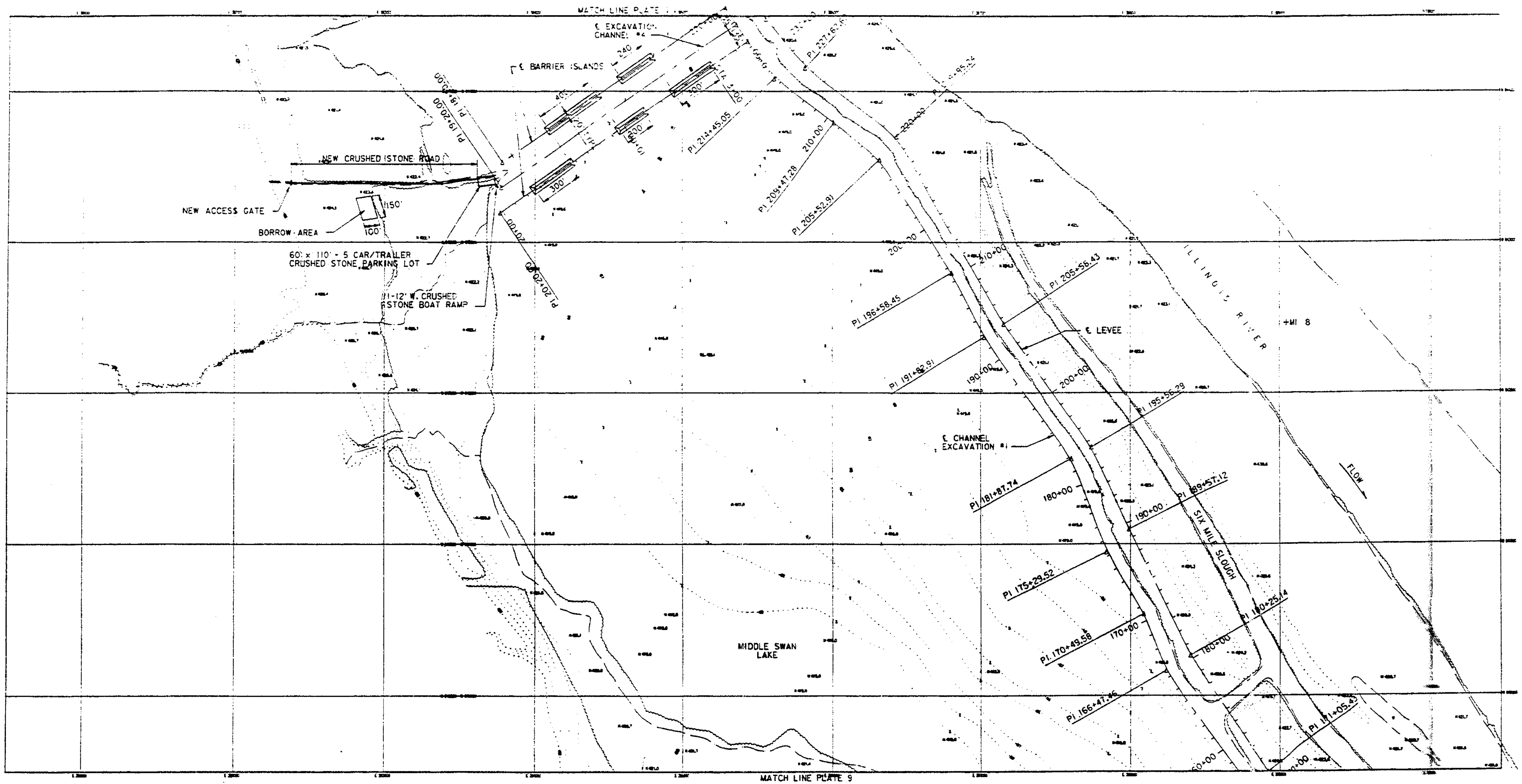
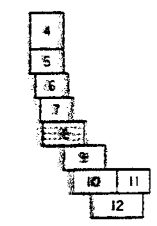
LEVEE SITE PLAN

DESIGNED BY: C. LEE	DESIGN FILE: plate7.dgn	PLATE 7
DATE: 8-91 SCALE: 300	SHEET NO. 7 OF 25	





NOTES:

1. FOR DETAILS ON CRUSHED STONE ROAD, PARKING LOT, BOAT RAMP AND ACCESS GATE SEE PLATE 25

SCALE: 1" = 300'

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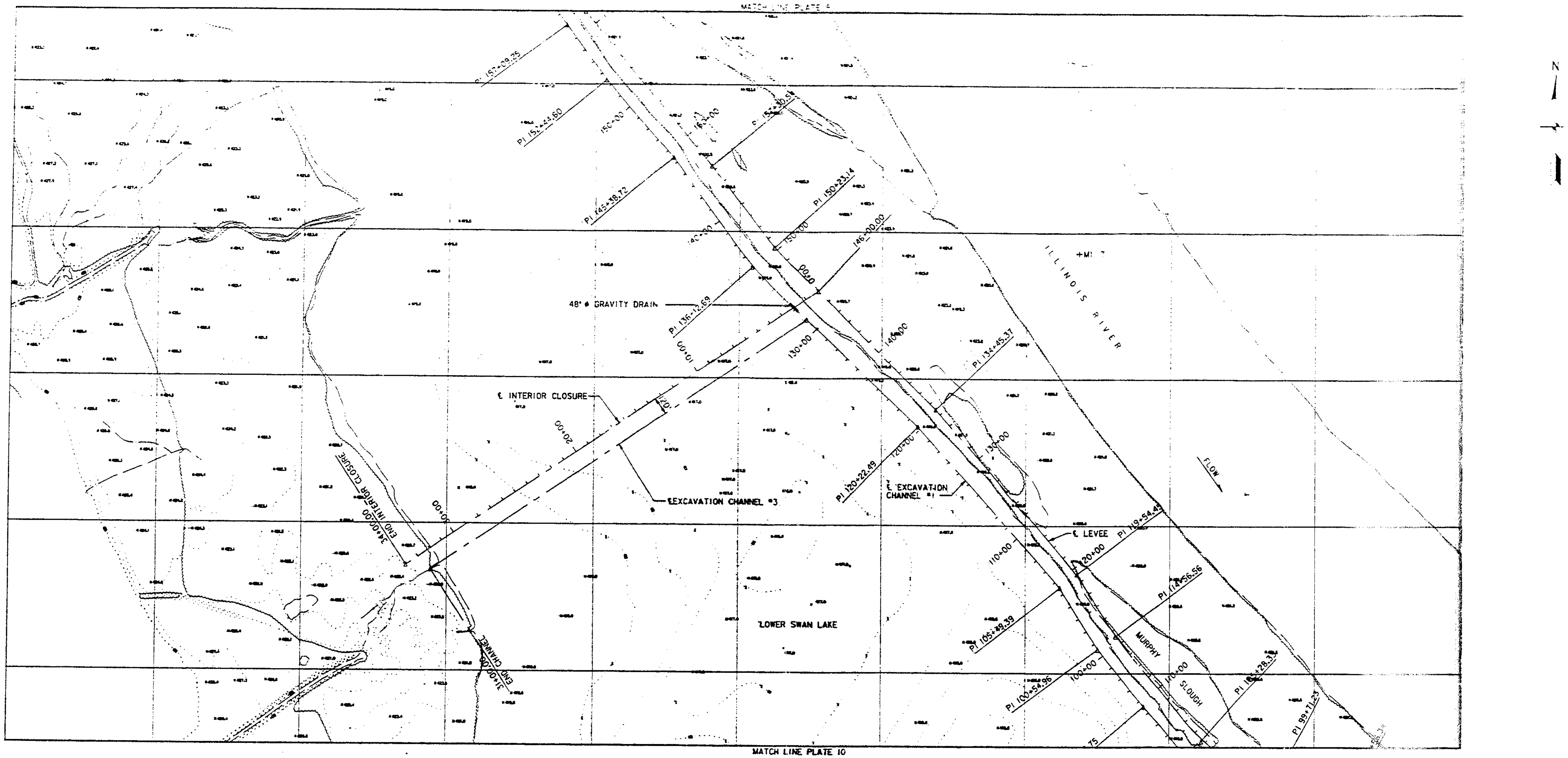
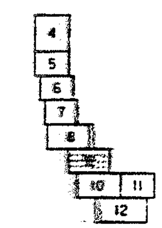
LEVEE SITE PLAN

DESIGNED BY: G. LEE		DESIGN FILE:	PLATE 8
DATE: 8-91	SCALE: 300	SHEET NO. 8 OF 25	





NOTES:

1. FOR DETAILS ON GRAVITY DRAIN SEE PLATES 21 AND 22

SCALE: 1" = 300'

300' 0 300'

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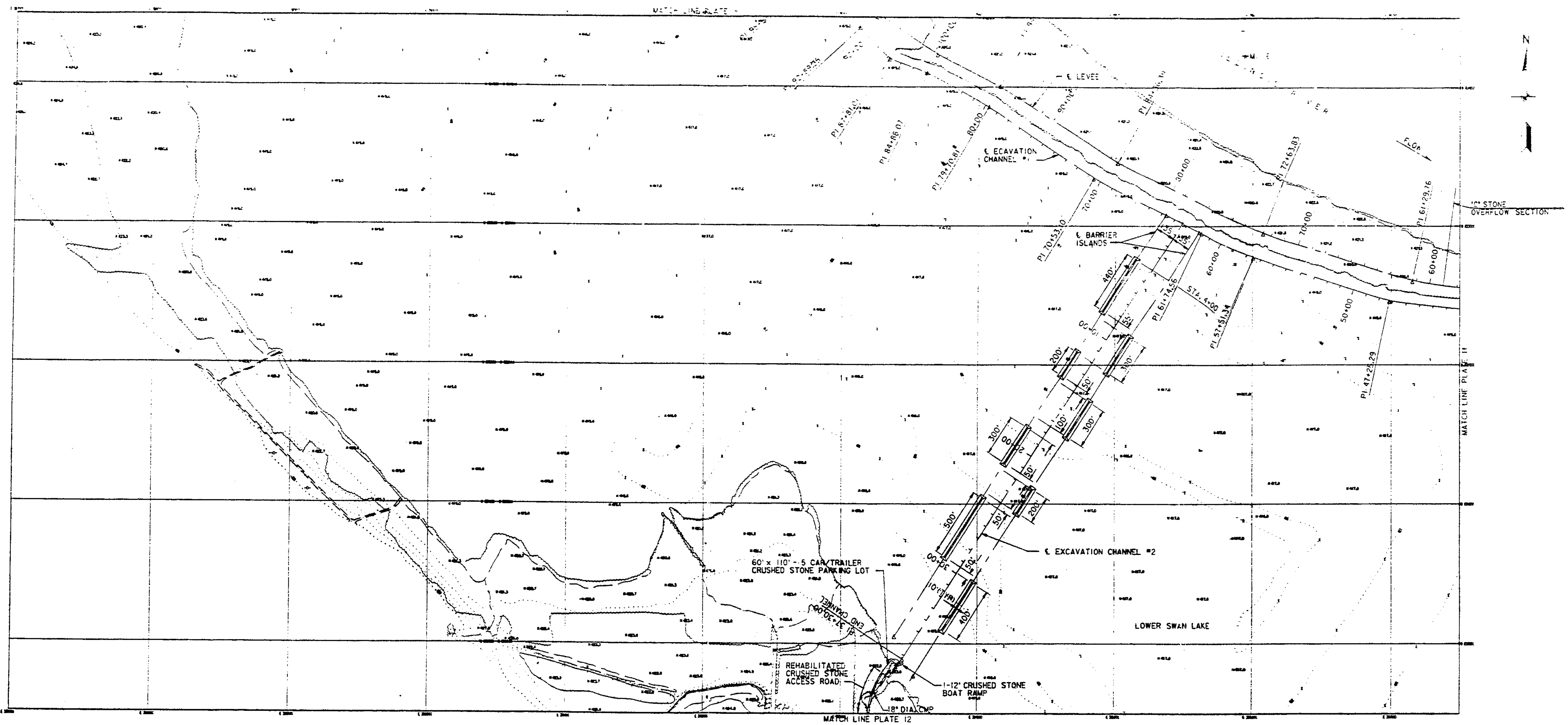
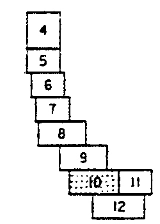
LEVEE SITE PLAN

DESIGNED BY: G. LEE	DESIGN FILE:	PLATE 9
DATE: 8-91	SCALE: 300	SHEET NO. 9 OF 25





KEY MAP

NOTES:

1. FOR DETAILS ON CRUSHED STONE ROAD, PARKING LOT AND BOAT RAMP — SEE PLATE 25
2. FOR DETAILS ON OVERFLOW SECTION — SEE PLATE 24

SCALE: 1" = 300'

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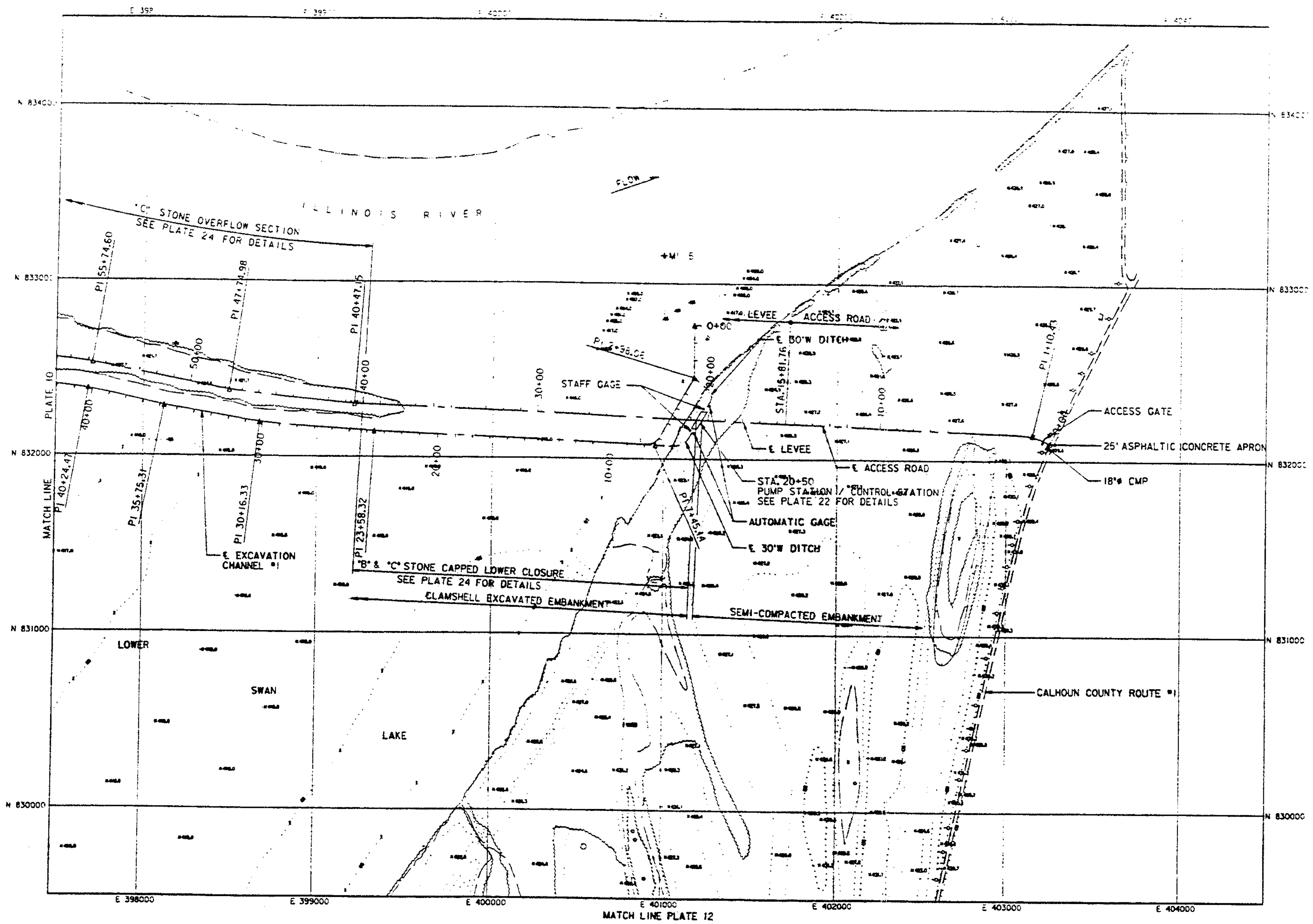
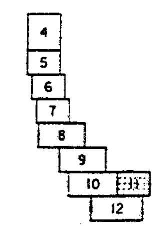
LEVEE SITE PLAN

DESIGNED BY: G. LEE		DESIGN FILE: plate10.dgn	PLATE 10
DATE: 8-91	SCALE: 300	SHEET NO. 10 OF 25	



NOTES:

1. FOR DETAILS ON OVERFLOW SECTION — SEE PLATE 24
2. FOR DETAILS ON LOWER CLOSURE — SEE PLATE 24
3. FOR DETAILS ON PUMP STATION/ CONTROL STRUCTURE — SEE PLATE 22
4. FOR DETAILS ON ACCESS ROAD, ASPHALTIC CONCRETE APRON AND CULVERT — SEE PLATE 22
5. FOR DETAILS ON DITCHING — SEE PLATE 24
6. FOR DETAILS ON STAFF GAGE — SEE PLATE 25



KEY MAP

SCALE: 1" = 300'

300 0 300

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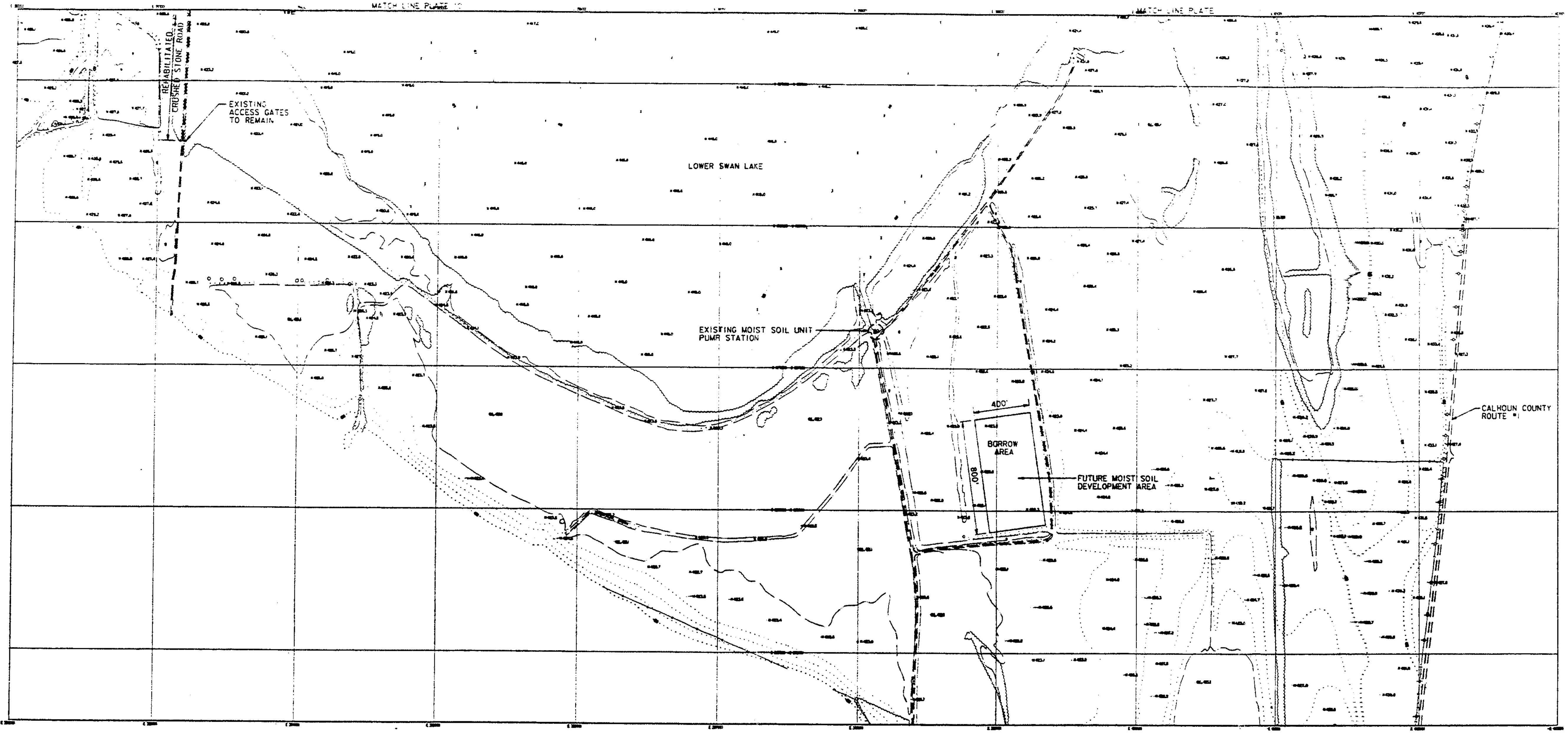
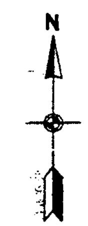
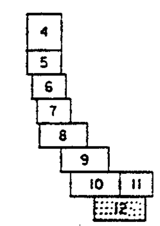
LEVEE SITE PLAN

DESIGNED BY: G. LEE		DESIGN FILE:	PLATE 11
DATE: 8-91	SCALE: 300	SHEET NO. 11 OF 25	







KEY MAP

NOTES:

1. FOR DETAILS ON CRUSHED STONE ROAD AND ACCESS GATES SEE PLATE 25

SCALE: 1" = 300'
300' 0 300'

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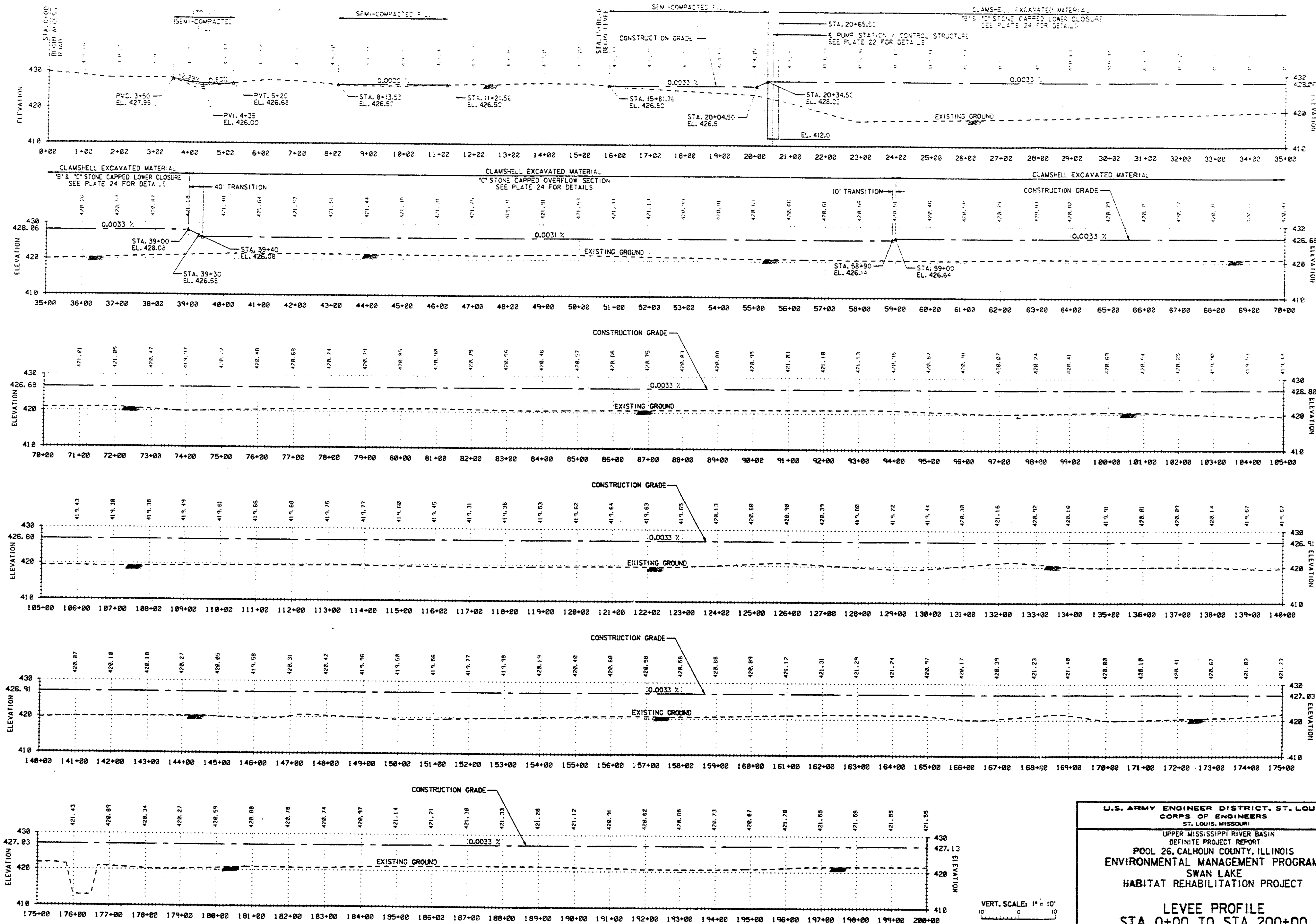
LEVEE SITE PLAN

DESIGNED BY: S. LEE		DESIGN FILE: swlen12.dgn	PLATE 12
DATE: 6-91	SCALE: 300	SHEET NO. 12 OF 25	



VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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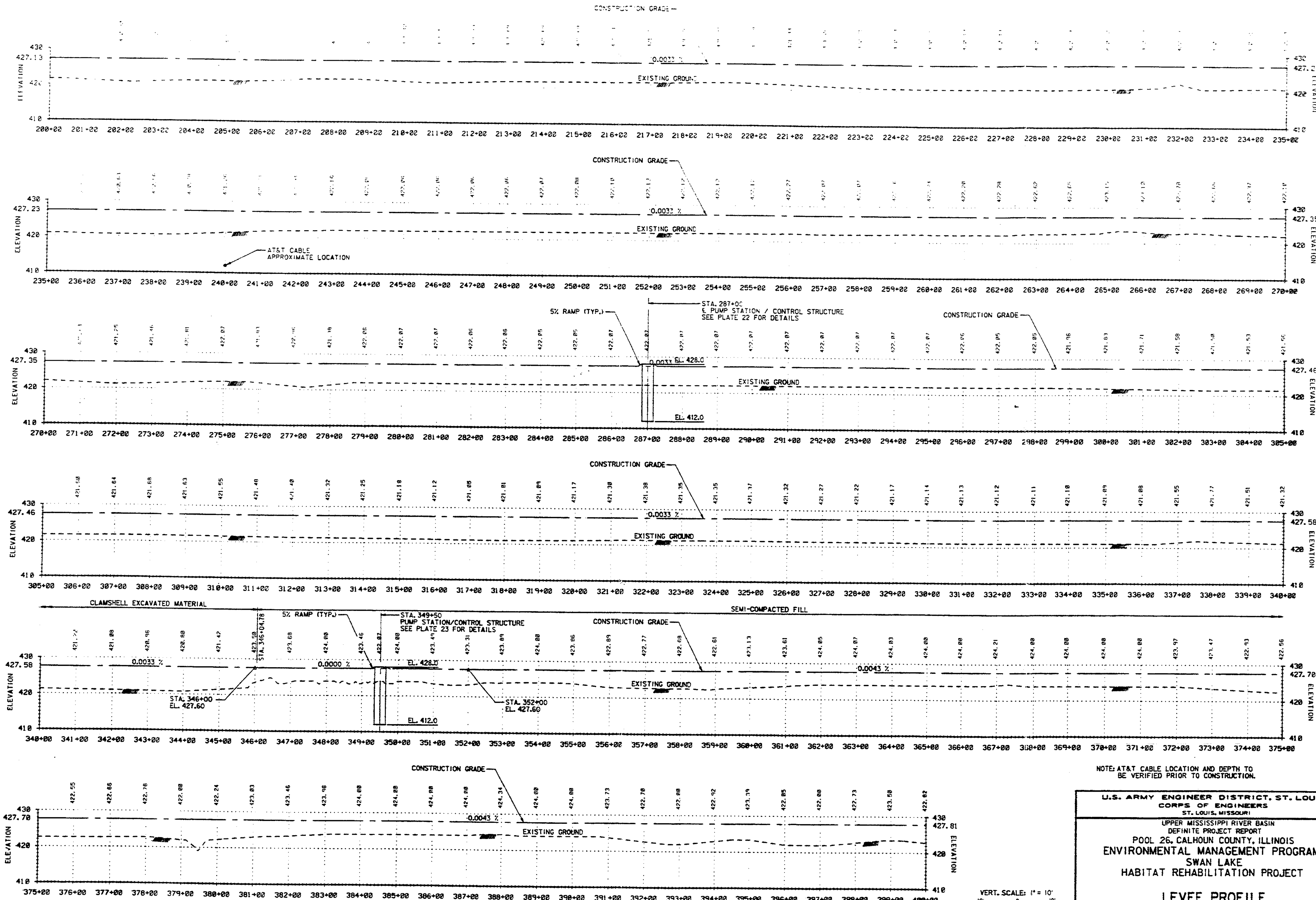
LEVEE PROFILE
STA. 0+00 TO STA. 200+00

DESIGNED BY: G. LEE	DESIGN FILE: profile.dgn	PLATE 13
DATE: 8-91 SCALE: 100	SHEET NO. 13 OF 25	



NOTE: AT&T CABLE LOCATION AND DEPTH TO BE VERIFIED PRIOR TO CONSTRUCTION.

VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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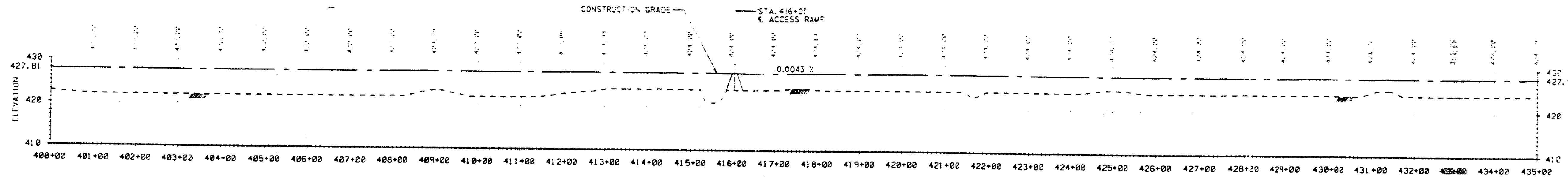
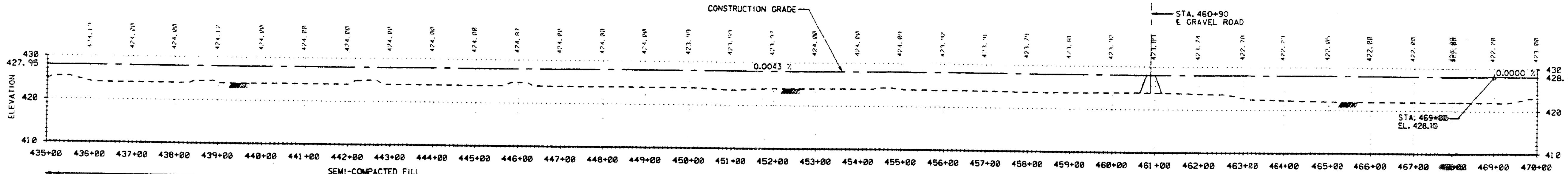
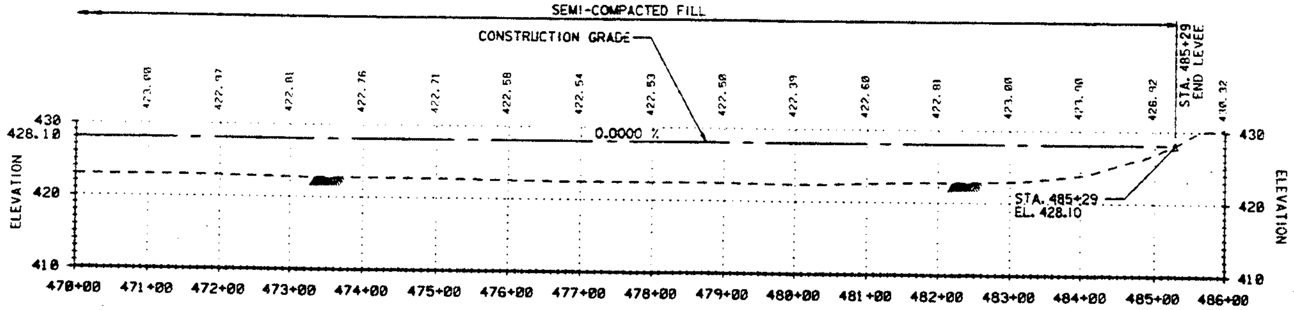
LEVEE PROFILE
STA. 200+00 TO STA. 400+00

DESIGNED BY: C. LEE	DESIGN FILE: profile.dgn	PLATE 14
DATE: 8-91 SCALE: 100	SHEET NO. 14 OF 25	







VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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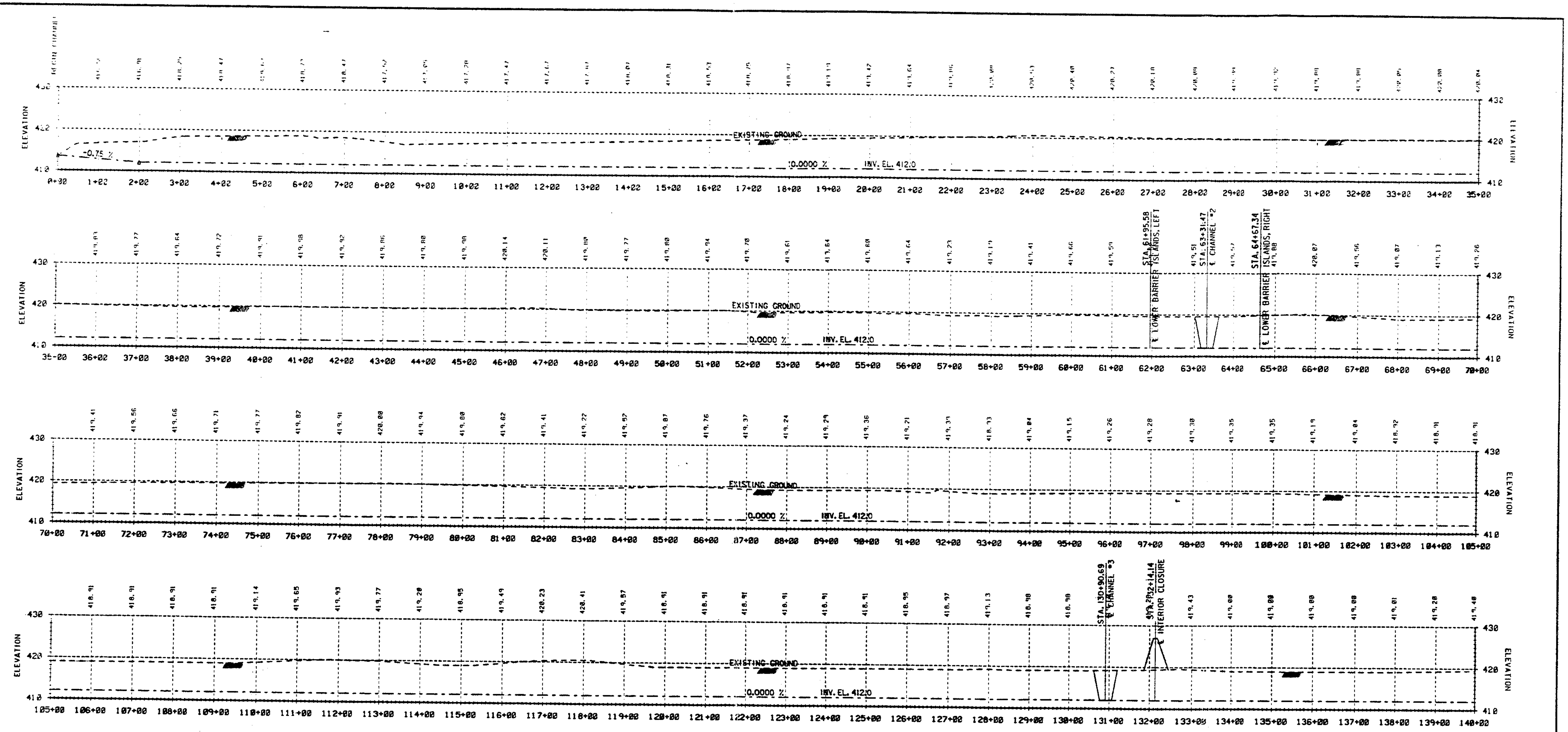
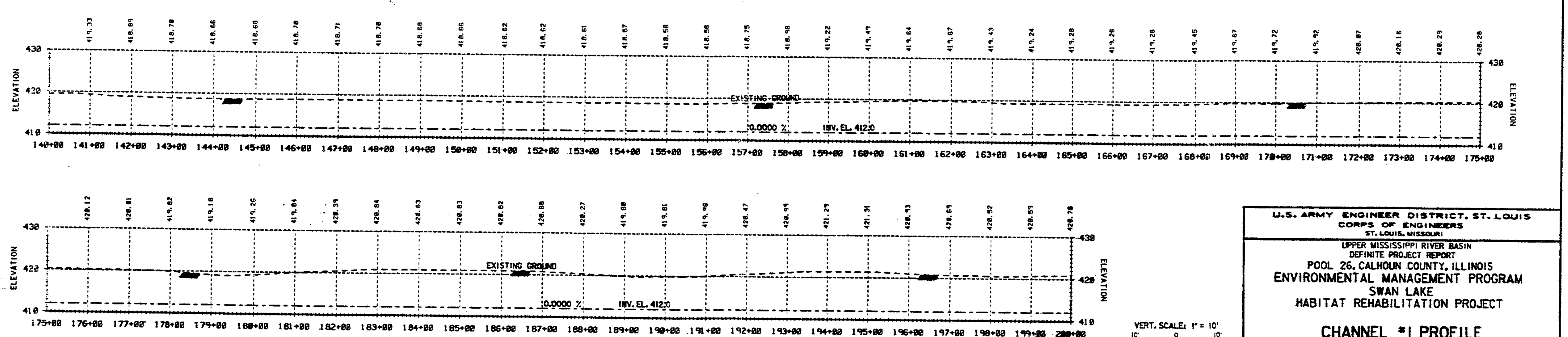
LEVEE PROFILE
STA. 400+00 TO STA. 485+29

DESIGNED BY: [illegible]	DESIGN FILE: [illegible]	PLATE 15
DATE: 8-91	SCALE: 100	SHEET NO. [illegible] OF 25





VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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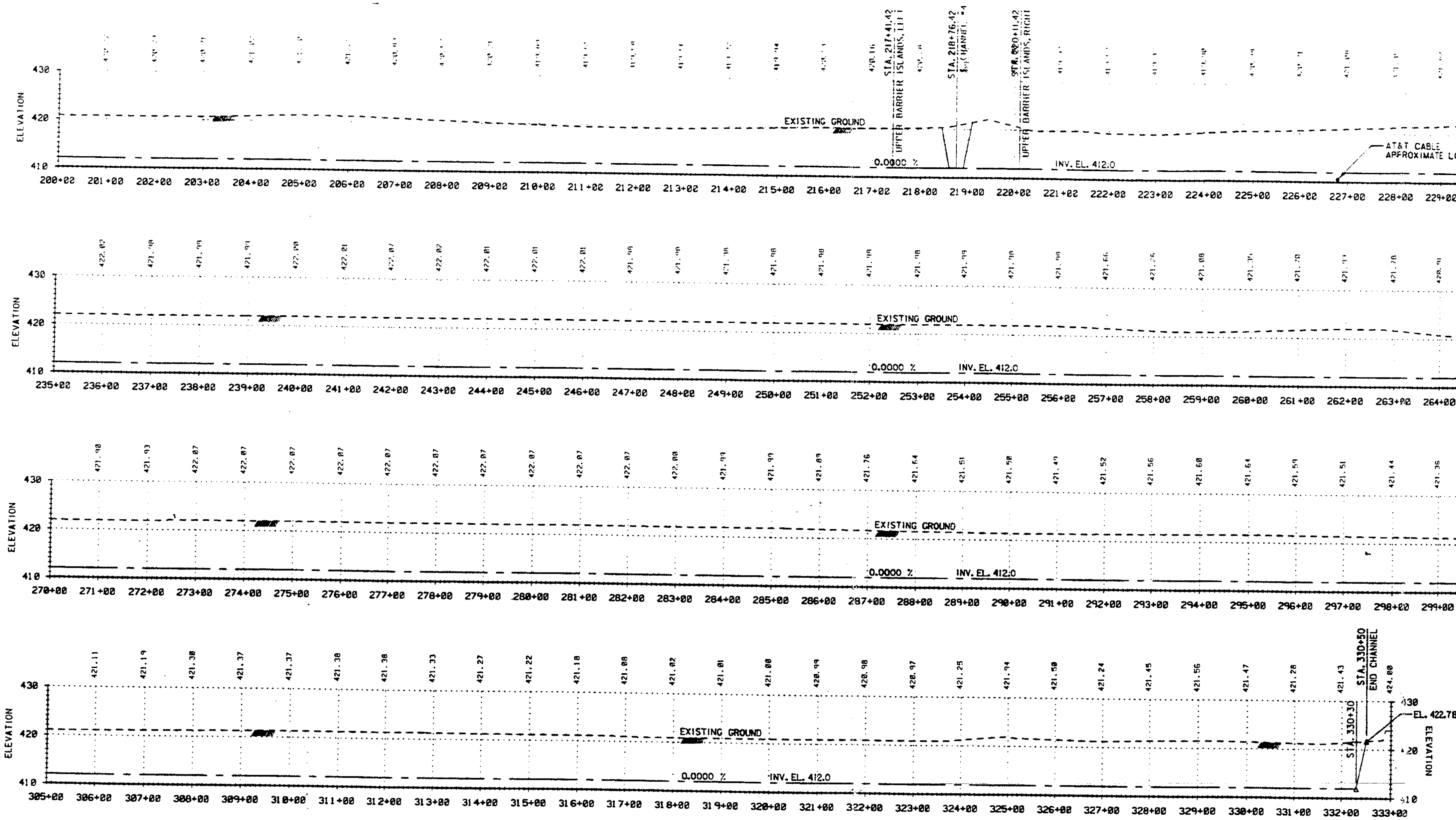
CHANNEL #1 PROFILE
STA. 0+00 TO STA. 200+00

DESIGNED BY: G. LEE	DESIGN FILE: profile2.dgn	PLATE 16
DATE: 11-90 SCALE: 100	SHEET NO. 16 OF 24	



NOTE: AT&T CABLE LOCATION AND DEPTH TO BE VERIFIED PRIOR TO CONSTRUCTION.

VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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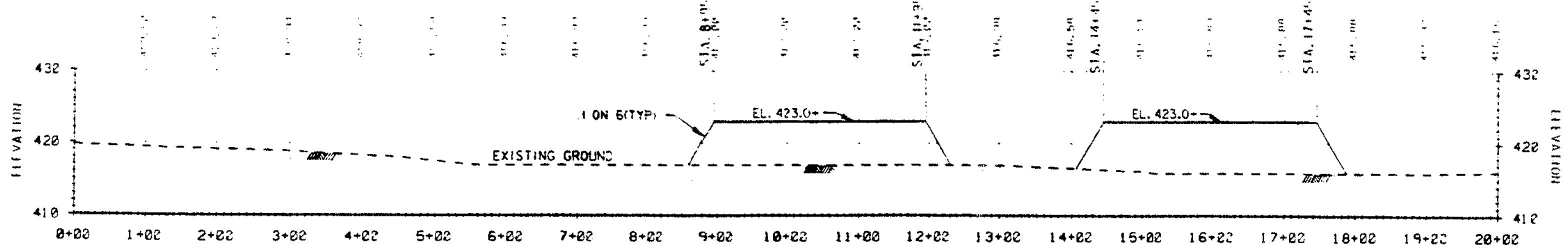
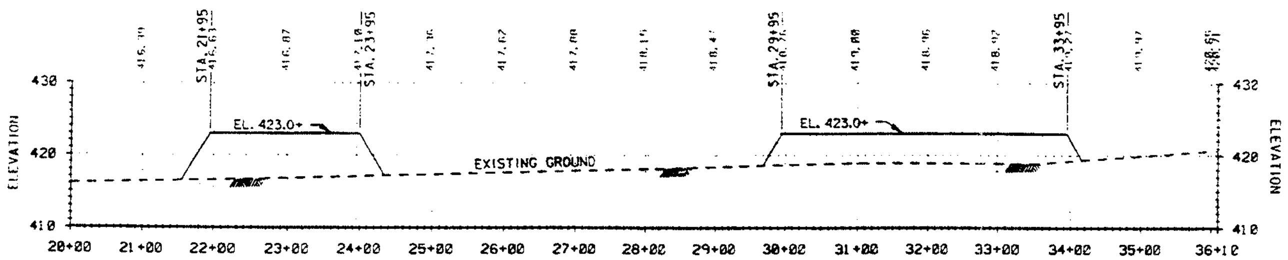
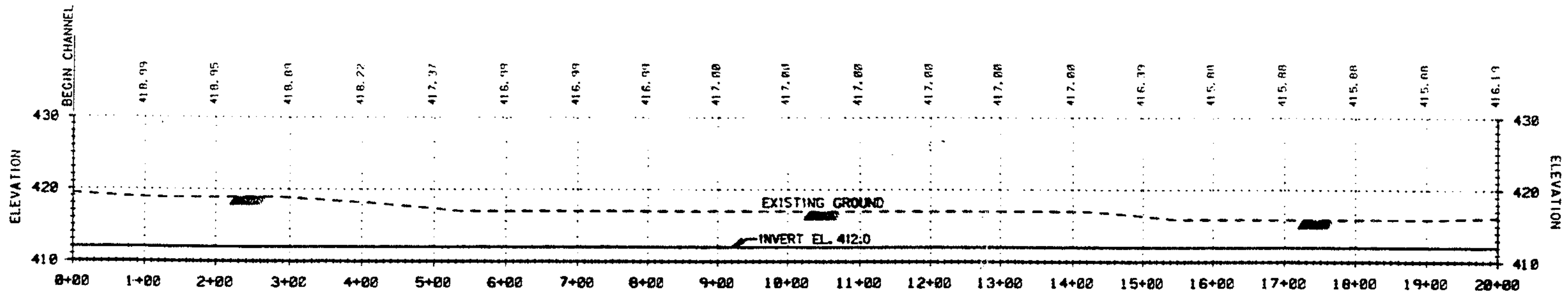
CHANNEL #1 PROFILE
STA. 200+00 TO STA. 333+40

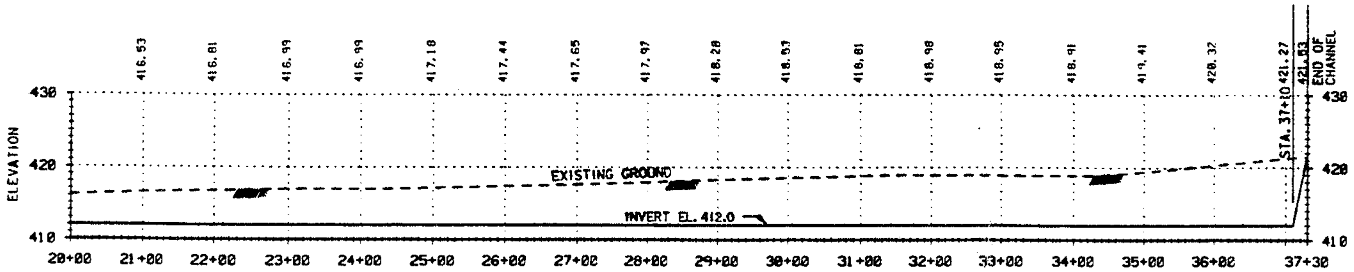
DESIGNED BY: G. LEE	DESIGN FILE: profile2.dgn	PLATE 17
DATE: 8-91 SCALE: 100	SHEET NO. 17 OF 25	



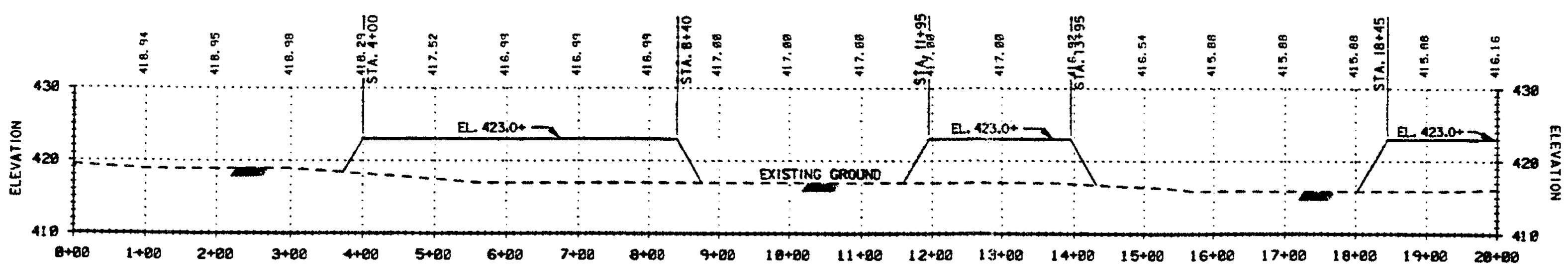


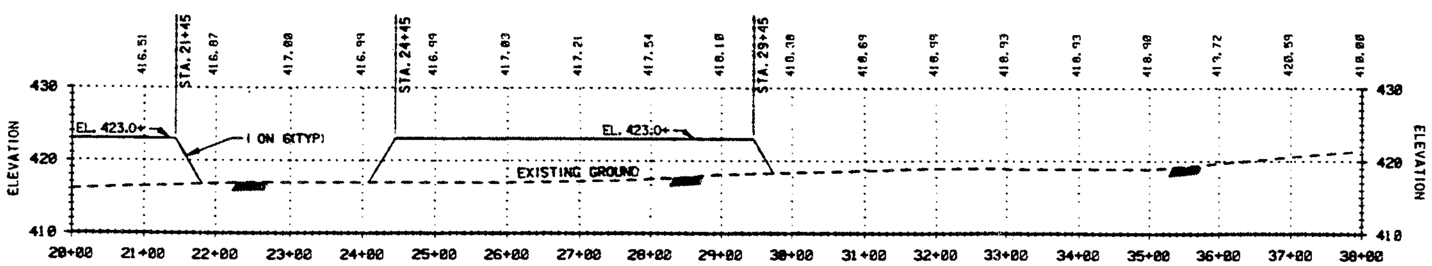
LOWER BARRIER ISLANDS, (LEFT OF CHANNEL)





CHANNEL EXCAVATION #2





LOWER BARRIER ISLANDS, (RIGHT OF CHANNEL)

VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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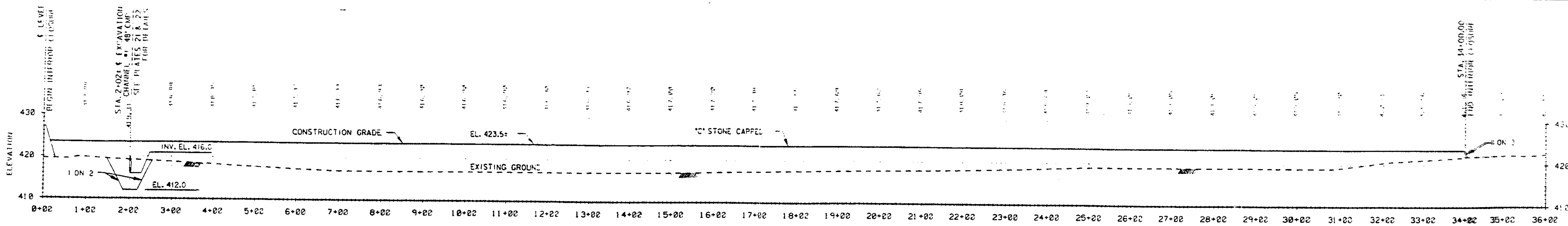
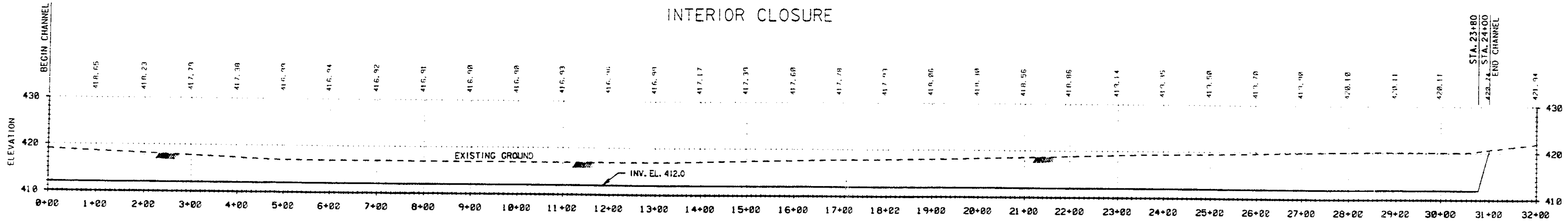
LOWER BARRIER ISLANDS PROFILES
CHANNEL #2 PROFILE

DESIGNED BY: G. LEE	DESIGN FILE: profile3.dgn	PLATE 18
DATE: 8-91 / SCALE: 100	SHEET NO. 18 OF 25	



INTERIOR CLOSURE



CHANNEL EXCAVATION #3

VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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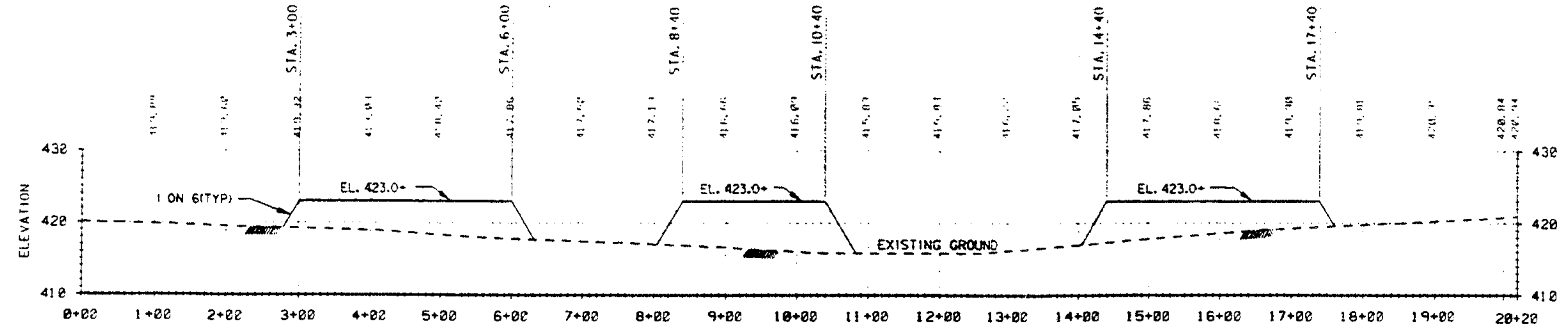
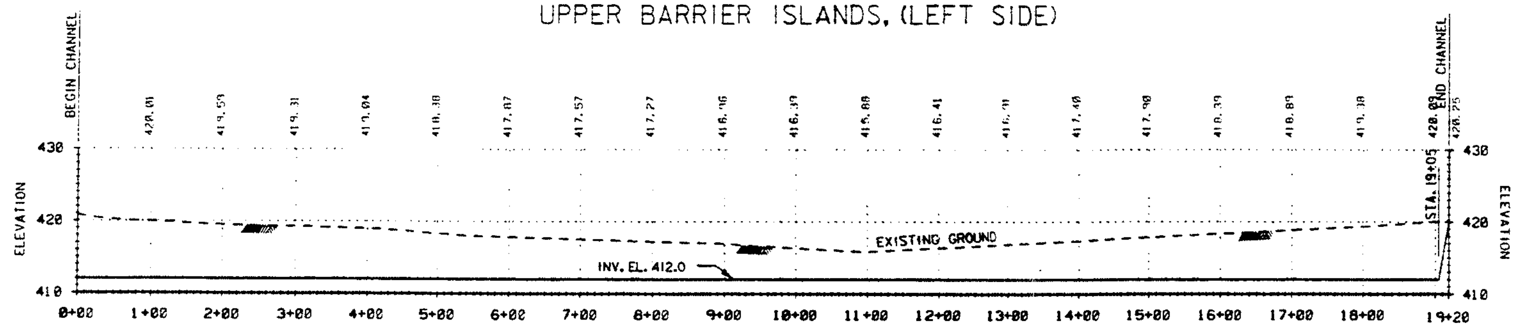
INTERIOR CLOSURE PROFILE
CHANNEL #3 PROFILE

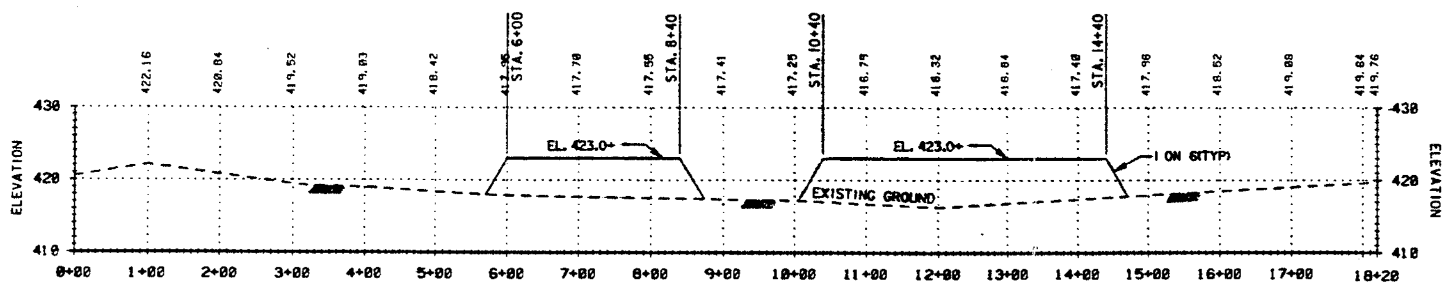
DESIGNED BY: G. LEE		DESIGN FILE: profile3.dgn	PLATE 19
DATE: 8-91	SCALE: 100	SHEET NO. 19 OF 25	



UPPER BARRIER ISLANDS, (LEFT SIDE)



CHANNEL EXCAVATION #4



UPPER BARRIER ISLANDS, (RIGHT SIDE)

VERT. SCALE: 1" = 10'

HORIZ. SCALE: 1" = 100'

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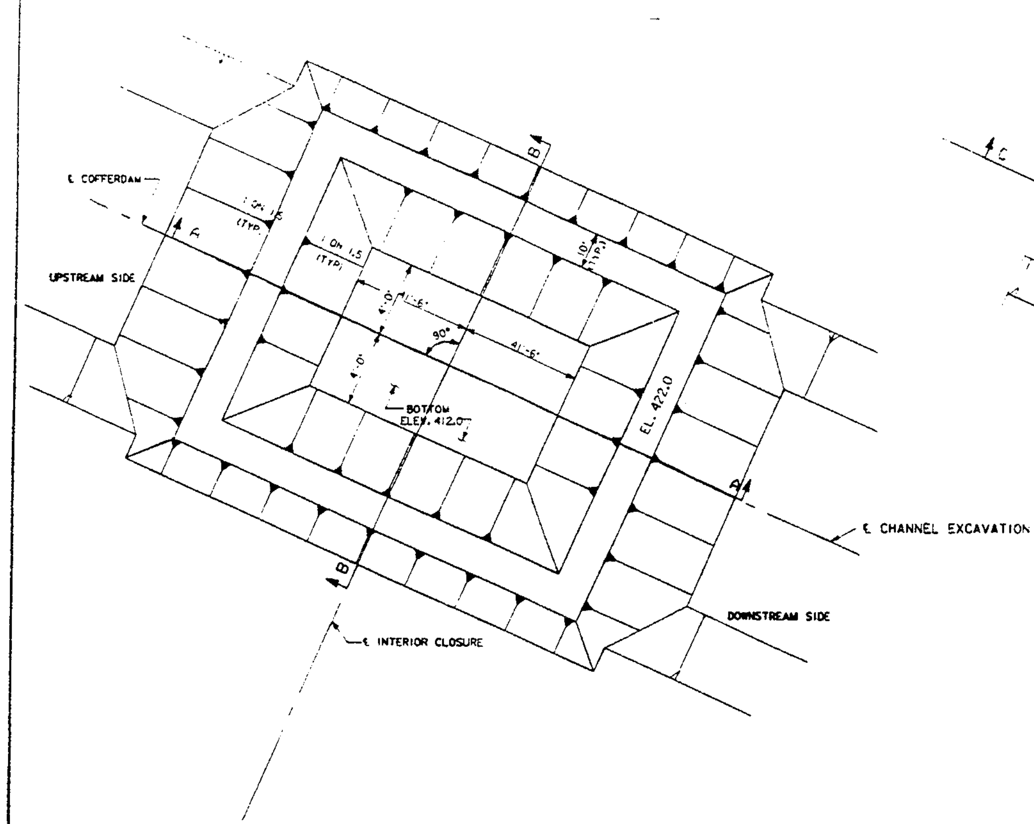
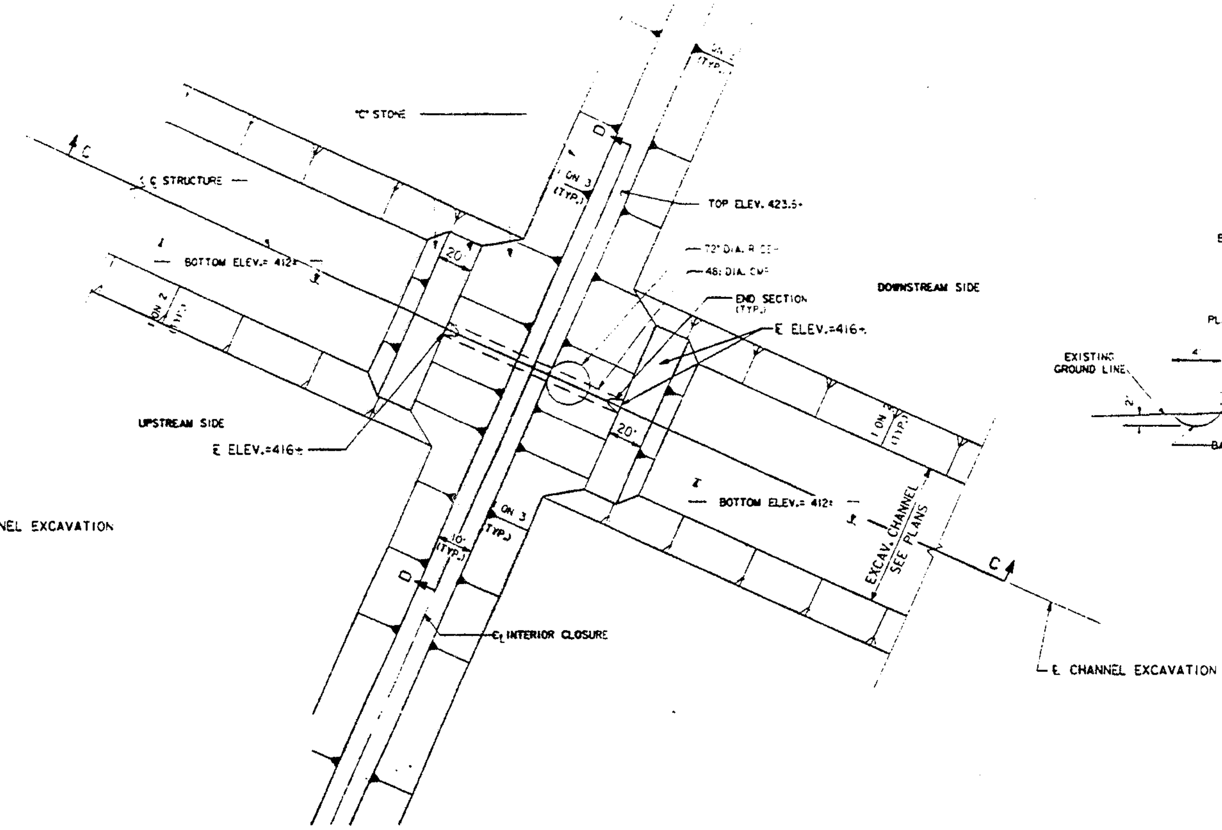
UPPER BARRIER ISLANDS PROFILES
CHANNEL #4 PROFILE

DESIGNED BY: G. LEE	DESIGN FILE: profile3.dgn	PLATE 20
DATE: 6-91 / SCALE: 100	SHEET NO. 20 OF 25	



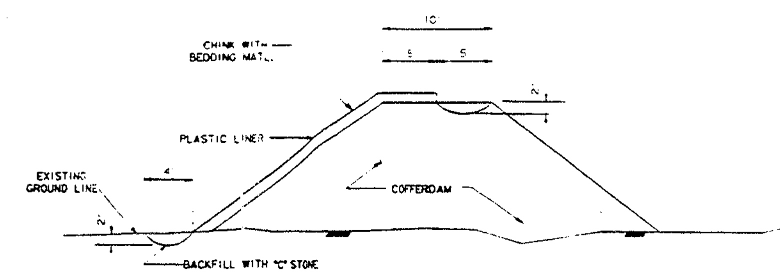
COFFERDAM PLAN
NO SCALE



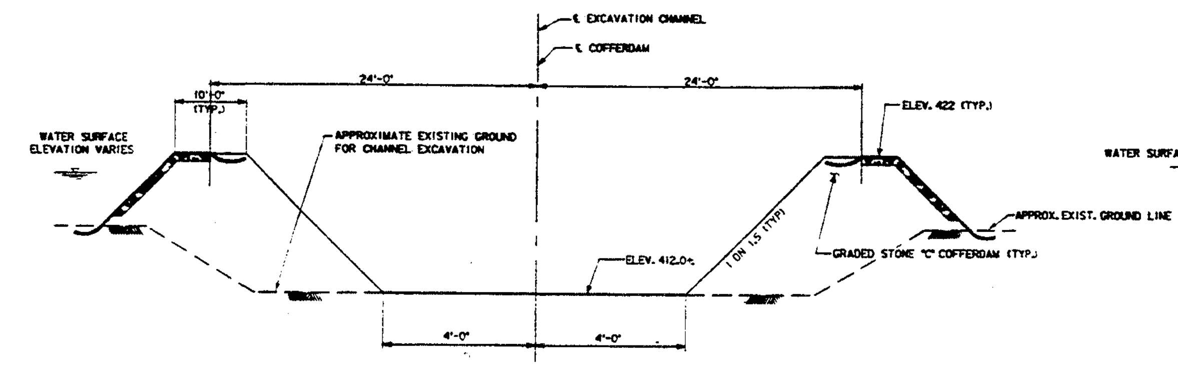
STRUCTURE PLAN
NO SCALE

GENERAL NOTES

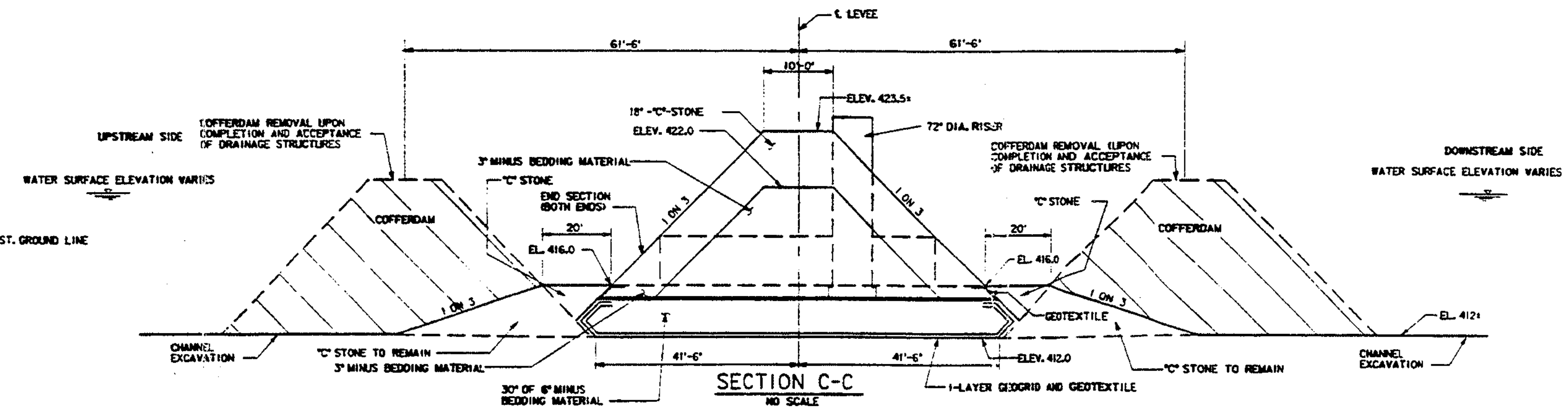
1. GATEWELL RISER PIPE NOT SHOWN IN SECTION D-D FOR CLARITY. SEE DETAIL, PLATE ...
2. THE COFFERDAM IS SHOWN IN SECTIONS C-C AND D-D FOR REFERENCE ONLY AND IS TO BE REMOVED AFTER INSTALLATION OF THE DRAINAGE STRUCTURES.
3. INSTALLATION OF DRAINAGE STRUCTURE WILL BE MADE IN ± 3' OF WATER.



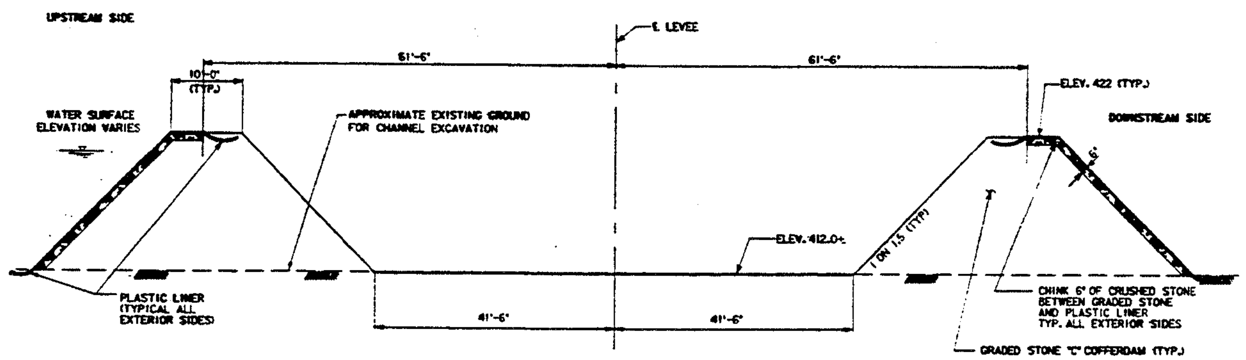
DETAIL
PLASTIC LINER ANCHORING
NO SCALE



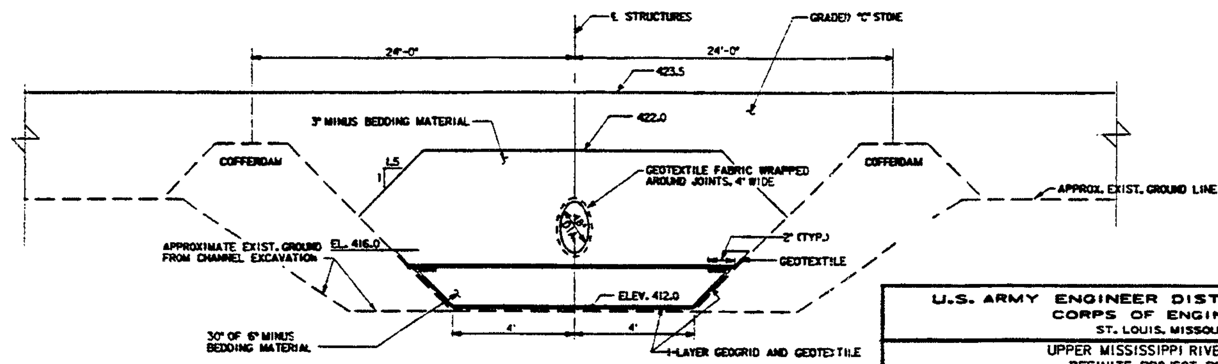
SECTION B-B
NO SCALE



SECTION C-C
NO SCALE



SECTION A-A
NO SCALE



SECTION D-D
NO SCALE

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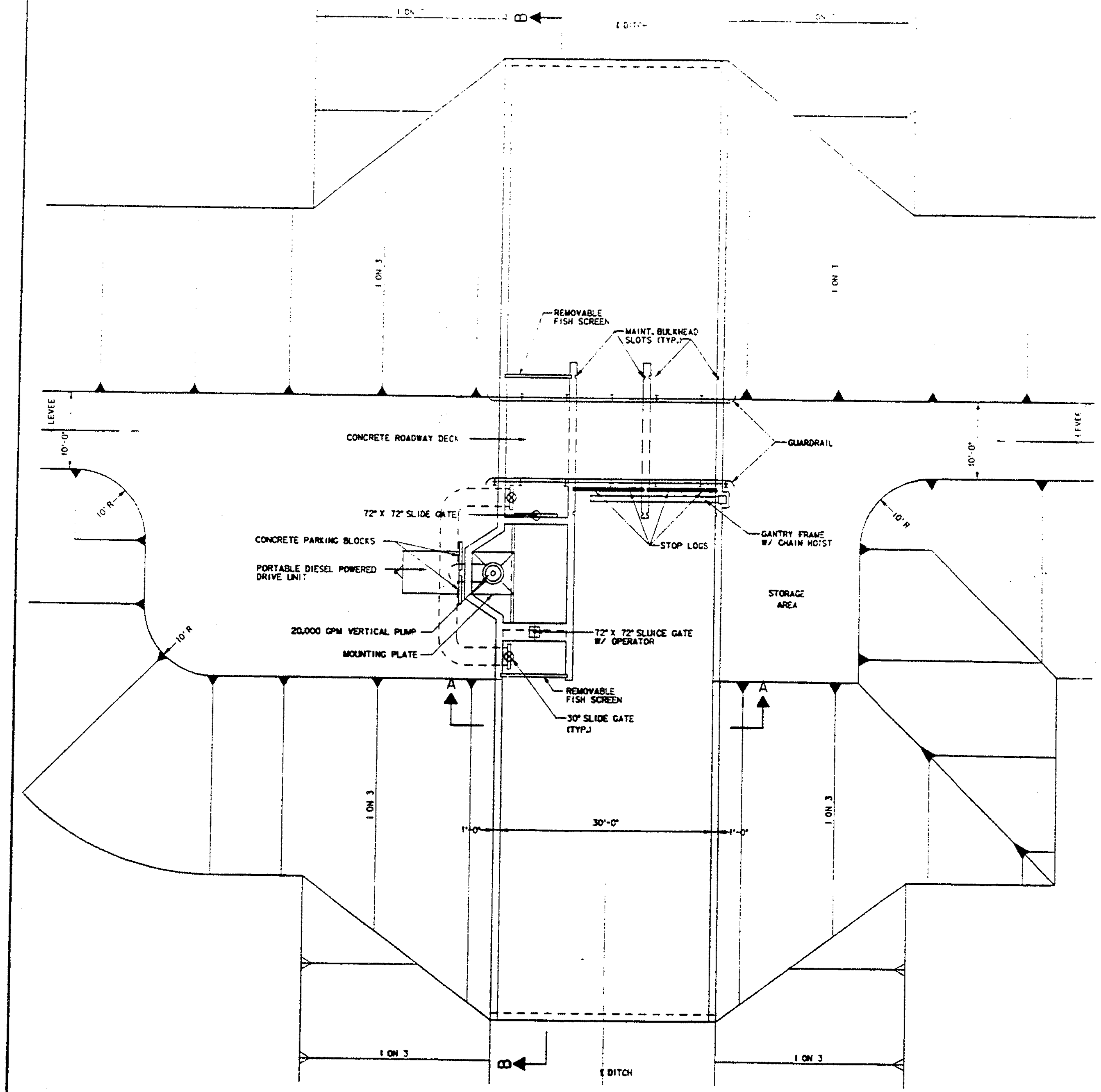
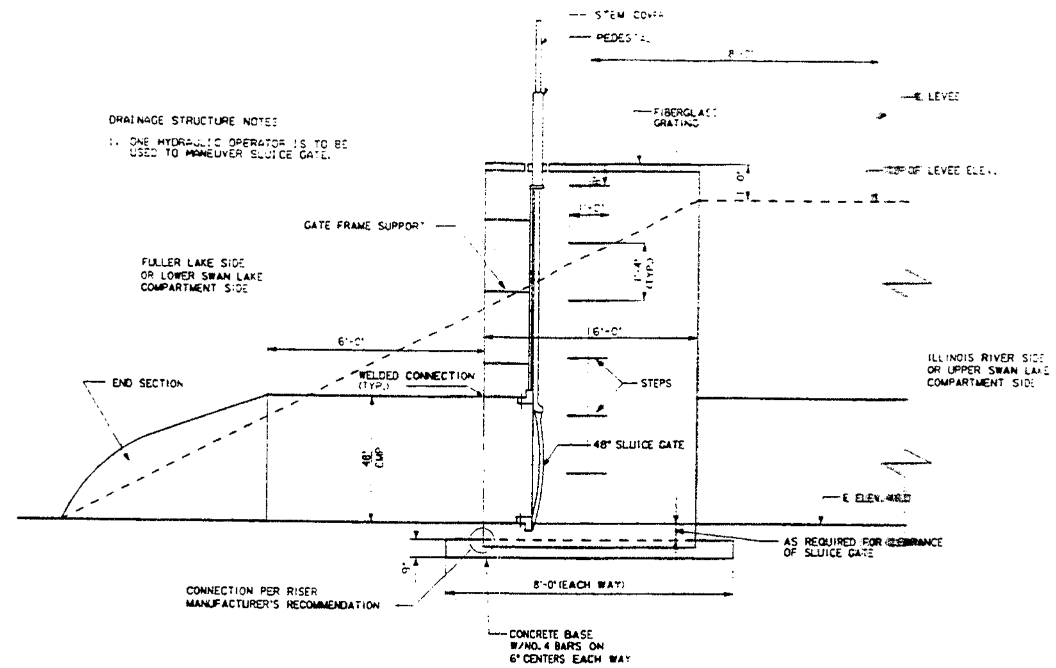
INTERIOR CLOSURE 48" DIA. DRAINAGE STRUCTURE PLANS AND SECTIONS

DESIGNED BY: C. LEE	DESIGN FILE: plate21.dgn	PLATE 21
DATE: 8-91 PLOT SCALE: 20	SHEET NO. 21 OF 25	



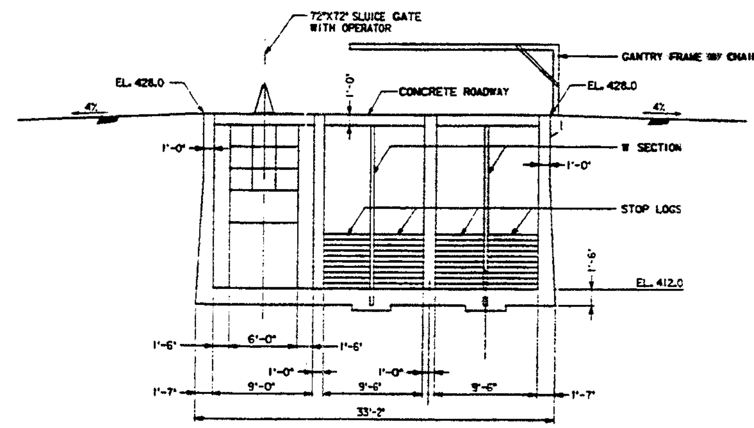
PUMP STATION / CONTROL STRUCTURE PLAN

NO SCALE



DRAINAGE STRUCTURE DETAIL (TYP.)

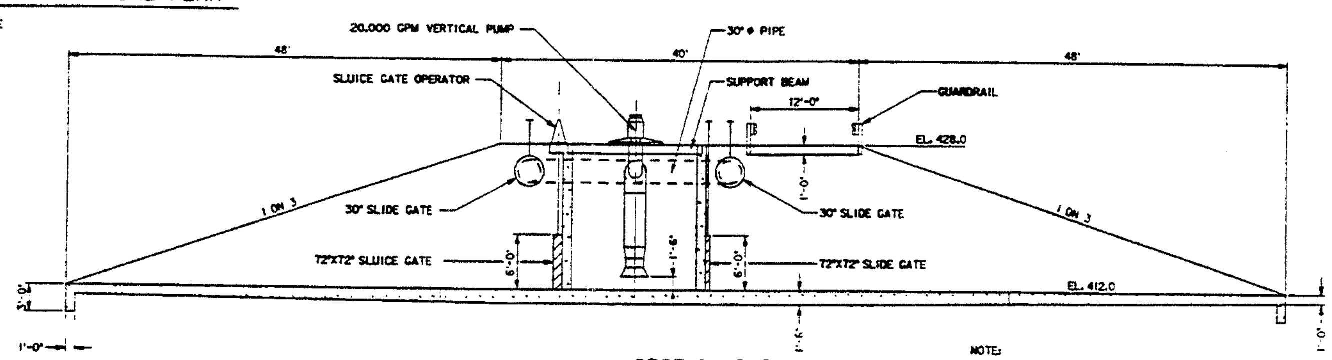
SCALE: 1" = 2'



SECTION A-A

NO SCALE

NOTE:
1. VERTICAL PUMP, PIPING AND GUARD RAIL NOT SHOWN FOR CLARITY.



SECTION B-B

NO SCALE

NOTE:
1. PUMPING SYSTEM IS BIDIRECTIONAL UPON SEQUENCING OF SLUICE AND SLIDE GATES.

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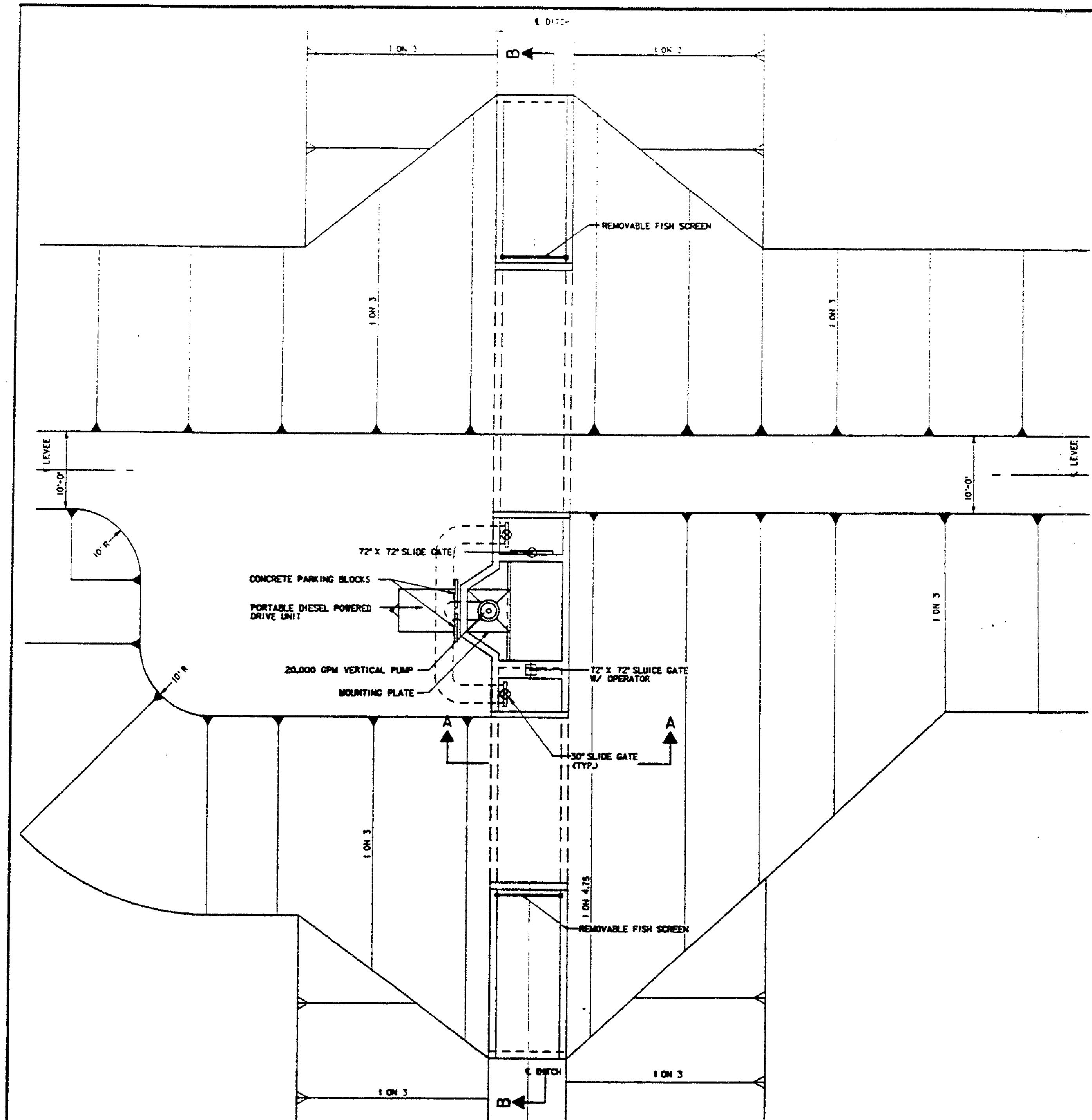
STA. 20+50 AND STA. 297+00
PUMP STATION / CONTROL STRUCTURE
AND DRAINAGE STRUCTURE DETAILS

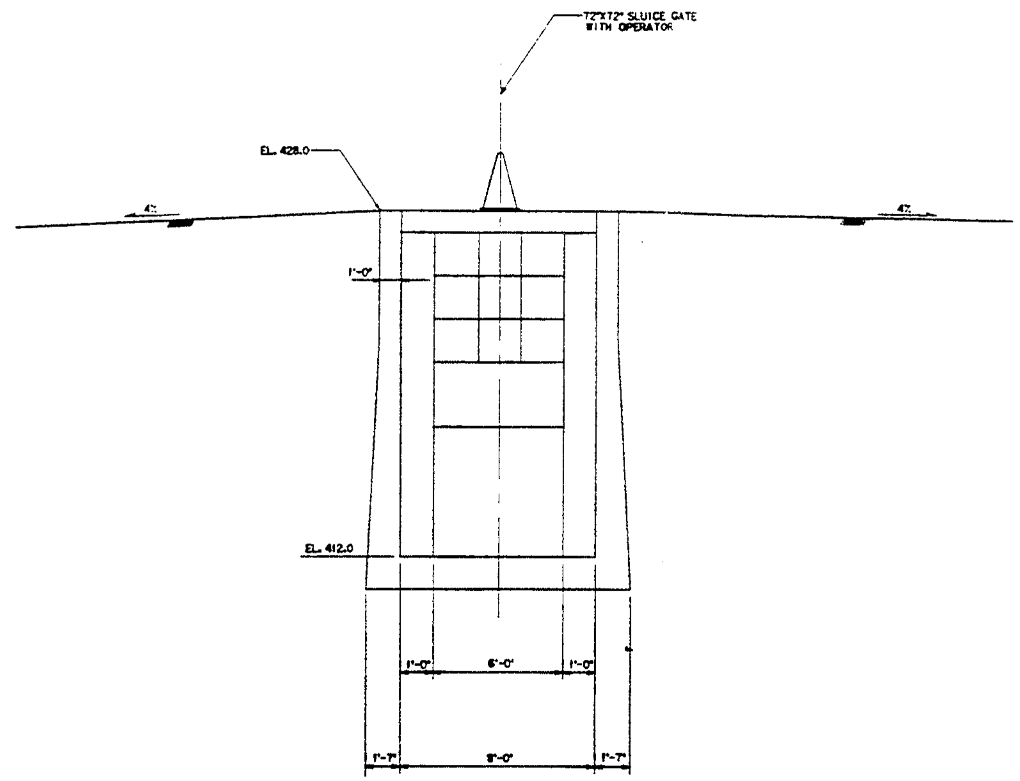
DESIGNED BY: G. LEE	DESIGN FILE: plate22.dgn	PLATE 22
DATE: 8-91 / SCALE: 10	SHEET NO. 22 OF 25	



ILLINOIS RIVER

PUMP STATION / CONTROL STRUCTURE PLAN

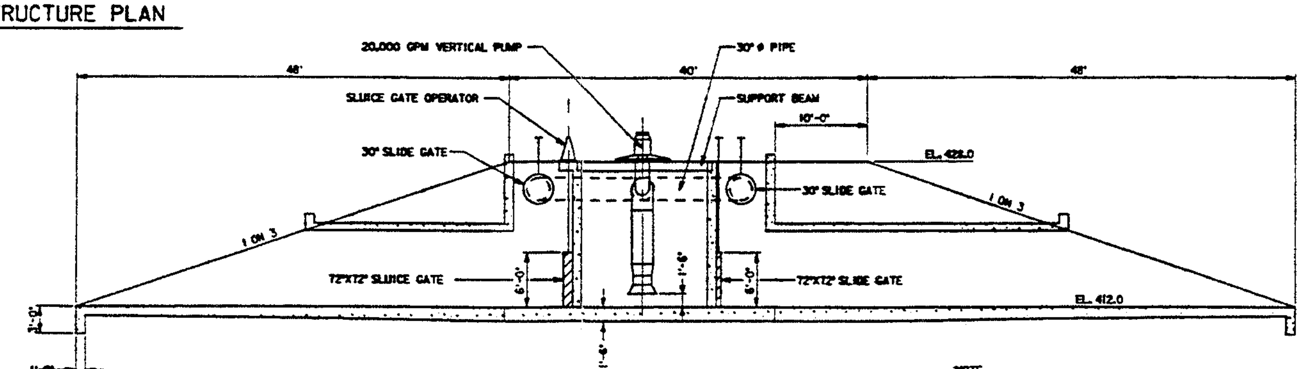
NO SCALE



SECTION A-A

NO SCALE

NOTE:
1. VERTICAL PUMP AND PIPING NOT SHOWN FOR CLARITY.



SECTION B-B

NO SCALE

NOTE

1. PUMPING SYSTEM IS BIDIRECTIONAL UPON SEQUENCING OF SLUICE AND SLIDE GATES.

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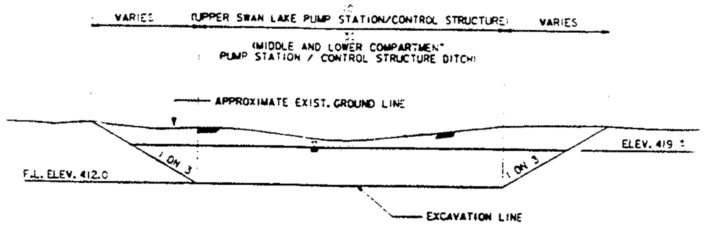
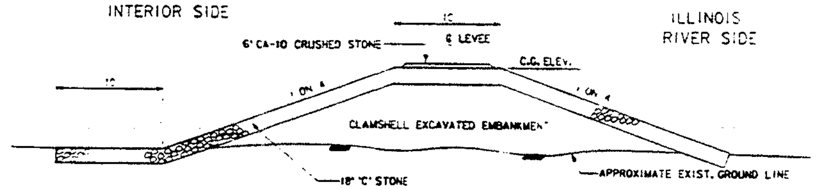
STA. 349+50
PUMP STATION / CONTROL STRUCTURE

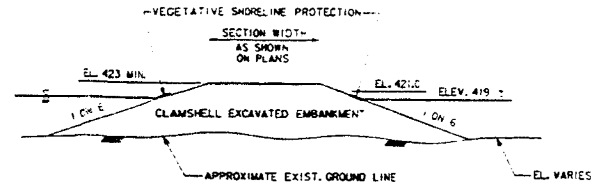
DESIGNED BY:	DESIGN FILE: plate23.dgn	PLATE 23
DATE: 6-91	SHEET NO. 23 OF 25	



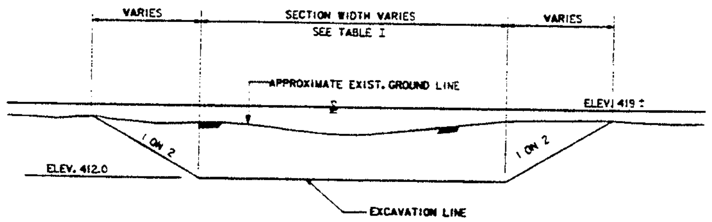
TYPICAL DITCH EXCAVATION
NO SCALE



TYPICAL SECTION
OVERFLOW LEVEE SECTION -STA. 39+00 TO 59+00
NO SCALE

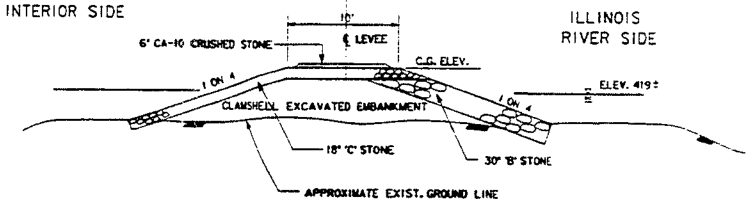


TYPICAL BARRIER ISLAND SECTION
NO SCALE

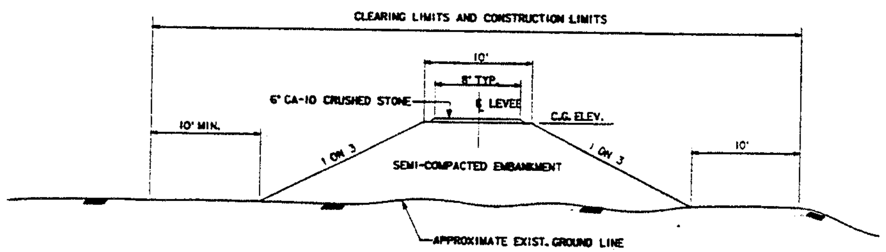


TYPICAL CHANNEL EXCAVATION
NO SCALE

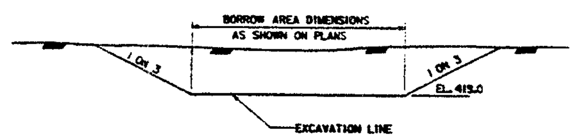
TABLE I			
CHANNEL EXCAVATION TRANSITION TABLE			
CHANNEL	STATION FROM	STATION TO	SECTION WIDTH
1	0+00	4+00	30
	4+00	5+00	TRANSITION
	5+00	22+00	60
	22+00	23+00	TRANSITION
	23+00	86+00	30
	86+00	87+00	TRANSITION
	87+00	92+00	40
	92+00	93+00	TRANSITION
	93+00	332+50	30
2	0+00	37+30	30
3	0+00	25+20	30
4	0+00	19+20	30



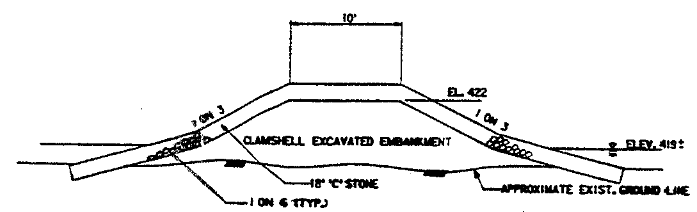
TYPICAL SECTION
LOWER CLOSURE ROCK LEVEE -STA. 20+65.56 TO 39+00
NO SCALE



TYPICAL SECTION -STA. 15+81.76 TO 20+34.50
AND STA. 346+07.48 TO 485+29.02
EARTHEN LEVEE
NO SCALE

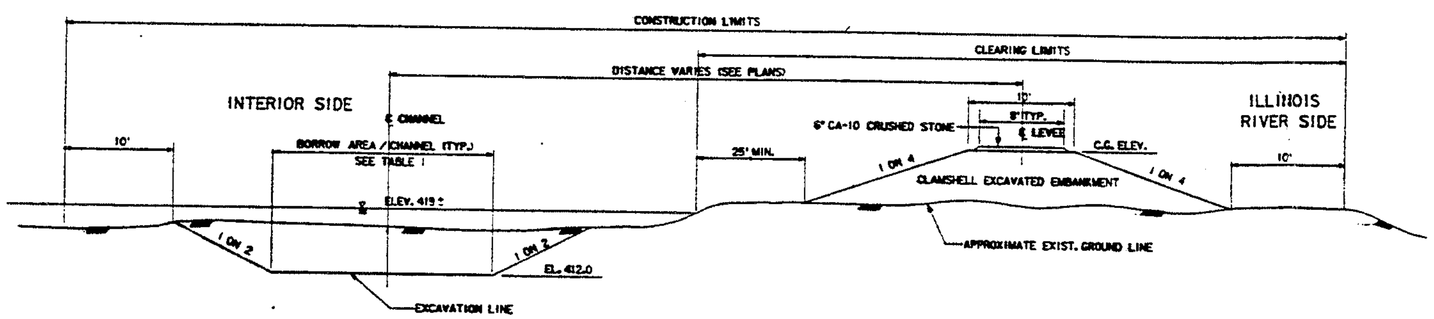


TYPICAL BORROW AREA
NO SCALE



TYPICAL SECTION
INTERIOR CLOSURE
NO SCALE

NOTE: CRUSHED STONE SURFACING NOT SHOWN ONE TYPICAL SECTION. CRUSHED STONE SURFACING TO BE PLACED FROM STA. 0+00 TO STA. 2+50 FOR ACCESS TO GRAVITY DRAIN.



TYPICAL SECTION -STA. 59+00 TO 346+04.78
EARTHEN LEVEE
NO SCALE

GENERAL NOTES:

1. CA-10 CRUSHED STONE IS ONLY PLACED ON LEVEE FROM STA. 15+81.76 TO STA. 416+00

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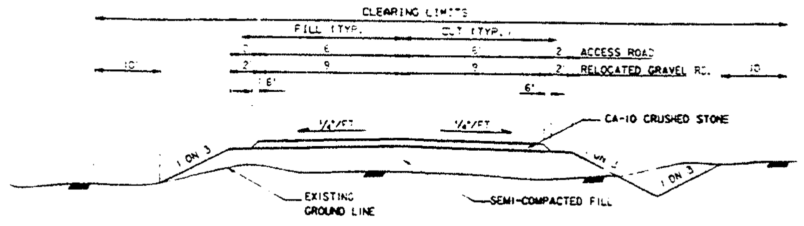
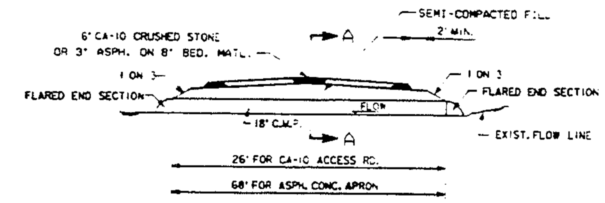
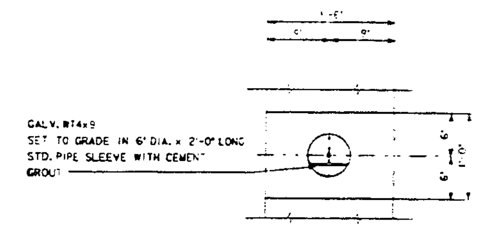
DESIGNED BY: G. LEE	DESIGN FILE: plate24.dgn
DATE: 8-91 SCALE: 10	SHEET NO. 24 OF 25
PLATE 24	



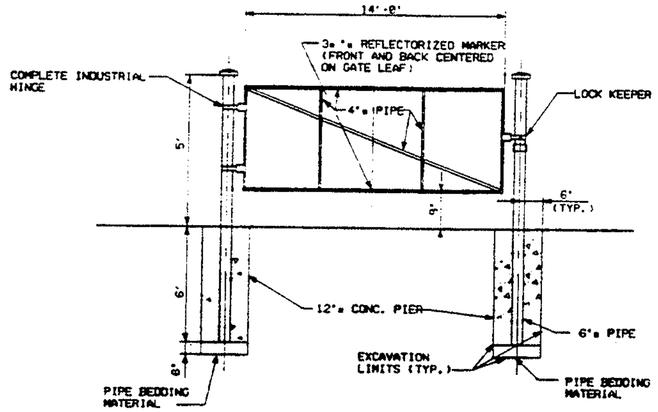
TYPICAL ROAD SECTIONS
NO SCALE



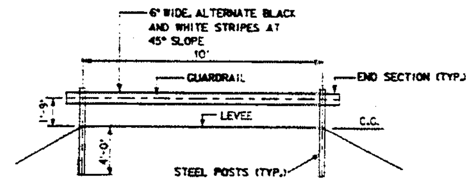
TYPICAL CULVERT SECTION
NO SCALE



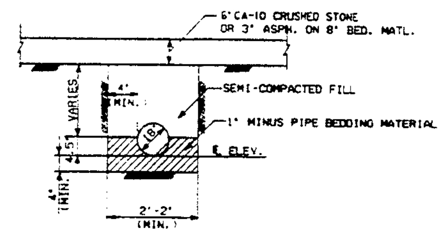
PLAN



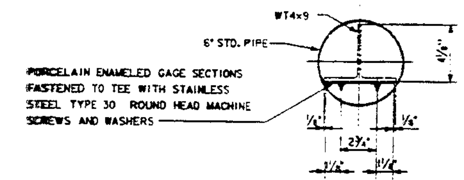
ACCESS GATE
NO SCALE



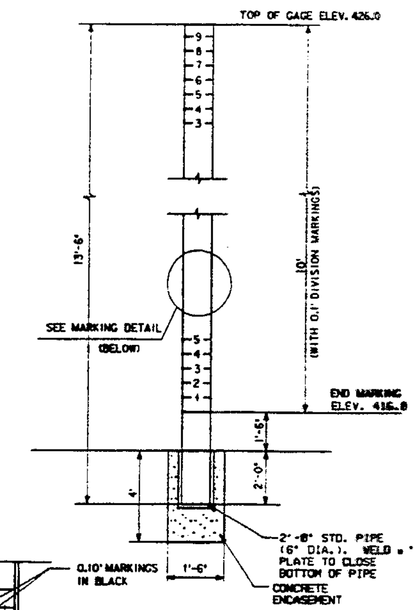
BARRICADE DETAIL
NO SCALE



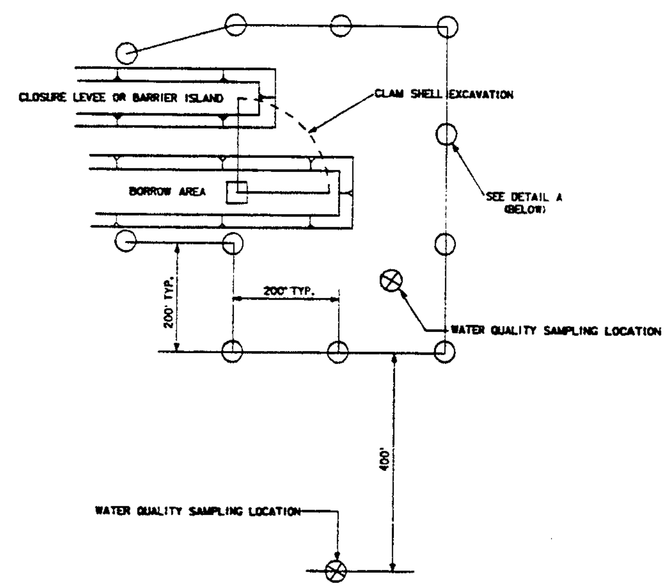
SECTION A-A
NO SCALE



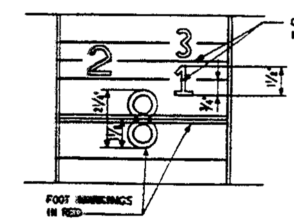
SECTION



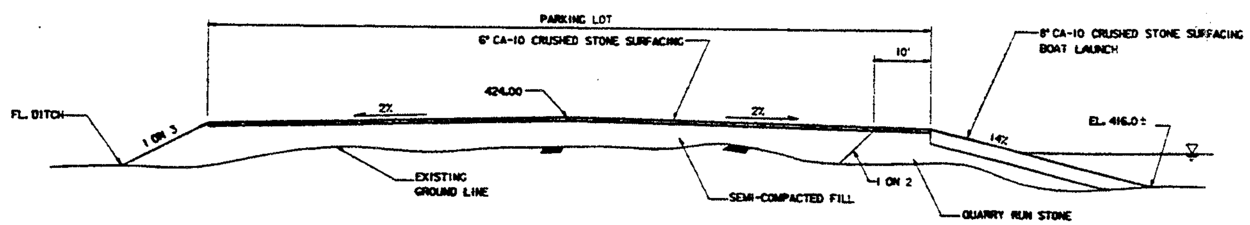
STAFF GAGE
ELEVATION
NO SCALE



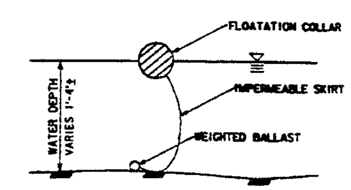
TURBIDITY CURTAIN PLAN
NO SCALE



MARKING DETAIL
NO SCALE



TYPICAL
PARKING LOT & BOAT LAUNCH SECTION
NO SCALE



DETAIL A-TURBIDITY CURTAIN
NO SCALE

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
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HABITAT REHABILITATION PROJECT

MISCELLANEOUS SECTIONS AND DETAILS

DESIGNED BY: G. LEE	DESIGN FILE: plate25.dgn	PLATE 25
DATE: 8-91 SCALE: 20	SHEET NO. 25 OF 25	

UPPER MISSISSIPPI RIVER SYSTEM-ENVIRONMENTAL MANAGEMENT PROGRAM DEFINITE PROJECT REPORT (SL-5) WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

SWAN LAKE

REHABILITATION AND ENHANCEMENT

TECHNICAL APPENDICES

POOL 26
ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS

FINAL

DECEMBER 1991
(Revised January 1993)

US Army Corps of Engineers
St. Louis District
Partners in Progress

ATTACHMENT 2

APPENDICES

FINAL DEFINITE PROJECT REPORT (SL-5)

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM
SWAN LAKE HABITAT AND REHABILITATION PROJECT
POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

APPENDICES

APPENDIX DPR-A

LETTERS OF INTENT AND PROJECT AGREEMENTS

FOREWORD

Section 1 of APPENDIX DPR-A provides project letters of intent from the U.S. Fish and Wildlife Service, the U.S. Soil Conservation Service, the Illinois Department of Conservation, and the Calhoun County Soil and Water Conservation District. These letters deal with the topic of land acquisition, cost-sharing, and/or O&M assurances. Section 2 of APPENDIX DPR-A provides the draft project agreements. This includes an MOA between the Corps and Fish and Wildlife Service, an LCA between the Corps and the Conservation District, an MOA between the Corps and the Soil Conservation Service, an O&M agreement between the Soil Conservation Service and the Conservation District, and a project agreement between the Conservation District and the landowner (including an operation and maintenance plan).

SECTION 1

LETTERS OF INTENT

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:

FWS/ARW-SS

JAN 21 1992

Colonel James D. Craig
District Engineer
U.S. Army Engineering District, Saint Louis
210 Tucker Boulevard, North
Saint Louis, Missouri 63101-1986

Dear Colonel Craig:

The U.S. Fish and Wildlife Service (Service) has reviewed the "Definite Project Report (SL-5) with Integrated Environmental Assessment" dated December 1991 for the Swan Lake rehabilitation and enhancement project. This project, located in Pool 26, Calhoun County, Illinois, is proposed under the Water Resources Development Act of 1986 (Public Law 99-662) as part of the Upper Mississippi River System Environmental Management Program.

The habitat project has been coordinated with the Service and we approve and support the project as planned and described in the definite project report. The Service agrees with the preferred alternative described in the environmental assessment, Table 19 of the definite project report. On December 17, 1990, the Refuge Manager, Mark Twain National Wildlife Refuge (Refuge), found the project compatible with the purposes for which the Refuge was established, as required by the National Wildlife Refuge Administration Act.

The Service will assure operation and maintenance requirements of the project will be accomplished in accordance with Section 906(e) of the Water Resources Development Act of 1986. In accordance with the policies stated in the Fourth Annual Addendum, the Service will perform the operation and maintenance requirements for this project as listed on pages 56 and 57.

This project being located on Refuge lands, the Service will complete its finding of no significant impact upon learning from you that the public review period produced no substantive changes in the definite project report-environmental assessment.

We look forward to our continued cooperative efforts in developing habitat rehabilitation and enhancement projects under the Environmental Management Program.

Sincerely,

Marvin E. Moriarty
Acting Regional Director

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

FWS/ARW-RE

AUG 14 1991

Colonel James D. Craig
District Engineer
U.S. Army Engineer District
St. Louis
1222 Spruce Street
St. Louis, Missouri 63103

Dear Colonel Craig:

We wish to express the intent of the U.S. Fish and Wildlife Service (Service) to acquire certain non-Federal lands needed for the Swan Lake Rehabilitation and Enhancement Project. This project is being implemented as part of the Upper Mississippi River System - Environmental Management Program (EMP).

The acquisition includes all privately-owned lands lying outside the Federal boundary that are needed to offset the project's water level management-associated elevation of 424 National Geodetic Vertical Datum, and consists of approximately 92 acres comprising 16 ownerships. In addition, approximately 4 acres of non-Federal land (two ownerships) would be acquired for permanent road easements, as described in the real estate requirements appendix of the Definite Project Report.

The acquisition is also included in the Service's preliminary project proposal to expand the Mark Twain National Wildlife Refuge. Because of this, the Service would have pursued acquisition of the area for national wildlife refuge management even if the EMP had not been developed.

Sincerely,

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

1902 FOX DRIVE
CHAMPAIGN, ILLINOIS 618

August 5, 1991

Owen Dutt, Acting Chief
Planning Division
1222 Spruce Street
St. Louis, MO 63103

Dear Mr. Dutt:

The Soil Conservation Service (Hardin, Illinois Field Office), at the request of the Calhoun County Soil Conservation District (CCSWCD), ha worked closely with the St. Louis Corps District on the Swan Lake Habitat Rehabilitation and Enhancement Project. The hillside sedimen control features for this project are anticipated to yield substantia benefits of soil erosion control and fish and wildlife habitat improvement.

It is the intent of the Service to sign into a Memorandum of Agreemen with the St. Louis Corps District for the hillside sediment control program portion of the Swan Lake Project. Under this agreement, with funding provided by the St. Louis District, the Service will provide technical assistance for the design and construction of this project component. Also under this agreement, and in accordance with Section 906 (e) of the Water Resources Development Act of 1986, the Service agrees to be responsible for the maintenance of the installed measure through an operation and maintenance agreement between the Service an the CCSWCD.

Furthermore it is the Services' intent to provide technical assistance, to the project sponsor for the hillside feature (i.e. the CCSWCD) as requested by that sponsor.

This project is not only the most economically feasible solution to the sedimentation problems in Swan Lake, it also provides a unique opportunity to foster interagency cooperation. We are looking forward to participating with you on this venture.

Sincerely,

Mark W. Berkland
MARK W. BERKLAND
Acting State Conservationist

cc:
Col. J. E. Corbin, Corps of Engineers, St. Louis, MO
D. Gates, Corps of Engineers, St. Louis, MO
C. Buel, Corps of Engineers, St. Louis, MO
G. Parker, ASTC, SCS, Champaign, IL
R. Macho, AC, SCS, Edwardsville, IL

GNP:lm:dutt-1

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
[redacted]

BRENT MANNING, DIRECTOR

June 21, 1991

Colonel James E. Corbin
District Engineer
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

24 Jun 91

Dear Colonel Corbin:

Members of my staff have worked closely with the St. Louis District, Corps of Engineers and the U.S. Fish & Wildlife Service in preparation of the Definite Project Report for the Upper Mississippi River System Environmental Management Program, Swan Lake Habitat Rehabilitation Project which includes improvements to the Fuller Lake Area that our Department manages under a cooperative agreement with the Service. We are confident that construction of this project will result in a significant increase in both the quantity and quality of fish and wildlife habitat in the Swan Lake area.

The Department is prepared to serve as the non-federal sponsor for the Fuller Lake Area and will cooperate with the U.S. Fish and Wildlife Service to assure that operation and maintenance activities, as described in the final Definite Project Report and any mutually agreed upon rehabilitation, will be accomplished in accordance with Section 906(e) of the Water Resources Development Act of 1986.

We look forward to a construction start on this project at the earliest possible date. Please do not hesitate to contact Mr. William R. Donels at the above address to further discuss this matter.

Sincerely,

Brent Manning
Director

BM:WRD:gb

Calhoun County Soil & Water Conservation District
P.O. Box 516 - Hardin, IL 62047 - Phone 576-2723

July 22, 1991

To: Owen Dutt
Acting Chairman of Planning
St. Louis District Corps of Engineers
1222 Spruce St.
St. Louis, MO 63103

Dear Mr. Dutt,

The Calhoun County Soil and Water Conservation District (CCSWCD) with the technical assistance of the U.S.D.A. Soil Conservation Service (SCS) has worked closely with the St. Louis Corps District in developing a strategy for hillside sediment control on the Swan Lake Habitat Rehabilitation and Enhancement Project.

By this letter, it is the intent of the CCSWCD to serve as the local sponsor for the hillside sediment control feature of the project. It is understood that the CCSWCD's cost share for the construction of this feature is 25 percent. A number of possible sources of funding exist for the 25 percent local cost share. These sources include state Conservation Practices Program funds, Ducks Unlimited M.A.R.S.H. Program funds, EPA 319 funds, and landowner contributions.

It is also the intent of the CCSWCD to incure the total cost of the operations and maintenance of the hillside sediment control feature as outlined in the draft operation and maintenance agreement between the SCS and the CCSWCD.

The agreement will be accomplished in accordance with Sec. 906 (E) of the Water Resource Development Act of 1986. Any mutually agreed to rehabilitation will be cost shared on a 75 percent Federal and 25 percent local sponsor basis.

The CCSWCD gives its full support to the hillside sediment control program and to its mutually beneficial benefits of soil erosion control and habitat rehabilitation and enhancement.

Sincerely,

Kenneth Friedel

Kenneth Friedel, Chairman
Calhoun County Soil and Water Conservation District

cc: Colonel James Corbin
Dave Gates
Clarence Buel

Calhoun County Soil & Water Conservation District
P.O. Box 516 - Hardin, IL 62047 - Phone 576-2723

Owen Dutt
Chief of Planning
St. Louis Corps of Engineers
1222 Spruce St.
St. Louis, MO

August 30, 1991

Dear Mr. Dutt,

The Calhoun County Soil and Water Conservation District fully supports the Swan Lake Partnership Program.

It is the intention of this District to provide 25% non-federal cost share in support of application on hillside features.

The District will obtain cost share through private landowners and state agencies as stated in the draft DPR.

If needed the Calhoun Co. Soil & Water Conservation District can also exercise taxing authority in support of the program requirements.

Please find explanation of Soil and Water Conservation District taxing authority as described in SWCD Acts of 1986, Sec. 26-B attached.

Sincerely,

Kenneth J. Friedel

Kenneth Friedel
Chairman

cc: Dave Gates
Clarence Buel
Rick Macho

After the adoption of the appropriation ordinance and on or before the second Tuesday in September of each year, the Directors of the sub-district shall ascertain the total amount of the appropriations legally made which are to be provided for from the tax levy for that year. Then, by an ordinance specifying in detail the purposes for which such appropriations have been made and the amounts appropriated for such purposes, the directors of the sub-district shall levy not to exceed the total amount so ascertained upon all the property subject to taxation in the sub-district as the same is assessed and equalized for State and County purposes for the current year. A certified copy of such ordinance shall be filed on or before the first Tuesday in October with the Clerk of each County wherein the sub-district or any part thereof is located.

The Board of Directors of any sub-district shall have power to build, construct, maintain and operate works of improvement, to borrow money and issue bonds and pay for such by special assessment or from the proceeds of the tax hereinbefore authorized, or both, as they by ordinance shall prescribe. The proceedings for borrowing money, issuing bonds, making, levying, collecting and enforcing of any special assessment levied hereunder, the letting of contracts, performance of work and all other matters pertaining to the construction and making of the improvement, shall be the same as nearly as may be as is prescribed in Division 2 of Article 9 of the "Illinois Municipal Code", approved May 29, 1961, as now or hereafter amended; but no special assessments shall be levied upon property situated outside of such sub-district and in no case shall any property be assessed more than it will be benefited by the improvement for which the assessment is levied. Whenever in that article the words "City Council" or the words "Board of Local Improvements" are used, the same shall apply to the board of directors of the respective sub-districts as constituted by this Act; the word "Mayor" or "President" of the "board of local improvements" shall apply to the Chairman of the board of directors of such sub-districts constituted by this Act, and the words applying to the City or its officers in that article shall be held to apply to the respective sub-district created under this act and its officers.

Such sub-districts in the area included within their boundaries shall have and may exercise all of the powers enumerated in Sections 22.01 to 22.09 each inclusive of this Act, in addition to the powers herein otherwise provided. As amended by act approved September 26, 1980. Section Added: 1955.

Sec. 26b.1. PETITION. When a majority of the land owners in a proposed sub-district who also own a majority of the land in such sub-district desire that a sub-district be organized they shall file a petition with the directors of the district. The area included in the petition need not be contiguous but shall serve compatible purposes. The petition shall contain a legal description of the lands proposed to be included, a brief statement of the reasons for requesting organization of the sub-district and a request that the proposed area be organized as a sub-district. The petition must be signed by a majority of those owning land in the proposed area who also own a majority of such land. Land already in one sub-district cannot be included in another. As amended by act approved December 3, 1971. Section Added: 1955.

Sec. 26b.2. HEARING. Within 30 days after such a petition has been filed with the directors they shall cause due notice to be given of a hearing upon the practicability and feasibility of creating the proposed sub-district. All interested parties shall have a right to attend such hearing and to be heard. If it shall appear at the hearing that other lands should be included or that lands included in the petition should be excluded the directors may permit such inclusion or exclusion, provided the petition still meets the requirements of Section 26b.1. No petitioner may withdraw from the petition without the consent of a majority of the other petitioners. The directors shall adjourn the hearing to a day certain, but not sooner than 15 days nor later than 30 days. Further adjournments may be made, but only for good cause. Added by act approved May 25, 1955.

SECTION 2

AGREEMENTS

MEMORANDUM OF AGREEMENT

BETWEEN
U.S. FISH AND WILDLIFE SERVICE
AND
U.S. ARMY CORPS OF ENGINEERS

DRAFT

MEMORANDUM OF AGREEMENT
BETWEEN
THE UNITED STATES FISH AND WILDLIFE SERVICE
AND
THE DEPARTMENT OF THE ARMY
FOR
ENHANCING FISH AND WILDLIFE RESOURCES
OF THE
UPPER MISSISSIPPI RIVER SYSTEM
AT
SWAN LAKE, ILLINOIS

I. PURPOSE

The purpose of this Memorandum of Agreement (MOA) is to establish the relationships, arrangements, and general procedures under which the U. S. Fish and Wildlife Service (FWS) and the Department of the Army (DOA) will operate in constructing, operating, maintaining, repairing, and rehabilitating the Swan Lake, Illinois separable element of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP).

The project lands of the Swan Lake, Illinois, separable element are managed as a National Wildlife Refuge under a cooperative agreement between the Department of the Interior (USFWS) and the U.S. Army Corps of Engineers. Subsequently, management of a portion of these project lands has been assumed by the Illinois Department of Conservation (IDOC) under a successive cooperation agreement between the USFWS and the IDOC.

II. BACKGROUND

Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, authorizes construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. Under conditions of Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, all construction costs of those fish and wildlife features at Swan Lake are 100 percent Federal, and all operation, maintenance, repair, and rehabilitation costs are to be cost shared 75 percent Federal and 25 percent non-Federal.

III. GENERAL SCOPE

The (Project) to be accomplished pursuant to this MOA shall consist of enhancing fish and wildlife habitat, by reducing sedimentation, by providing a means of water level control, by reducing the effects of wind generated waves, and by implementing a variety of habitat management practices.

IV. RESPONSIBILITIES

a. DOA is responsible for:

(1) Construction: Construction of Project features that will enhance fish and wildlife habitat, by reducing sedimentation, by providing a means of water control, and reducing wave action.

DOA: District Engineer
U.S. Army Engineer District, St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-2833

VII. EFFECTIVE DATE OF MOA

This MOA shall become effective when signed by the appropriate representatives of both parties.

THE DEPARTMENT OF THE ARMY

By:

(Signature)
JAMES D. CRAIG
Colonel
U.S. Army Engineer District
Corps of Engineers

Date ______________________

THE U.S. FISH AND WILDLIFE SERVICE

By:

(Signature)
JAMES C. GRITMAN
Regional Director
U. S. Fish and Wildlife Service

Date ______________________

LOCAL COOPERATIVE AGREEMENT

BETWEEN
CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
AND
U.S. ARMY CORPS OF ENGINEERS

DRAFT--NOT FOR SIGNATURE
LOCAL COOPERATION AGREEMENT
BETWEEN
THE CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
AND
THE DEPARTMENT OF THE ARMY
FOR CONSTRUCTION OF
HILLSIDE SEDIMENT CONTROL FEATURES AT
SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
CALHOUN COUNTY, ILLINOIS

THIS AGREEMENT is entered into this ____ day of ____________, 19____, by and between the DEPARTMENT OF THE ARMY acting by and through the Acting Principal Deputy Assistant Secretary of the Army for Civil Works (herinafter referred to as the "Corps"), and the Calhoun County Soil and Water Conservation District (herinafter referred to as the "District").

WITNESSETH, that:

WHEREAS, construction of the hillside sediment control feature to the Swan Lake Habitat Rehabilitation and Enhancement Project at Swan Lake in Calhoun County, Illinois (hereinafter referred to as the "project", as defined in Article I.a. of this Agreement), was approved under the terms of the Upper Mississippi River System Environmental Management Program, as authorized by Section 1103 (e) of the Water Resources Development Act of 1986, Public Law 99-662, as amended; and

WHEREAS, Section 906 (e) of the Water Resources Development Act of 1986, Public Law 99-662, as amended, specifies the cost-sharing requirements applicable to the Project; and

WHEREAS, Section 221 of the Flood Control Act of 1970, Public Law 91-611, as amended, provides that the construction of any water resources project by the Secretary of the Army shall not be commenced until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the Project, and

WHEREAS, the District has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in cost-sharing and financing in accordance with the terms of this Agreement;

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS AND GENERAL PROVISIONS

For purposes of this Agreement:

a. The term "Project" shall mean construction of approximately 190 sediment control structures (including ponds, terraces and basins) as generally described in the Report entitled "Swan Lake Habitat Rehabilitation and Enhancement Project, Pool 26 - Illinois River, Calhoun County, Illinois," dated August 1991 and approved by the Acting Principal Deputy Assistant Secretary (Civil Works) on ______________(hereinafter referred to as the "Definite Project Report").

b. The term " total project costs" shall mean all costs related to the construction of the Project. Such costs shall include, but not necessarily be limited to general design (including preparation of the Definate Project Report), continuing planning and engineering costs incurred after approval of the Definite Project Report; actual construction costs; supervision and administration costs; costs of plans and specifications; costs of contract dispute settlements or awards; and the value of relocations provided by the District, but shall not include any costs for easements, rights-of-way, betterments, operation, maintenance or rehabilitation.

c. The term "fiscal year" shall mean one fiscal year of the United States Government, unless otherwise specifically indicated. The Government fiscal year begins on October 1 and ends on September 30.

d. The term "functional portion of the Project" shall mean a completed portion of the Project as determined by the Contracting Officer to be suitable for tender to the District to operate and maintain in advance of completion of construction of the entire project.

e. The term "relocations" shall mean alterations to existing man-made structures determined by the Government to be necessary for the construction, operation and maintenance of the Project.

f. The term "period of construction" shall mean the time from the advertisement of the first construction contract to the time of acceptance of the Project by the Contracting Officer.

g. The term "Service" refers to the U.S. Soil Conservation District. The Service will provide the Corps with technical assisstance during the design and implementation of the hillside features.

h. The term "Contracting Officer" shall mean the U.S. Army District Engineer for the St. Louis District, or his designee.

ARTICLE II - OBLIGATIONS OF THE PARTIES

A. The Corps, subject to and using funds provided by the District and appropriated by the Congress of the United States, shall with the technical assistance of the Service (per a Memorandum of Agreement) expeditiously construct the Project, including any relocations. This will be accomplished using those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The

District shall be afforded the opportunity to review and comment on all contracts, including relevant plans and specifications, prior to the issuance of invitations for bid. To the extent possible, the District will be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed. The Corps will consider the comments of the District, but award of the contracts, modifications or change orders, and performance of all work on the Project, shall be within the control of the Corps.

b. As further specified in Article VI hereof, the District as the local sponsor for the Project shall provide, during the period of construction, a cash contribution of 25 percent of total project construction costs.

c. As further specified in Article III hereof, the District shall provide all lands, easements, rights-of-way, and suitable borrow and dredged material disposal areas determined by the Corps to be necessary for construction of the Project.

d. As further specified in Article III hereof, the District shall perform all relocations determined by the Corps to be necessary for construction of the Project.

e. The value of the contributions provided under paragraph d. of this Article may be applied as a credit against the cash contribution required pursuant to paragraph b. of the Article.

f. When the Corps determines that the Project or a functional portion of the Project is complete, the Corps shall turn the completed Project or functional portion over to the District, which shall accept the completed Project or functional portion and be responsible for operating, maintaining and rehabilitating the Project or functional portion in accordance with Article VIII hereof.

g. The District shall be responsible for 25% of the costs of any mutually agreed to rehabilitation of the Project or functional portion thereof; however, no rehabilitation shall be undertaken unless specifically directed by the Corps.

h. No Federal funds may be used to meet the District´s share of total project costs under this Agreement unless the expenditure of such funds is expressly authorized by statute as verified in writing by the Federal granting agency.

ARTICLE III - FACILITIES, AND PUBLIC LAW 91-646 RELOCATION ASSISTANCE

A. The District shall make available to the Corps easements, and rights-of-way, including suitable borrow and dredged material disposal areas, as may be determined by the Corps to be necessary for the construction, operation, and maintenance of the Project, and shall furnish to the Corps evidence supporting the District´s legal authority to grant rights-of-entry to such lands. The necessary easements, and rights-of-way may be provided incrementally, but all easements, and rights-of-way determined by the Corps to be necessary for work to be performed under a construction contract must be furnished prior to the advertisement of the construction contract.

b. Upon notification from the Corps, the District shall accomplish or arrange for accomplishment at no cost to the Corps all relocations determined by the Corps to be necessary for construction of the Project.

c. The District shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring easements, and rights-of-way for construction and subsequent operation and maintenance of the Project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - CREDIT FOR RELOCATIONS

The costs of relocations which will be included in the total project costs and credited towards the District'share of the total project costs shall be that portion of the actual costs approved by the Corps.

ARTICLE V - CONSTRUCTION PHASING AND MANAGEMENT

a. To provide for consistent and effective communication between the District and the Corps during the period of construction, the District and the Corps shall appoint representatives to coordinate on all matters relating to construction of the Project. The District will be informed of any changes in cost estimates by the Corps.

b. The representatives appointed above shall meet as necessary during the period of construction and shall make such recommendations as they deem warrented to the Contracting Officer.

c. The Contracting Officer shall consider the recommendations of the representatives in all matters relating to construction of the Project, but the Contracting Officer, having ultimate responsibility for construction of the Project, has complete discretion to accept, reject, or modify the recommendations.

ARTICLE VI - METHOD OF PAYMENT

a. The District shall provide, during the period of construction, the cash payments required to meet its obligations under Article II of this Agreement. Total project costs are currently estimated to be $ ________. In order to meet its share, the District mujst provide a cash contribution currently estimated to be $ _________. The dollar amounts set forth in this Article are based upon the Corps' best estimates which will reflect projection of costs, price level changes, and anticipated inflation. Such cost estimates are subject to adjustments based upon costs actually incurred and are not to be construed as the total financial responsibilities of the Corps and the District.

b. The District shall provide its required cash contribution in accordance with the following provisions:

1. For purposes of budget planning, the Corps shall notify the District by ____________________ of each year of the estimated funds that will be required from the District to meet its share of total project costs for the upcoming fiscal year.

2. No later than 60 calendar days prior to the award of the first construction contract, the Corps shall notify the District of the District's share of total project costs, including its share of costs attributable to the Project incurred prior to the initiation of construction, for the first fiscal lyear of construction. No later than 30 calendar days thereafter, the District shall verify to the satisfaction of the Corps that it has deposited the requisite amount in an escrow account acceptable to the Corps, with interest accruing to the District.

3. For the second and subsequent fiscal years of project construction, the Corps shall, no later than 60 calendar days prior to the beginning of the fiscal year, notify the District of the District's share of total project costs for that fiscal year. No later than 30 calendar days prior to the beginning of the fiscal year, the District shall make the necessary funds available to the Corps through the funding mechanism specified in Article VI.b.2 of this Agreement. As construction of the Project proceeds, the Corps shall adjust the amounts required to be provided under this paragraph to reflect actual costs.

4. If at any time during the period of construction the Corps determines that additional funds will be needed from the District, the Corps shall so notify the District, and the District, no later than 45 calendar days from receipt of such notice, shall make the necessary funds available through the funding mechanism specified in Article VI.b.2. of this Agreement.

c. The Corps will draw on the escrow account provided by the District such sums as the Corps deems necessary to cover contractual and in-house fiscal obligations attributable to the Project as they are incurred, as well as costs incurred by the Corps prior to the initiation of construction.

d. Upon completion of the Project and resoulution of all relevant claims and appeals, the Corps shall compute the total project costs and tender to the District a final accounting of the District's share of total project costs. In the event the total contribution by the District is less than its minimum required share of total project costs, the District shall, no later than 90 calendar days after receipt of written notice, make a cash payment to the Corps of whatever sum is required to meet its minimum required share of total project costs.

e. If the District's total contributions under Article II.b. and II.d. of this Agreement (including relocations) exceed 25 percent of total project costs, the Corps shall, no later than 90 calendar days after the final accounting is complete, subject to the availability of funds, return said excess to the District.

ARTICLE VII - DISPUTES

Before any party to this Agreement may bring suit in any court concerning an issue relating to this Agreement, such party must first seek in good faith to resolve the issue through negotiation or other forms of no-binding alternative dispute resolution mutually acceptable to the parties.

ARTICLE VIII - OPERATION, MAINTENANCE AND REHABILITATION

a. After the Corps has turned the completed Project, or functional portion of the Project, over to the District, the District shall operate and maintain the completed Project, or functional portion of the Project, as provided in Article II of this Agreement, and in accordance with the O&M agreements between the Corps, the Service, and the District.

ARTICLE IX - RELEASE OF CLAIMS

The District shall hold and save the Corps free from all damages arising from the construction, operation, and maintenance of the Project, except for damages due to the fault or negligence of the Corps or its contractors.

a. After execution of this Agreement and upon direction by the Contracting Officer, the District shall perform, or cause to be performed, such environmental investigations as are determined necessary by the Corps or the District to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, on lands necessary for Project construction, operation, and maintenance. All actual costs incurred by the District which are properly allowable and allocable to performance of any such environmental investigations shall be included in total project consts and cost-shared as a construction cost in accordance with Public Law 99-662.

b. In the event it is discovered through an environmental investigation or other means that any lands, easements, rights-of-way, or disposal areas to be acquired or provided for the

Project contain any hazardous substances regulated under CERCLA, the District and the Corps shall provide prompt notice to each other, and the District shall not proceed with the acquisition of lands, easements, rights-of-way, or disposal areas until mutually agreed.

c. The Corps and the District shall determine whether to initiate construction of the Project, or, if already in construction, to continue with construction of the Project, or the terminate construction of the Project for the convenience of the Corps in any case where hazardous substances regulated under CERCLA are found to exist on any lands necessary for the Project. Should the Corps and the District determine to proceed or continue with construction after considering any liability that may arise under CERCLA, the District shall be responsible, as between the Corps and the District for any and all necessary clean up and response costs, to include the costs of any studies and investigations necessary to determine an appropriate response to the contamination. Such costs shall not be considered a part of total project costs as defined in this Agreement. In the event the State fails to provide any funds necessary to pay for clean up and response consts or to otherwise discharge its responsibilites under this paragraph upon direction by the Corps, the Corps may either terminate or suspend work on the Project or proceed with further work as provided in Article XVII of this Agreement.

d. The District and the Corps shall consult with each other under the Construction Phasing and Management Article of this Agreement to assure that responsible parties bear any necessary clean up and response costs as defined in CERCLA. Any decision made pursuant to paragraph c. of this Article shall not relieve any party from any liability that may arise under CERCLA.

e. The District shall operate, maintain and rehabilitate the Project in a manner so that liability will not arise under CERCLA.

ARTICLE XI - MAINTENANCE OF RECORDS

The Corps and the District shall keep books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect total project costs. The Corps and the District shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the Project and resolution of all relevant claims arising there from, and shall make available at their offices at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the parties to this Agreement.

ARTICLE XII - GOVERNMENT AUDIT

The Corps shall conduct an audit when appropriate of the

District's records for the Project to ascertain the allowability, reasonableness, and allocability of its costs for inclusion as credit against the no-Federal share of project costs.

ARTICLE XIII - FEDERAL AND STATE LAWS

In acting under its rights and obligations hereunder, the District agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant therto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

ARTICLE XIV - RELATIONSHIP OF PARTIES

The parties to this Agreement act in an independent capacity in the performance of their respective functions under this Agreement, and neither party is to be considered the officer, agent, or employee of the other.

ARTICLE XV - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, or resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE XVI - COVENANT AGAINST CONTINGENT FEES

The District warrants that no person or selling agency has been employed or retained to solicit or secure this Agreement upon agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the State for the purpose of securing business. For breach or violation of this warranty, the Corps shall have the right to annul this Agreement whithout liability, or, in its discretion, to add to the Agreement or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE XVII - TERMINATION OR SUSPENSION

a. If at any time the District fails to make the payments required under this Agreement, the Secretary of the Army shall terminate or suspend work on the Project until the District is no longer in arrears, unless the Secretary of the Army determines that continuation of work on the Project is in the interest of the United States or is necessary in order to satisfy agreements with any other non-Federal interests in connection with the Project. Any delinquent payment shall be charged interest at a rate, to be determined by the Secretary of the Treasury, equal to 150 per centum of the average bond equivalent rate of the 13-week

Trasury Bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3-month period if the period of delinquency exceeds 3 months.

b. If the Corps fails to receive annual appropriations for the Project in amounts sufficient to meet project expenditures for the then-current or upcoming fiscal year, the Corps shall so notify the District. After 60 calendar days either party may elect without penalty to terminate this Agreement pursuant to this Article or to defer future performance hereunder; however, deferral of future performance under this Agreement shall no affect existing obligations or relieve the parties of liability for any obligation previously incurred. In the event that either party elects to terminate this Agreement pursuant to this Article, both parties shall conclude their activities relating the the Project and proceed to a final accounting in accordance with Article VI of this Agreement. In the event that either party elects to defer future performance under this Agreement pursuant to this Article, such deferral shall remain in effect until such time as the Corps receives sufficient appropriations or until either party elects to terminate this Agreement.

ARTICLE XVIII - NOTICES

a. All notices, requests, demands, and other communications required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and delivered personally, given by prepaid telegram, or mailed by first-class (postage pre-paid), registered, or certified mail, as follows:

If to the District:

Chairman
Calhoun County Soil and Water Conservation District
P.O. Box 516
Hardin, Illinois 62047

If to the Corps:

District Engineer
U.S. Army Engineer District, St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-2833

b. A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this Article.

c. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at such time as it is personally delivered or seven calendar days after it is mailed, as the case may be.

ARTICLE XIX - OBLIGATION OF FUTURE APPROPRIATIONS

Nothing herein shall constitute, nor be deemed to constitute, and obligation of future appropriations when such obligation would be inconsistent with the District's constitutional or statutory limitations.

ARTICLE XX - CONFIDENTIALITY

To the extent permitted by the laws governing each party, the parties agree to maintain the confidentiality of exchanged information when requested to do so by the providing party.

IN WHITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the Acting Principal Deputy Assistant Secretary of the Army (Civil Works).

THE DEPARTMENT OF THE ARMY	THE CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
By:____________________ G. EDWARD DICKEY Acting Principal Deputy Assistant Secretary of the Army (Civil Works)	By:____________________ Chairman
Date:____________________	Date:____________________

CERTIFICATE OF AUTHORITY

I, ____ do hereby certify that I am the Chairman of the Calhoun County Soil and Water Conservation District that the District is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army and the Conservation District in connection with a Habitat Rehabilitation and Enhancement Project at Swan Lake in Calhoun County, Illinois, and to pay damages, if necessary, in the event of the failure to perform, in accordance with Section 221 of Public Law 91-611, as amended, and that the person who has executed this Agreement on behalf of the Conservation District has acted within his statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this _________day of _______________, 19___.

____

Chairman for the Calhoun County
Soil and Water Conservation District

ATTACHMENT TO THE LOCAL COOPERATION AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY AND THE
CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
FOR CONSTRUCTION OF
HILLSIDE SEDIMENT CONTROL FEATURES
AT SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
CALHOUN COUNTY, ILLINOIS

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

THE CALHOUN COUNTY SOIL AND
WATER CONSERVATION DISTRICT

By:________________________

Date:________________________

MEMORANDUM OF AGREEMENT

BETWEEN
U.S. SOIL CONSERVATION SERVICE
AND
U.S. ARMY CORPS OF ENGINEERS

DRAFT--NOT FOR SIGNATURE
MEMORANDUM OF AGREEMENT
BETWEEN
THE UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
AND THE
UNITED STATES DEPARTMENT OF THE ARMY
U.S. CORPS OF ENGINEERS, ST. LOUIS DISTRICT

I. PURPOSE

The purpose of this Memorandum of Agreement (MOA) is to establish the relationships, arrangements, and general procedures under which the United States Department of Agriculture, Soil Conservation Service (herinafter referred to as the "Service") and the Department of Army, Corps of Engineers, by and through the St. Louis District, Lower Mississippi Valley Division (hereinafter referred to as the "Corps"), in the plans and specifications, construction operation and maintenance, and rehabilitation of the Swan Lake, Illinois separable element of the Upper Mississippi River System--Environmental Management Program (UMRS-EMP). As appropriate the relationship of this understanding with respect to the local sponsor for the hillside program, i.e. the Calhoun County Soil and Water Conservation District (CCSWCD) is also mentioned.

II. BACKGROUND

Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, authorizes the construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System.

The Service, under the authority of all applicable Federal laws and regulations, including, but not limited to, the Soil Conservation and Domestic Allotment Act, as amended, 16 U.S.C. 590 a-f, has the authority for the development and prosecution of a continuing program of soil and water conservation.

III. GENERAL SCOPE

The Swan Lake, Illinois hillside sediment control program to be accompished pursuant to this MOA shall consist of the design, construction, operation and maintenance (through a successive agreement with the CCSWCD), and rehabilitation of conservation measures, such as water and sediment control basins and ponds to reduce sediment in the uplands of Swan Lake, thereby reducing sedimentation in the lake and providing improved habitat conditions.

IV. RESPONSIBILITIES

A. The Service is responsible for:

1. technical assistance in the preparation of plans and

specifications, and of preparation, advertisement, awarding and monitoring of contracts for the construction of all hillside sediment control conservation measures.

2. accomplishment of construction related contracting in accordance with Federal Aquisition Regulations.

3. assuring operation and maintenance of the installed measures through an operation and maintenance agreement between the Service and the Calhoun County Soil and Water Conservation District, and in accordance with Section 906 (e) of the Water Resources Development Act (P.L. 99-662).

4. will afford the Corps and the CCSWCD the opportunity to review and comment on the plans and specifications all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed.

5. will notify the District prior to construction of proposed upland projects and will coordinate with the District in conducting these investigations.

B. The Corps is responsible for:

1. providing 100% reimbursement of the design and construction costs (75% Corps/25% local sponsor dollars). No more than ___ percent of which will be used for costs related supervision and administration.

2. providing 100% reimbursement of the costs (75% Federal/25% local sponsor) of any Corps/CCSWCD mutually agreed upon rehabilitation of the hillside component of the project that exceeds the annual operation and maintenance requirements, and that is needed as a result of specific storm or flood events.

3. obtaining through a Local Cooperative Agreement with the Calhoun County Soil and Water Conservation District, all required easement/right-of-way rights, permits, etc. for the installation of the conservation measures.

4. review and approve the plans and specifications for lthe hillside sediment control feature prior to the initiation of any contracting work.

5. will certify satisfactory completion of various phases of the contract work prior to cost reimbursement.

6. the St. Louis District will be responsible for all historic properties compliance activities, including investigations to locate archaeological sites listed in or eligible for listing in the National Register of Historic Places.

V. FINANCIAL ARRANGEMENTS/TRANSFER OF FUNDS

The Service and the Corps shall develop a multi-year program, with segments revised on an annual basis estimating expenditures by fiscal year for the current fiscal year and upcoming fiscal year. Also, at the start of each fiscal year, a schedule of obligations and expenditures will be developed for known and anticipated work for that fiscal year.

The Service and the Corps will enter into a separate agreement (using a form resembling SCS Form AD-628) to provide funding needs for the fiscal year. The Service will bill the Corps on a quarterly basis for expenses incurred for the previous quarter.

V. MODIFICATION AND TERMINATION

This MOA may be modified or terminated at any time by mutual agreement of the parties. Any such modification or termination must be in writing. Unless otherwise modified or terminated, this MOA shall remain in effect for a period of no more than 50 years after initiation of construction of the project.

VI. REPRESENTATIVES

The following individuals or their designated representatives shall have authority to act under this MOA for their respective parties:

Service: ______________________________,
U.S. Soil Conservation Service
____
____

Corps: District Engineer,
U.S. Army Engineer District, St. Louis
St. Louis, Missouri 63103-2833

VII. EFFECTIVE DATE OF MOA

This MOA shall become effective when signed by the appropriate representatives of both parties.

THE DEPARTMENT OF THE ARMY

By:

(Signature)
JAMES D. CRAIG
Colonel
U.S. Army Engineer District
Corps of Engineers

Date______________________________

THE SOIL CONSERVATION SERVICE

By:

(Signature)
____
____
U.S. Soil Conservation Service
Date______________________________

Date______________________________

MEMORANDUM OF AGREEMENT

BETWEEN
CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
AND
U.S. SOIL CONSERVATION SERVICE

DRAFT--NOT FOR SIGNATURE
OPERATION AND MAINTENANCE AGREEMENT
BETWEEN
THE CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
AND
THE U.S. SOIL CONSERVATION SERVICE
FOR HILLSIDE SEDIMENT CONTROL FEATURES AT
SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
CALHOUN COUNTY, ILLINOIS

THIS AGREEMENT made on _______________, _____, is between the Soil Conservation Service, United States Department of Agriculture, hereinafter referred to as the "Service", and the following organization, hereinafter referred to as the "District":

CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT

The District and the Service agree to carry out the terms of this agreement for the operation and maintenance of the practices in the State of Illinois. The practices covered in this agreement are identified as follows:

SWAN LAKE, ILLINOIS UPLANDS SEDIMENTATION CONSERVATION MEASURES

I. GENERAL.

A. The District will:

1. Be responsible for operating and performing or having performed all needed maintenance of practices, as determined by either the Service or the District, without cost to the Service.

2. Obtain prior Service approval of all plans, designs and specifications for maintenance work deviating from the operation and maintenance plan and of plans and specifications for any alteration to the structural practice.

3. Be responsible for the replacement of parts or portions of the practice(s) which have a physical life of less duration than the evaluated life of the practice(s).

4. Prohibit the installation of any structure or facilities that will interfere with the practices.

5. Notify the Service of any agreement to be entered into with other parties for the operation or maintenance of all or any part of the project practices and provide the Service with a copy of the agreement after it has been signed by the District and the other party.

6. Comply with the PROPERTY MANAGEMENT STANDARDS set forth in 7 CFR 3015.160-3015.175, and all applicable Federal, State and local laws.

7. Provide Service and Corps of Engineers personnel the right of free access to the project practices at any reasonable time for the purposes of carrying out the terms of the agreement.

B. The Service will:

1. Upon request of the District, and to the extent that its resources permit, provide consultative assistance in the operation, maintenance, and replacement practices.

II. OPERATION AND MAINTENANCE PLAN (O&M PLAN).

An O&M plan for each practice included in this agreement is attached to and becomes part of this agreement. Forms SCS-LTP-011 and SCS-LTP-11B will be used for this purpose.

III. INSPECTIONS AND REPORTS.

A. The District will inspect the practices as specified in the O&M plan.

B. The Service and Corps of Engineers may inspect the practices at a reasonable time during the period covered by this agreement.

C. A written report will be made of each inspection and provided to others as outlined in the O&M plan.

IV. TIME AND RESPONSIBILITY.

The District's responsibility for operation and maintenance begins when a practice is partially done or completed and accepted or is determined complete by the Service. This responsibility shall continue until the expiration of all the installed project practices. This does not relieve the District's liability which continues throughout the life of the measure nor until the measure is modified to remove potential loss of life or property.

V. RECORDS.

The District will maintain a record of all inspections and significant actions taken, cost of performance and completion date with respect to operation and maintenance. The District and Soil Conservation Service, and the Corps of Engineers may inspect these records at any reasonable time during the term of the agreement.

CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT By:________________________	This action authorized at an official meeting of the Calhoun County Soil and Water Conservation District on the

(Signature)
Title:______________________________

________________ day of __________, 199__, at Hardin, State of Illinois.

THE SOIL CONSERVATION SERVICE

By:______________________________
(Signature)

Title:______________________________

Date:______________________________

PROJECT AGREEMENT

BETWEEN
LANDOWNER
AND
CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT

DRAFT--NOT FOR SIGNATURE
PROJECT AGREEMENT
BETWEEN
______________________(LANDOWNER)
AND
THE CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT
FOR CONSTRUCTION, OPERATION, MAINTENANCE, AND REHABILITATION
OF
HILLSIDE SEDIMENT CONTROL FEATURES AT
SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
CALHOUN COUNTY, ILLINOIS

THIS AGREEMENT is entered into this _____ day of ________, 19__, by and between the Calhoun County Soil and Water Conservation District (hereinafter referred to as the "District"), and the following individual (herinafter referred to as the "landowner").

____

The landowner and the District agree to carry out the terms of this agreement related to the construction, operation, maintenance, and rehabilitation of certain practices in the State of Illinois. The practices covered in this agreement are identified as follows:

SWAN LAKE, ILLINOIS UPLANDS SEDIMENT CONTROL CONSERVATION MEASURES

I. GENERAL--CONSTRUCTION PHASE

A. The landowner will:

1. review and comment on all contracts, including relevant plans and specifications, prior to the issuance of invitations for contract bid, and on modifications and change orders prior to the issuance to the contractor of a Notice to Proceed.

2. provide, during the period of construction, a cash contribution of ___ percent of the total construction costs of measures to be installed on the landowner's property.

3. provide easements, rights-of-way, and suitable borrow and dredged material disposal areas determined by the District as necessary for construction of the Project, and shall furnish the District with evidence supporting the landowner's legal authority to grant rights-of-entry to such lands. Those elements above determined by the District to be necessary for work to be performed under a construction contract must be furnished prior to the advertisement of the construction contract.

4. perform all relocations determined by the District to be necessary for the construction of the Project. Upon notification by the District, the landowner shall accomplish all

relocations determined by the District to be necessary for construction of the Project. This work shall comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as ammended by the Surface Transportation and Uniform Relocation Assistance Act of 1987, and the Uniform Regulations contained in 49 C.F.R. Part 24.

5. when the District and the Corps have determined that the measures or a functional portion of the measures are complete, accept the completed measure and be responsible for operating, maintaining and rehabilitating the measure.

6. be responsible for ____ percent of the total costs of any rehabilitation of measures mutually agreed upon with the District and the Corps.

7. not use Federal funds to meet the landowner's share of the ____ costs under this Agreement, unless the expenditure of such funds is expressly authorized by statute as verified in writing by the Federal granting agency.

8. perimit free access to District, Soil Conservation Service, and Corps personnel to provide technical assistance and inspect the work at any reasonable time during the contract period.

B. The District will:

1. to the extent possible, make available to the landowner all relevant construction related documentation for review and comment.

2. credit towards the landowner's share of the total project costs, the costs of relocations approved by the Corps.

3. inform the landowner of any changes in cost estimates.

II. GENERAL--OPERATION AND MAINTENANCE, AND REHABILITATION PHASE

A. The landowner will:

1. be responsible for reimbursing the District for the non-landowner portion of the total construction costs for sediment reduction features installed on the landowner's property for which operation and maintenance was not performed as specified in the landowner prescribed plan of operation and maintenance. This also includes any change of land ownership for which no arrangement was made to transfer the obligation for continued operations and maintenance of the practices.

2. be responsible for operating and performing or having performed all needed maintenance of practices, as determined by either the District or the landowner, without cost to the

District.

3. obtain prior District approval of all plans, designs and specifications for maintenance work deviating from the operation and maintenance plan and of plans and specifications for any alteration to the structural practice.

4. be responsible for the replacement of parts or portions of the practice(s) which have a physical life of less duration than the evaluated life of the practice(s).

5. prohibit the installation of any structure or facilities that will interfere with the practices.

6. notify the District of any agreement to be entered into with other parties for the operation or maintenance of all or any part of the project practices and provide District with a copy of the agreement after it has been signed by the landowner and the other party.

7. provide District, Soil Conservation Service, and Corps of Engineers personnel the right of free access to the project practices at any reasonable time for the purposes of carrying out the terms of the agreement.

B. The District will:

1. upon request of the landowner, and to the extent that its resources permit, provide consultative assistance in the operation, maintenance, and replacement practices.

III. OPERATION AND MAINTENANCE PLAN (O&M PLAN).

An O&M plan for each practice included in this agreement is attached to and becomes part of this agreement. Forms SCS-LTP-011 and SCS-LTP-11B will be used for this purpose.

IV. INSPECTIONS AND REPORTS.

A. The landowner will inspect the practices as specified in the O&M plan.

B. The District, Soil Conservation Service, and Corps of Engineers may inspect the practices at a reasonable time during the period covered by this agreement.

C. A written report will be made of each inspection and provided to the landowner as outlined in the O&M plan.

V. TIME AND RESPONSIBILITY.

The landowner's responsibility for operation and maintenance begins when a practice is partially done or completed and accepted or is determined complete by the District. This responsibility shall continue until the expiration of all the installed project practices. This does not relieve the landowner's liability which continues throughout the life of the measure nor until the measure is modified to remove potential loss of life or property.

VI. RECORDS.

The landowner will maintain a record of all inspections and significant actions taken, cost of performance and completion date with respect to operation and maintenance. The District and Soil Conservation Service, and the Corps of Engineers may inspect these records at any reasonable time during the term of the agreement.

THE LANDOWNER

By: ____________________________
(Signature)

Date: ____________________________

THE CALHOUN COUNTY SOIL AND WATER CONSERVATION DISTRICT

By: ____________________________
(Signature)

Title: ____________________________

Date: ____________________________

OPERATION AND MAINTENANCE PLAN

BETWEEN
LANDOWNER
AND
CALHOUN COUNTY CONSERVATION DISTRICT

PLAN OF OPERATION AND MAINTENANCE
SWAN LAKE
WATERSHED SEDIMENT REDUCTION

Purpose

The purpose of this plan is to describe the operation, inspection, and financial requirements and the maintenance procedures, using a systematic listing of specific dates, detailed review items, and maintenance criteria.

Authorization

This operation and maintenance plan is authorized by the successive operation and maintenance agreements between the Calhoun County Soil and Water Conservation District Board (the "District"), the U.S. Soil Conservation Service (the "Service"), and the U.S. Army Corps of Engineers (the "Corps").

Policy

We, the District, are responsible for operation and maintenance until termination of the operation and maintenance agreement. By virtue of the cooperative agreement that has been jointly signed by the District Board and the landowner, this responsibility of operation and maintenance is delegated to the individual landowners on whose property specific works of improvement have been performed. This agreement is on file at the District office.

The landowner, having the physical operation and maintenance responsibility, must repay the District for the construction cost of the practice if operation and maintenance schedules are not followed.

Operation and Maintenance Handbook and "As-Built" Drawings

The current Service's Illinois Operation & Maintenance Handbook (Attachment No. 1) is hereby made a part of this operation & maintenance plan. The "As-Built" drawings depicting the work as it was constructed will be provided the District and the landowner by the Service after construction is completed. The "As-Built" drawings will at that time become attachment No. 2 of this operation and maintenance plan.

Safety

Landowners will be cautioned about equipment operations on steep slopes and will be encouraged to operate all equipment in a safe manner.

Inspection Dates

Joint maintenance inspection, involving representatives of the District, Service, and the Corps (at their discretion), and the landowner and/or tenant will be conducted on the first work day after these dates:

30 days after final inspection
3 months after final inspection
1 year after final inspection

After completion of the above schedule, inspections will be conducted Bi-annually during April by the landowner and/or tenant and the District. The Service and the Corps will be requested to participate in these inspections. The project life span is to be 50 years.

In addition to these specific dates, an inspection by the landowner or tenant of the conservation practices will be conducted during and after each strom event that produces a flash flood condition.

Records and Reports

Operation and maintenance inspection and follow up reports, will be prepared and distributed as indicated in the Service's Illinois Operation and Maintenance Handbook. We, the District will maintain a record of all inspections and significant actions taken with respect to operation and maintenance. These records will be kept at the District Office. The Service, and the Corps may inspect these records at any reasonable time.

Plan Review

This plan will be reviewed annually by the District and the landowners and/or tenant at the time of annual inspections. The Corps will be invited to participate in all plan reviews. All proposed revisions in lthe plan will be reviewed and approved by the Service prior to initiating appropriate changes.

Personnel Responsibilities

Each landowner and/or tenant will inspect the conservation practices on their land and conduct maintenace work in a timely manner throughout the year.

The Corps has assigned responsibility to assist the landowners and tenants in carrying out their operation and maintenance plans to the:

District Conservationist
Soil Conservation Service
P.O. Box 516, 101 French St.
Hardin, Il 62047
Tel: (618) 576-2723

Operation

Operation is defined as the administration, management, and performance of non-maintenance actions by the landowners needed to keep the completed structure functioning as planned. Operation requirements are as follows:

1. The basins will be observed during and after each strom and flood event to insure that they are functioning properly. Major items of concern are:

a. Debris accumulation on the PVC risers and underground outlets.

b. Obstructions in lthe basin channels and outlet ditch which restrict water flow, water storage, create turbulence, and cause erosion.

c. Excessive muddy or turbid water discharging from the outlet pipe at the outlet ditch.

d. Erosion in emergency spillways and embankments.

2. The water reservoirs will be observed during and after each storm and flood event to insure that they are functioning properly. Major items of concern are:

a. Debris accumulation on the hooded inlets and underground outlets.

b. Excessive muddy or turbid water discharging from the outlet pipe at the outlet ditch.

c. Erosion in emergency spillways and embankments.

d. Animal burrows and trees on levy and other possible sources of seepage.

3. The water reservoirs will be observed during and after each storm and flood event to insure that they are functioning properly. Major items of concern are:

a. Any areas of failure will be replaced.

If any of these items are observed, the landowner and/or tenant will contact the District Conservationist in charge of the Service's field office immediately so that appropriate action can be taken.

Maintenance Requirements

The following criteria will be followed in performing needed maintenance on the component parts of the conservation practices installed on this farm.

I. Sediment control basin and outlet system.

a. Basins will be observed for seepage, wet areas or sedimentation.

b. Any lowering of the embankment by settlement or tillage operation will be corrected to the original cross section especially in the ridge above the tile line. This will be corrected to original height to prevent over topping during a flash flood.

c. The basin inlet will be repaired or replaced according to "As Built" plans. The tile line will be replaced or maintained as installed.

d. The outlet channel will be maintained.

e. Underground Outlet Pipe.

1. Rodent guard - The animal guard attached to the end of the outlet pipe that connects to the riser will be cleaned of alol debris and other obstructuion and kept in functioning condition. Parts will be replaced as needed.

2. Obstructions - Outlet pipe will be kept clear of all obstructions.

f. Cropping system will be monitored to assure that soil on cropland are kept at or below the planned levels.

g. If the basins' trap efficiency becomes severely reduced by sedimentation prior to the specified life of the feature, the basins' efficiency will be restored by excavation.

II. Water reservoirs and outlet system.

a. Reservoirs will be observed for seepage, wet areas or sedimentation.

b. Any lowering of the embankment by settlement or tillage operation will be corrected to the original cross section especially in the ridge above the outlet. This will be corrected to original height to prevent over topping during a flash flood.

c. The emergency spillway will be repaired or replaced according to "As Built" plans.

d. The outlet channel will be maintained.

e. Underground Outlet Pipe.

1. Obstructions - Outlet pipe will be kept clear of all obstructions.

f. Cropping system will be monitored to assure that soil on cropland are kept at or below the planned levels.

g. If the reservoirs' trap efficiency becomes severely reduced by sedimentation prior to the specified life of the feature, the reservoir's efficiency will be restored by excavation.

Attachments:
(1) Operation and Maintenance Handbook.
(2) "As-Built" Plans.

III. Maintenance of Vegetation

a. Need for cutting and/or spraying

(1) Woody vegetation such as shrubs, brush or willows will be hand cut in August for best control.

(2) Weeds that are providing competition to growth of desirable species will be mowed or hand cut as needed.

b. Need for Seeding

Seeding will be done from early spring to May 15 or August 1 to September 10.

(1) The cleared area and the area disturbed to construct the diversion, and the diversion where vegetation becomes inadequate or is destroyed by erosion will be seeded as follows:

Smooth Bromegrass	-	16 lbs/acre
Alfalfa	-	8 lbs/acre
Timothy	-	2 lbs/acre

When seeding areas of inadequate vegetation or severely eroded area all rills and gullies will be filled and compacted. Stones and other debris will be removed. Fertilizer will be spread and incorporated into a seedbed 3 inches deep at the rate of:

120 lbs. actual N
120 lbs. actual P
120 lbs. actual K

Lime is to be applied at the rate recommended by a Helige-Truog test kit.

The seeding may be done by broadcasting and covering with a light harrow; drilling and cultipacking, or a Brillion seeder. The seed should be covered approximately 1/4 to 1/2 inch deep. The area disturbed and seeded will be mulched immediately after seeding with small grain, straw, at the rate of 100 pounds/1,000 square feet and anchored with a farm disc set straight or netting anchored with wire staples.

This document has been developed with the concurrence of the Soil Conservation Service and we adopt it as the Operation and Maintenance plan for the conservation practices on this farm.

______________________________ __________

Landowner Date

______________________________ __________

Calhoun County Date
Soil and Water Conservation
District

OPERATION AND MAINTENANCE FORMS

Form Approv OMB No. .../8-0013

.S. DEPARTMENT OF AGRICULTURE
oil Conservation Service

SCS-LTP-011
2-89

PAGE ____ OF ____

CONSERVATION PLAN
SCHEDULE OF OPERATIONS

NAME	2. COUNTY	3. STATE	4. CONTRACT OR AGREEMENT NO.	5. TOTAL ACRES UNDER CONTRACT

TEM NO.	FIELD	PLANNED CONSERVATION TREATMENT (Record of Decisions)	ESTIMATED AMOUNT (UNITS)	COST BASIS $	COST-SHARE RATE %	COMPLETION SCHEDULE AND ESTIMATED COST-SHARE BY YEAR (For Noncost-Share Items Show Units)					REF. NO.
						19	19	19	19	19	
6	7	8	9	10	11	12	13	14	15	16	17
						$	$	$	$	$	

A40

Form Approved OMB No.

U.S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

SCS-LTP-11B
(8-89)

PAGE ____ OF ____

CONSERVATION PLAN
SCHEDULE OF OPERATIONS

1. NAME	2. COUNTY	3. STATE	4. CONTRACT OR AGREEMENT NO.	5. TOTAL ACRES UNDER CONTRAC

ITEM NO.	FIELD	PLANNED CONSERVATION TREATMENT *(Record of Decisions)*	ESTIMATED AMOUNT (UNITS)	COST BASIS	COST-SHARE RATE %	COMPLETION SCHEDULE AND ESTIMATED COST-SHARE BY YEAR *(For Noncost-Share Items Show Units)*										REF. NO.
						19	19	19	19	19	19	19	19	19	19	
6	7	8	9	10	11	12	12	12	12	12	12	12	12	12	12	13
		Total Cost-Share by Year:				$	$	$	$	$	$	$	$	$	$	
		Total Contract Cost-Share: $														

NOTES:

A. All items numbered in column 6 must be carried out as a part of this contract to prevent violation.
B. When established, the conservation practices listed in column 8 must be maintained by the participant at no cost to the government.
C. Enter total cost per unit in column 10 unless the method of cost-share is flat rate. When flat rate, enter the amount per unit to be paid to the participant.
D. All cost share rates in column 11 are based on average cost (AC) with the following exceptions:
   AA = Actual costs not to exceed average cost.
   FR = Flat rate.
   NC = Non cost-shared.
   AM = Actual cost not to exceed a specified maximum.
E. Modifications will be referenced by number in column 13.
F. By signing, the participant acknowledges receipt of this conservation plan including the SCS-LTP-11 or SCS-LTP-11A and agrees to comply with the terms and conditions hereof.

A41

14. CERTIFICATION OF PARTICIPANTS

SIGNATURE	DATE	SIGNATURE	DATE	SIGNATURE	DATE

15. REVIEWING OFFICIALS SIGNATURES

DISTRICT CONSERVATIONIST-TECHNICAL ADEQUACY CERTIFICATION	DATE	APPROVED BY OTHER ADMINISTERING AGENCY	DATE	APPROVED BY *(Signature of Conservation District Representative)*	DATE

SEE REVERSE SIDE

IL-WS-16
Rev. 3/84

U.S. Department of Agriculture
Soil Conservation Service

OPERATION AND MAINTENANCE INSPECTION RECORD (STRUCTURES)

Project ______________________ Inspection Date ______________________

Structure No. ______________________ Type ______________________

Type of Inspection: Special [ ] Annual [ ] Formal [ ]

Structure Operation: Satisfactory [ ] Unsatisfactory [ ]

Sponsoring Local Organization ______________________

Item	Condition S or U*	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to Be Completed
1. Vegetation				
2. Fences				
3. Principal Spillway				
4. Emergency Spillway				
5. Embankment				
6. Reservoir Area				
7. Gates or Valves				
8. Outlet Channels				
9. Structure Drainage Outlets				
10. Riprap				

*S = Satisfactory, U = Unsatisfactory

REMARKS:

Signature: ______________________ Signature: ______________________

SCS Representative(s) SLO Representative(s)

NOTE: All inspection team members should sign the report.

Distribution: SCS-FO, SLO

IL500-32(3)

O&M INSPECTION RECORD (STRUCTURES) CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following: See O&M Manual, Subpart F, Sec. 500.53 for a more complete checklist.

1. Vegetation (Structures & Channels)
   a. Need for cutting and/or spraying
   b. Need for reseeding
   c. Need for fertilizing
   d. Evidence of overgrazing

2. Fences
   a. Loose or damaged posts
   b. Loose or broken wires
   c. Accumulated debris in fence
   d. Condition of gates and gaps

3. Principal Spillway
   a. Obstructions in spillway
   b. Condition of outlet and riser
      (1) Signs of seepage
      (2) Separation of joints
      (3) Cracks, breaks, or deterioration of concrete
      (4) Differential settlement
   c. Sediment level in relation to top of riser
   d. Scour at outlet
   e. Condition of trash racks

4. Emergency Spillway
   a. Erosion
   b. Sedimentation
   c. Weeds, logs, or other obstructions reducing channel capacity
   d. Depositions or sloughing

5. Embankment
   a. Settlement or cracking
   b. Erosion
   c. Leakage
   d. Rodent, wildlife, or livestock damage
   e Wave damage

6. Reservoir Area
   a. Undesirable vegetative growth
   b. Cut or fallen trees
   c. Slash and other debris

7. Gates or Valves
   a. Damage by debris, ice or freezing

8. Channels
   a. Sedimentation
   b. Bank cutting
   c. Debris accumulation
   d. Condition of riprap or other works of improvement
      (1) Undermining
      (2) Damage or deterioration
      (3) Adjacent channel scouring
   e. Adjacent property damage

9. Structure Drainage Outlets
   a. Drainage outlet pipes
      (1) Clean or dirty water?
      (2) Rodent guard attached and functioning?
      (3) Pipes free-flowing, no obstructions?
      (4) Evidence of seepage?
      (5) Adjacent to pipes
      (6) Lower 1/3 downstream slope and flood plain?
   b. Rock toe drains
      (1) Free draining into stilling basin or collection channels?
      (2) Clean or dirty water?

10. Safety Hazards

11. Signs

IL500-32(4)

IL-WS-17
Rev. 3/84

U.S. Department of Agriculture
Soil Conservation Service

OPERATION AND MAINTENANCE INSPECTION RECORD (CHANNELS)

Project ______________________ Inspection Date ______________________

Structure No. ______________________ Type ______________________

Type of Inspection: Special [ ] Annual [ ] Formal [ ]

Structure Operation: Satisfactory [ ] Unsatisfactory [ ]

Sponsoring Local Organization ______________________

Item	Condition S or U*	Maintenance & Needed Repairs	Estimated Costs	Agreed Date Repairs to Be Completed
1. Channel				
2. Berms				
3. Levees				
4. Riprap				
5. Vegetation				
6. Tile Outlets				
7. Lateral Structures a. Pipe				
b. Concrete				
8. Water Gaps				
9. Bridges				

*S = Satisfactory, U = Unsatisfactory

REMARKS:

Signature: ______________________ Signature: ______________________

SCS Representative(s) SLO Representative(s)

NOTE: All inspection team members should sign the report.

Distribution: SCS-FO, SLO

O&M INSPECTION RECORD
(CHANNELS)
CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following:

1. Channels
   a. Silt bars (sedimentation)
   b. Debris
   c. Need for spraying
   d. Erosion in channel (bank cutting)
   e. Sloughing of banks
   f. Is grazing being permitted?

2. Berms
   a. Erosion
   b. Debris

3. Levees
   a. Settlement
   b. Any breaks

4. Riprap
   a. Adequate? (need more)
   b. Is it holding? (not undermining)

5. Vegetation
   a. Banks of channel
   b. Berms
   c. Need for reseeding
   d. Need for fertilizing
   e. Levee and water gaps

6. Tile Outlets
   a. Is trash on or inside grille
   b. Any ice damage to outlet of pipe
   c. Undermining of any of the pipe

7. Lateral Structures
   a. Pipe
      (1) Inlets & Outlets not
      (2) Flap Gate - performing adequately
      (3) Exit Channel - not silted
   b. Concrete Structure
      (1) Berm adequate
      (2) Any unusual settlement
      (3) Emergency spillway performing adequately
      (4) Exit channel - any siltation
      (5) Weep holes

8. Water Gaps
   a. Are they operating properly?
   b. Any damage to gap?

9. Bridges
   a. Any scouring around wingwalls?
   b. Any undermining of footings?
   c. Debris or trash need to be removed?

10. Safety Hazards

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U.S. Department of Agriculture
Soil Conservation Service

IL500-32

OPERATION AND MAINTENANCE
Inspection Record - Excavated Reservoirs

Project ______________________ **Inspection Date** ______________________

Structure No. ______________________

Type of Inspection: Special [ ] Annual [ ] Formal [ ] **Structure Operation:** Satisfactory [ ] Unsatisfactory [ ]

Sponsoring Local Organization(s) (SLO)

ITEM	Condition S* or U*	Maintenance Needed	Estimated Costs	Agreed Date Repairs to be Completed
1. Vegetation				
2. Fences				
3. Principal Spillway				
4. Gates or Valves				
5. Diversion Structure				
6. Reservoir Area				
7. Fill Areas				
8. Outlet Channels				
9. Structure Drainage System				
10. Pump Stations				

***S = Satisfactory, U = Unsatisfactory**

REMARKS:

Signature: ______________________ **Signature:** ______________________

______________________ ______________________

______________________ ______________________

Soil Conservation Service Representative(s) **SLO Representative(s)**

NOTE: All inspection team members should sign the report.

Distribution: SCS-FO, SLO

EXCAVATED RESERVOIRS
O & M INSPECTION RECORD - CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following:

1. VEGETATION (Structures & Channels)
   a. Need for cutting and/or spraying
   b. Need for reseeding
   c. Need for fertilizing
   d. Evidence of grazing
   e. Evidence of motorbikes or other vehicles

2. FENCES
   a. Loose or damaged posts
   b. Loose or broken wires
   c. Accumulated debris in fence
   d. Condition of gates

3. PRINCIPAL SPILLWAY
   a. Obstructions in spillway
   b. Condition of outlet and inlet structure
      (1) Signs of seepage
      (2) Separation of joints
      (3) Cracks, breaks, or deterioration of concrete
      (4) Differential settlement
   c. Sediment level in relation to crest inlet structure
   d. Scour at outlet
   e. Condition of trash racks
   f. Levees
      (1) Settlement
      (2) Any breaks
      (3) Erosion
   g. Condition of riprap
      (1) Undermining
      (2) Damage or deterioration

4. GATES OR VALVES
   a. Damage by debris, ice, or freezing

5. RESERVOIR AREA
   a. Undesirable vegetative growth
   b. Slash and other debris
   c. Berms
      (1) Erosion
      (2) Settlement
   d. Levees
      (1) Settlement
      (2) Any breaks
   e. Slope failure
   f. Surface drainage
      (1) Condition of open channels
      (2) Catch basin condition
         (a) Manholes
         (b) Outlets

6. DIVERSION STRUCTURE
   a. Pipes free-flowing, no obstructions
   b. Entrance and exit scour
   c. Settlement or breaks in diversion

7. FILL AREAS
   a. Settlement or cracking
   b. Erosion
   c. Slope failure
   d. Rodent or wildlife damage

8. CHANNELS
   a. Sedimentation
   b. Bank cutting
   c. Debris accumulation
   d. Condition of riprap or other works of improvement
      (1) Undermining
      (2) Damage or deterioration
      (3) Adjacent channel scouring
   e. Adjacent property damage

9. STRUCTURE DRAINAGE SYSTEM
   a. Drainage outlet pipes
      (1) Clean or dirty water
      (2) Rodent guard attached and functioning
      (3) Pipes free-flowing, no obstructions
      (4) Evidence of seepage
         (a) Adjacent to pipes
         (b) Lower 1/3 slope
   b. Rock toe drains
      (1) Free draining into collection channels or catch basins
      (2) Clean or dirty water

10. PUMP STATIONS
    a. Inlet structure
       (1) Free of obstructions
       (2) Sedimentation
    b. Power units
       (1) Electrical or mechanical controls
       (2) Gates and/or valves

11. SAFETY HAZARDS

12. SIGNS

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U.S. Department of Agriculture
Soil Conservation Service

OPERATION AND MAINTENANCE
Inspection Record - Land Treatment and Non-Structural Measures

Project ______________________ **Inspection Date** ______________________

Measures ______________________

Measures Operation · [ ] Satisfactory [ ] Unsatisfactory **Type of Inspection:** [ ] Annual [ ] Special

Sponsoring Local Organization(s) (SLO) ______________________

Item	Condition S* or U*	Maintenance Needed	By Whom	Estimated Cost	Agreed Date Repairs to be Completed
1. Land Treatment a. Agricultural & Other Land b. Urban Developing Land					
2 Flood Plain					
3. Natural Areas					
4. Recreation Areas					
5. Wetland					

* S = Satisfactory, U = Unsatisfactory

REMARKS:

Signature: ______________________ **Signature:** ______________________

______________________ ______________________

______________________ ______________________

SCS Representative(s) SLO Representative(s)

NOTE: All inspection team members should sign the report.

Distribution: SCS-FO, SLO

LAND TREATMENT AND NON-STRUCTURAL MEASURES O&M INSPECTION RECORD - CHECK LIST

The items to be checked at time of inspection may include, but not be limited to, the following:

1. LAND TREATMENT (Soil Erosion and Sediment Control)
   a. Agricultural and other lands
      (1) Needed conservation practices applied and maintained so soil loss is within tolerable limits
   b. Urban area
      (1) Offsite sediment controlled
      (2) Sediment control practices established in timely manner
      (3) Maintenance of practices
      (4) Units of government implementing erosion and sediment ordinances

2. FLOOD PLAIN
   a. Evidence of damage by people or vehicles
   b. Evidence of livestock damage
   c. Evidence of erosion by surface runoff
   d. Sedimentation
   e. Development within flood plain
   f. Evidence of channel work
   g. Condition of vegetation

3. NATURAL AREAS
   a. Evidence of damage by people or vehicles
   b. Evidence of livestock in area
   c. Erosion caused by surface runoff
   d. Sedimentation damages
   e. Natural character preserved
   f. Condition of vegetation

4. RECREATION AREAS
   a. Vegetation condition
      (1) Erosion or sediment problems
      (2) Need for reseeding
      (3) Need for fertilizer
      (4) Need for hard surface
      (5) Landscaping, condition of plantings
   b. Roads and parking areas
      (1) Traffic confined to roads
      (2) Condition
      (3) Erosion or drainage problem
   c. Shelters, picnic tables and other improvements
      (1) Need for repair
      (2) Need for repainting
      (3) Need for replacement
   d. Health hazards
      (1) Cleanliness of restrooms
      (2) Septic or sewage system operating properly
      (3) Cleanliness of refuse containers and area
      (4) Drinking water safe
   e. Safety hazards
   f. General appearance

5. WETLAND AREAS
   a. Evidence of damage by people or vehicles
   b. Evidence of livestock damage
   c. Evidence of filling or drainage
   d. Desired water level maintained
   e. Undesirable vegetation controlled
   f. Evidence of erosion damage
   g. Evidence of sedimentation
   h. Condition of vegetation

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U.S. Department of Agriculture
Soil Conservation Service

IL500-32(11)

Consolidated
Operation and Maintenance Record of Repairs

Project ____________________

Subject ____________________

Type of Inspection [ ] Annual [ ] Special [ ] Formal

Date of Inspection ____________

Phase*	Component	Item	Cost of Repairs Estimate	Cost of Repairs Actual	Date of Repairs Estimate	Date of Repairs Actual

Remarks:

Completed by: ____________
Name - Title

Distribution: SCS(FO,AO,SO), SLO

*see back for column heading definition

Date Completed ____________

(180-V-NO&MM, Amend. IL2 March 1984)

Subpart F - Exhibit
A50

§IL 500.52

Definition of Column Headings:

Phase - S - Structure
C - Channel
R - Recreation
LT - Land treatment
FP - Flood plain
NA - Natural area
W - Wetland
EXR - Excavated reservoir

Component (Not limited by those listed)

S - Number, Name
C - Reach, Structure number, Stationing
R - Area, facility
LT - Area, Location, Landowner
FP - Name, Location, Town
NA - Area, Location
W - Area, Location, Town
EXR - Number, Name

Item - From IL-WS-16, 17, 18, or 19
for needed repairs only

Cost of Repairs - Estimated/Actual

Date of Repairs - Estimated/Actual

APPENDIX DPR-B

CORRESPONDENCE PERTAINING TO DRAFT DPR

FOREWORD

APPENDIX DPR-B provides the comments received from review of the Draft DPR/EA, Final DPR/EA, and Section 404/Section 10 Public Notice, and, as appropriate, St. Louis District responses to those comments.

PUBLIC MEETING COMMENTS

PUBLIC MEETING COMMENTS

Summary--2 April 91 Swan Lake Public Meeting

The meeting was an informal workshop held between 1500 to 2000 hours. There were two work stations, wall displays, detailed plan drawings, detailed contour maps and photographic base maps of the project area, and comment sheets available to the public for making written comments. The IPT explained the project and answered specific questions from the public. Corps employees in attendance were: Ron Dieckmann, Gary Lee, Tim George, Clyde Hopple, Riley Pope, Dave Leake, and Dave Gates. Neil Booth from IDOC was present. Patti Meyers, Mike Bornstein, and Chuck Surprenant were present for FWS. Chris Borden was present representing SCS and Oliver Simon was present from the CCSWCD.

Twenty-two people showed up for the public meeting. Each individual's name, organization, and address is provided below.

NAME	ORGANIZATION	ADDRESS
Lila Logeman		Box 1F, Brussels, IL
Darren R. Pohlman		Hardin, IL
Wayne Fuhler		Golden Eagle, IL
Jerome Toppmeyer	Farmer	Box 113, Brussels, IL 62013
Vince Tepen	County Board	Hardin, IL
Greg Franke	Migratory Waterfowl Hunters, Inc.	P.O. Box 175 Batchtown, Il 62006
Dave Brueckner		216 Cross Creek Bethalto, IL 62010
Miles Brueckner	Migratory Waterfowl Hunters, Inc.	P.O. Box C Godfrey, IL 62035
Roland E. White	AT&T	RR1, Box 15, Peru, IL 62022
Henry J. Kilian	AT&T	28W210 Warrenville Road Warrenville, IL 60555
Fred A. Cronin	Il. Natural History Survey (LTRM)	P.O. Box 368 West Alton, MO 63386
Karen Peitzmeier	Il. Natural History Survey (LTRM)	P.O. Box 368 West Alton, MO 63386
Eric Ratcliff	Il. Natural History Survey (LTRM)	P.O. Box 368 West Alton, MO 63386
Vince Tepen	Calhoun County Board of Commissioners	RR1, Hardin, IL
Chris Borden	SCS	Box 516, Hardin, IL 62047
Sue Morris		132A, Brussels, IL
Barbara J. Dahlberg		RR1, Box 44, Hardin, IL 62047

G. Tanner Girard	Il. Nature Preserves Commission	Principia College Elsah, IL 62028
William B. Dahlberg		RR Box 44, Hardin, IL
Ron Weigel	Farmer	Box 72, Golden Eagle, IL
August R. Nolte	Calhoun Planning Commission	RR1, Box 116 Golden Eagle, IL 62036
Oliver Simon	Calhoun Soil and Water Conservation District	Hardin, IL

Issues raised as a result of the public meeting, and the District's perspective regarding each of those issues, are described below.

NEED FOR PROJECT

Comment:

Dave Brueckner stated emphatically the need to get the project in place and that it has been needed for a long time.

District Perspective:

The District agrees.

LAND ACQUISITION

Comment:

Ron Weigel stated he is against any land being bought and that the County needs the farm land that furnishes the county's tax base. He believes that the Federal government buys too much land. He noted that he would be affected by the project's 424 NGVD acquisition line. While opposed to land purchase, he said he was agreeable to easements as compensation for potential damages to his land.

District Perspective:

It was indicated that per North Central Division's recent ruling, the FWS, and not the Corps, would be accomplishing the actual acquisition and the Service appears to be inclined to use easements where landowners oppose land purchase.

Comment:

Lila Logeman stated she felt the project was handled poorly and a better attempt should have been made to notify potentially affected landowners. She feels the project may be harmful to her property and crop damages may occur during high lake stages. She said that at the meeting they wanted her to decide whether to sell the affected piece of property or grant to the government an easement. She indicated she is still undecided on this point but is leaning more towards an easement. She expressed a desire to know more about how much land the government would need and if she could still use the land as she wanted to. She felt the landowners should be given more specific information before they are expected to make a decision (e.g. price quotes). She warned that the government should not make any decisions without giving her prior notification.

District Perspective:

See attached letter sent to Ms. Logeman.

UPSTREAM FLOODING

Comment:

August Nolte was concerned that the project levee, in combination with the Stump Lake levee, could cause upstream farmland impacts.

District Perspective:

Based on the results of the HEC model (APPENDIX E), the upstream impacts are judged to be minor.

UPLAND SEDIMENT TRAPS

Comment:

Ron Weigel felt the effectiveness of the O&M for the upland sediment traps would be improved if some Federal dollars were to be provided towards O&M.

District Perspective:

The District believes the O&M mechanism developed between successive agreements between SCS, the CCSWCD, and the landowners provides sufficient controls to assure adequate operative and maintenance of the structures

CABLE CROSSING

Comment:

Ronald White and Henry Kilian noted that AT&T has the same concern regarding the cable crossing through the Swan Lake project area that they had expressed regarding the Stump Lake project. They indicated the need for very close coordination during the Plans and Specifications phase of the project.

District Perspective:

The District agrees on the need for close coordination during Plans and Specifications.

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

Plan Formulation Branch
Planning Division

Ms. Lila Mae Logeman, Administrator
Frank W. Logeman Estate
Box 1F
Brussels, Illinois 62013

Dear Ms. Logeman:

The purpose of the public meeting held on April 2 was mainly to explain the proposed Swan Lake Rehabilitation and Environmental project. It was not meant to specifically discuss landowners' property rights. At the time of the meeting, a listing of purported landowners was not available, and no personal announcements were sent.

Although these notices were posted in grocery stores, post offices and other public or civic places, we do apologize for overlooking the process of getting the names and addresses of purportedly affected landowners for advance notice purposes. We are likely to change our procedures and include advance notices to landowners in future public meetings.

In the event the project is approved, a formal landowners' meeting will be called to explain or answer any questions the owners may have relating to real estate acquisition procedures in acquiring their land (fee or easement).

As stated at the earlier meeting, this project (if approved) could be one to two years away. The very purpose of our holding the public meetings is to keep the public informed of our intentions of preservation of wildlife habitat and answer all project-related questions.

Sincerely,

Owen D. Dutt
Acting Chief, Planning Division

CORPS REVIEW COMMENTS

ON DRAFT DPR/EA

CORPS REVIEW COMMENTS

ST. LOUIS DISTRICT IN-HOUSE COMMENTS

Levee Scour Protection. The District's Potamology Section expressed concern over the potential susceptibility of the upper end earthen levee to flood scour. There is a bend in the river that experiences bank scour, typical of meandering rivers. This bendway is void of any meaningful frontline defense. Little in the way of top of bank trees are remaining. Since the bankline is unrevetted, this lake of trees will accelerate bankline erosion. Between the top of bank and the upper end of Swan Lake, there also exists two open areas. Velocity conditions during open river conditions can be such that the levee could face direct attack and eventual failure.

Action Taken. Per the recommendation of the Potamology Section, the project design now incorporates a 100-foot wide band of tree plantings along the bankline in areas devoid of trees and a 50-foot wide band of tree plantings adjacent to the upper most section of levee. To expedite the establishment of these buffer zones, willow cuttings will be utilized for this reforestation.

LOWER MISSISSIPPI VALLEY DIVISION COMMENTS

Hillside Sediment Control Program. LMVD indicated that as proposed the program could not be recommended. Key problems identified were (1) the need for 25 percent non-Federal cost sharing, since the lands used for the proposed feature are non-Federal; (2) the need for a local sponsor for the program; (3) the need for a contracting process in compliance with Federal procurement rules; and (4) the need for a responsible party for the operations and maintenance of the program.

Action Taken. A new implementation mechanism was developed for the program. The Calhoun County Soil and Water Conservation District (CCSWCD) has indicated its intent to serve as the local sponsor and to contribute 25 percent of the construction related costs. The Corps, with technical assistance from the U.S. Soil Conservation Service (SCS), would construct the hillside sediment control structures. SCS through successive agreements with the CCSWCD and the local landowners would be responsible for the operation and maintenance of the structures.

Land Acquisition. LMVD has indicated that the use of EMP funds must be limited to the acquisition of temporary construction access easements for project features on lands managed as a national wildlife refuge. Accordingly, the proposed lands acquisition along the lake's west shore cannot be accomplished using EMP funds.

Action Taken. The U.S. Fish and Wildlife Service has indicated that it will acquire the lands with its own funds.

Bottomland Hardwood Forest Mitigation. LMVD has indicated that a loss of bottomland hardwood forest must be mitigated in kind to the extent possible.

Action Taken. APPENDIX DPR-J, Project Habitat Quantification, now includes a mitigation discussion.

AGENCY REVIEW COMMENTS

ON DRAFT DPR/EA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FEDERAL BUILDING, FORT SNELLING
TWIN CITIES, MINNESOTA 55111

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

FWS/ARW-SS

MAY 2 1991

Colonel James E. Corbin
District Engineer
U.S. Army Engineering District, Saint Louis
210 Tucker Boulevard, North
Saint Louis, Missouri 63101-1986

CdC 9 May 1991

Dear ~~Colonel Corbin~~: Jim

This letter responds to your notice dated March 7, 1991, requesting comments on the Swan Lake Rehabilitation and Enhancement Definite Project Report (SL-5) with integrated environmental assessment.

The U.S. Fish and Wildlife Service supports the project as proposed in alternative number three, including attempts to reduce future siltation of the lake through hillside sediment control basins in cooperation with the Calhoun County Soil and Water Conservation District. The environmental assessment presents the no action alternative and two action alternatives, and describes existing conditions and probable future under the no action alternative, as well as the likely environmental consequences of the preferred alternative. Consequently we are making no comment on the environmental assessment for this project and look forward to continued progress with the several involved parties.

Sincerely,

Jim

James C. Gritman
Regional Director

United States Department of the Interior
BUREAU OF MINES
INTERMOUNTAIN FIELD OPERATIONS CENTER
P.O. BOX 25086
BUILDING 20, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

TAKE PRIDE IN AMERICA

April 9, 1991

District Engineer
St. Louis District, Corps of Engineers
1222 Spruce St.
St. Louis, Missouri 63103-2833

ATTN. Plan Formulation Branch (CELMS-PD-F)

Dear District Engineer:

Subject: Swan Lake Draft Definitive Project Report with integrated Environmental Assessment and a Draft Finding of No Significant Impact

As requested by Owen D. Dutt, Acting Chief, Planning Division, St. Louis District, personnel of the U.S. Department of the Interior, Bureau of Mines reviewed the subject document to determine whether mineral resources or mineral-producing facilities would be adversely impacted by the proposed project. The document pertains to a proposal for the rehabilitation and enhancement of wetlands at Swan Lake, in southwestern Illinois.

Minerals are not mentioned in the document. Owing to the nature of the project, however, and the fact that we have no record of economic minerals in the area, we have no comment regarding the environmental document as written and no objections to the project as proposed.

Our comments are drawn from available information, are provided on a technical assistance basis only, and may not reflect the position of the Department of the Interior.

Sincerely,

Bradford B Williams

FOR William Cochran, Chief
Intermountain Field Operations Center

jez/bde

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

5ME-16JCK

District Engineer
U.S. Army Engineer District, St. Louis
ATTN: Planning Division, PD-F
1222 Spruce Street
St. Louis, Missouri 63103-2833

District Engineer:

In accordance with the National Environmental Policy Act and Section 309 of the Clean Air Act, we have reviewed the draft Definite Project Report with Environmental Assessment (EA) for the Swan Lake Rehabilitation and Enhancement Project in Calhoun County, Illinois. The purpose of the project is to reduce the sediment load that is threatening the integrity of the fishery and waterfowl of the Swan Lake deep water habitat.

Swan Lake is a back-watered area of the Illinois River between river miles 5 and 13 which was a forested floodplain prior to the inundation due to impoundment of the river. The total project rehabilitation and enhancement area includes 2900 acre Swan Lake, 200 acre Fuller Lake, 950 acres of bottomland forest and 550 acres of cropland. This area contains approximately one-fourth of all wetland and deepwater habitats found in the lower 80 miles of the Illinois River Valley. This area has been identified in the EA as an integral component of a Nationally significant ecosystem. The majority of the project is part of the Mark Twain National Wildlife Refuge.

The goals of the project include restoration of aquatic macrophyte beds and associated invertebrate communities for the benefit of migratory water fowl, improved habitat for over winter survival of fish, and improved habitat for spawning and rearing of fish. In order to achieve these goals, the project proposes the formation of smaller lake units with reduced sedimentation of lake bottoms along with wave control and maintenance of stable water levels. Deep water areas would be created with buffers to minimize impacts to the lake from cold water and ice from the river. Structures would be created allowing for fish passage between the lakes and the river.

Three alternatives were assessed for the proposed project. These alternatives include the no action alternative, dredging of lake substrate to remove prior sedimentation, and the selected alternative. The first two alternatives were rejected because they offered no long-term solution to the sedimentation and water control problems. The selected alternative involves several measures to rectify the problems. The EA estimates that two thirds of the sediments originate from the river, while the remaining one third comes from the hillside along the west bank of Swan Lake. Additionally, the lake level tends to fluctuate considerably, which further degrades the lake's fishery and waterfowl habitat. To address these problems, the selected alternative proposes dredging, riverside levees and dikes primarily along the east bank isthmus that separates the lake from the river, water control structures and interior closures, hillside sediment control and construction of islands.

The purpose of the dredging is to create areas in the lake with water depths in excess of seven feet. The dikes and levees will reduce the amount of sediment reaching the lake from the river, and prevent river level fluctuations from affecting the water level in Swan Lake. The water control structures and interior closures will maintain lake levels, dissipate lake waves up to one foot in height and accommodate fish movement. The hillside sediment control plan includes placement of sediment traps along tributaries to reduce the amount of hillside sediment reaching Swan Lake. The islands will in effect subdivide the large contiguous surface area of Swan Lake into smaller areas, thus reducing wave size and motion, and provide habitat values to waterfowl, by planting native grassy vegetation, which would be maintained through prescribed burning.

The EA states that a total of 106 acres of wetland would be directly impacted by the project, including 95 acres of bottomland forested wetland to be cleared for construction of the dike/levee. In addition, eight acres of forested wetland will be lost for the placement of the closures, one acre lost for the construction of drainage ditches, and 2 acres lost for boat access roads.

The EA determined that no compensatory mitigation is required for the project since net environmental benefits for fish and wildlife are expected to result. This finding is based on the Missouri Habitat Appraisal Guide (WHAG) method of analysis of habitat quantification, which fine tunes the U.S. Fish and Wildlife Habitat Evaluation Procedures (HEP) to more efficiently input field data. The evaluation appears to favor waterfowl species and "wet" habitat mammals such as muskrat and beaver. Forested wetlands provide habitat for a variety of upland species as well, including deer and bat species, so these species should also be factored into the study. The study should be conducted without being biased towards the desired species whose habitat would be most favorably influenced by the project's implementation.

Historically, Swan Lake was a forested floodplain, and the no action alternative indicates that the lake would revert, at least partially, to its original condition if left alone. Under the no action alternative, the current 942 acres of forested wetland is projected to expand to 1803 acres by the year 2040. Following a temporary decrease due to project construction and implementation, the acreage of forested wetland is projected to increase under all of the variations of the preferred alternative. The trail acreage will vary, depending on levee height and percent of hillside sediment control. We support the rehabilitation and enhancement project provided that forested wetland impacts are minimized to the greatest extent practicable. In other words, the levee height and the amount of hillside sediment control should be constructed to maximize the amount of forest wetland created.

No net loss of forested wetlands should occur as long as the natural succession of bottomland forests is not further impeded by similar projects in the future. Therefore, we agree with you that compensatory mitigation is not necessary for the 95 acres of bottomland forest impacted by the project based on the projected natural succession and establishment of bottomland forest and the net ecological benefits the project provides to wildlife. However, there may be opportunity for immediate compensatory mitigation on areas of the refuge that have been farmed or otherwise degraded, and these opportunities should be explored and discussed in the Final EA. One such opportunity may be the establishment of a rare, wet community, such as the cypress swamp.

Mitigation for the loss of nonforested wetlands due to the project should be done. We recommend that this compensation be done on a minimal ratio of 1.5:1 of wetlands created to those lost. The compensation should be outlined in a mitigation plan, and included in the Final Definite Project Report with EA.

We are concerned with impacts to the hydrology of the area, and the hillside erosion. The sediment and water control structures will influence the hydrology of the forested floodplain adjacent to Swan Lake. This alteration of water regime may have an adverse impact on the remaining 800+ acres of forested wetlands. This impact should be assessed and discussed in the Final EA. The Final EA should also assess the cause of the hillside erosion that is significantly contributing to sedimentation of Swan Lake. The sediment traps do not address the erosion problem itself, but only represent a stopgap measure to reduce the amount of sediment reaching the lake. We recommend that other solutions to the sedimentation problem be investigated, such as not allowing any clearing of vegetation on the slopes facing the lake, disallowing agricultural activity near the slopes, diverting runoff away from erosion sensitive areas, applying vegetative strips along agricultural fields to reduce or eliminate sedimentation, etc.

Water quality should benefit from the project. Decreased sedimentation and wave action should reduce turbidity and introduction of riverine constituents to the lake substrate. However, there are a couple of potential water quality impacts that should be assessed. The dredging will result in temporary increased turbidity due to stirred up sediments, and these sediments may be contaminated. Tests have shown that the Illinois River south of Seneca, Illinois, has PCB concentrations of 1 part per million, and this and other pollution sources may have contributed to lake sediment deposits. The sediments should be tested to assure that the dredged material is uncontaminated. If the sediments contain contaminants, they should not be used to construct islands or side casted to another location; they will need to be disposed of properly to assure no adverse environmental impacts. If it is still planned to use contaminated sediments for island construction, then bioassays should be conducted to determine impact upon aquatic species and wildlife that would use the islands.

Grab samples should be taken in areas to be dredged. If 80 percent or more of the sample is retained after passing through a #200 sieve, then the sediment can be assumed to be clean or uncontaminated. If the sample fails this test, then additional chemical sampling should be undertaken to check for possible contamination. Core sample should be taken at the dredging locations at three foot depth intervals for each clamshell extraction, plus an additional core sample at the expected depth of excavation to characterize sediment quality at the future lake bottom. Each core should be tested for the for the presence of the following constituents:

Total Solids
Volatile Solids
Chemical Oxygen Demand
Percent Moisture
Cyanide
Metals
-Arsenic
-Cadmium
-Chromium
-Copper
-Lead
-Mercury
-Nickel
-Selenium
-Zinc
-Manganese

Chlorinated Hydrocarbons
-alpha BHC
-beta BHC
-delta BHC
-gamma BHC
-Chlordane
-DDD
-DDE
-DDT
-Dieldrin
-Endrin
-Heptachlor
-PCBs
Total Phosphate
Total Organic Carbon
Ammonia Nitrogen

The results of the sample tests should be made available to our Agency prior to issuance of the Final EA and Finding of No Significant Impact.

The final EA should assess and discuss secondary water quality impacts of the completed project. These impacts include increased recreational use and potential for increased agricultural activities. Impacts due to motor boating and marina development may result in increased turbidity, and the release of hydrocarbons into the lake. Increased agricultural activity may pose a water quality impact of runoff of toxins such as pesticides and fertilizers. The potential for any of these activities should be discussed for the Swan Lake Rehabilitation and Enhancement Project.

Once completed, the project should provide a benefit to the waterfowl and fishery habitat of Swan Lake. The project can further benefit waterfowl by provided nesting habitat through the planting of native vegetation on the islands and dike/levee. Such vegetation could include prairie grasses, which are becoming increasingly rare with the degradation of prairie remnants. We support the project provided that the aforementioned concerns are adequately assessed.

Thank you for the opportunity to review the draft Definite Project Report with Environmental Assessment for the Swan Lake Rehabilitation and Enhancement Project. If you have any questions regarding our comments, please contact Milo Anderson of my staff at (312) or FTS 886-2967.

Sincerely yours,

William D. Franz

William D. Franz, Chief
Environmental Review Branch

SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 5
UNDATED

ST. LOUIS DISTRICT RESPONSES

Compensatory Mitigation. Our Draft DPR statement regarding no compensatory mitigation needs to be modified. Our Division office has informed us that bottomland hardwood forest requires special consideration. Corps regulations require that a loss of bottomland hardwood forest be mitigated in kind to the extent possible. Accordingly, APPENDIX DPR-J now includes a section on forest habitat mitigation.

The District agrees that the orientation of the WHAG analysis is more on wetlands type species. For the purposes of a mitigation analysis, the District opted to use the Habitat Evaluation System (HES) methodology developed by the Lower Mississippi Valley Division of the Corps. The District has used this methodology a great deal in the past. The methodology addresses habitat value for forested habitat at a broad-based community level rather than a species-specific level (such as the WHAG).

The District believes that it has minimized the adverse impacts to forested habitat to the maximum extent possible, consistent with the need to address the study objectives for the project. All identified unavoidable impacts to forested habitat have been offset with compensatory mitigation as described in APPENDIX DPR-J.

We disagree with the concept of linking mitigation on Swan Lake to efforts on future EMP projects. It is likely that nearly all EMP projects will of necessity require some forest clearing. However, the District is prepared to mitigate each of these locations on a site by site basis. The specific options employed in addressing forest mitigation are covered in APPENDIX DPR-J. The District does not feel that the establishment of a cypress swamp is sound from an ecological standpoint. While cypress trees will grow if planted in this area, naturally occurring stands of this forest type do not extend this far upriver.

The District does not believe that mitigation for the loss of nonforested wetlands is appropriate. Except for the placement of the lake closures, there will be little impact to this habitat. Approximately 8 acres of non-forested wetland will be eliminated by the construction of the lake closure structures; at a compensation ratio of 1.5:1 about 2 acres of replacement wetland would be needed. Any adverse impacts are more than compensated for by the positive effects of the project on non-forested wetlands habitat acres (i.e. a net gain of 502 acres, see Draft DPR, Figure 9).

A compensation plan for bottomland forest is included as part of APPENDIX DPR-J.

Impacts of Changed Lake Hydrology. The impacts of an altered lake hydrology on the remaining forested habitat is expected to be rather subtle and generally beneficial. APPENDIX DPR-P, Figure P-2 provides our best estimate of the changed hydrology of the lake with the project compared to a no project condition. During the dormancy period the hydrology of the area would not be very different with or without a project. The period of most concern would be the growing season, say May to September. During this period, water levels would be typically lower in the forested shoreline areas. This drier condition is likely to cause some gradual changes in the species composition of this floodplain forest. This change is viewed as beneficial from a habitat perspective. With drier conditions, we expect to see increased ground cover and understory development and an increase in the oak trees that were once so abundant in the preimpoundment floodplain forest of this area.

Hillside Erosion. The sources of hillside erosion in the local watershed is 65 percent sheet and rill, 30 percent ephemeral, and 5 percent gully erosion. We agree that the sediment traps do not address the actual source of the sediment; however, they do keep the soil in the uplands and out of Swan Lake. The use of other methods such as you have described is the reason for the existence of the SCS. Farm planning is the key to wide scale change in the source of sedimentation. SCS encourages farm planning within the county which is essentially wise use of the soils resource. In conjunction with the construction of the sediment traps will be the development of vegetative buffers around these sites. The dams will be grassed covered, but upstream of the dams some tree vegetation will be permissible. The District is very supportive of all SCS farm planning efforts as increased soil conservation practices will help extend the efficiency and utility of the sediment detention basins. The above discussion has been incorporated into the Final EA and Finding of No Significant Impact.

PRIMARY WATER QUALITY IMPACTS

We have assessed the potential for dredged material (lake sediments) to be contaminated with pollutants. Our assessment was based on published literature, an unpublished report, and sampling efforts conducted by the District.

We are concerned with some of your comments about contaminants (i.e., "If the sediments contain contaminants, they should not be used to construct islands or side casted to another location..." [page 3, paragraph 3]). This statement implies that a sample is contaminated regardless of the concentration of the contaminant. There is no reference to sediment criteria, guidelines, or standards to be used to determine if sediments are contaminated. Does your agency have such criteria?

Published Information. The 10 metals listed in your letter (except selenium) and organic carbon were included in a recent study of the concentration of about 40 elements found in sediments of backwater lakes of the Illinois River [Cahill, R. A. and J. D. Steele. 1986. Inorganic composition and sedimentation rates of backwater lakes associated with the Illinois River. Illinois State Geological Survey, Environmental Geology Notes 115, 61 pp.]. Sediment cores were taken from Swan Lake and 17 other backwater lakes that range over the entire length of the Illinois River. These lakes were created after completion in 1933 of a series of navigation dams. Sediment samples were taken from material deposited since creation of the backwater lakes and from the preimpoundment soil substrate. At Swan Lake, sediment cores were taken from six sites in 1983.

Cahill and Steele divided the backwater lake samples into three groups - upper, middle, and lower Illinois River - according to their locations and calculated mean concentrations. They compared the concentrations of these metals and percent organic carbon among these three groups and also with data from pools 19 and 26 of the Mississippi River. They found that the lower Illinois River sites (which included Swan Lake and another adjacent lake) and Mississippi River sites had similar sediment compositions and that the concentrations of arsenic, cadmium, chromium, copper, nickel, lead, zinc, and organic carbon for these two groups were lower than those of the middle Illinois River sites. The concentrations of these same elements were high in the upper Illinois River sites. (Mercury was not assessed at Swan Lake.) Manganese (as MnO) was one of the elements measured at Swan Lake, but the report did not discuss any variation of its concentration among sites on the river. We can forward a copy of Cahill and Steele's report if you so desire.

Total phosphate was examined by the Illinois State Water Survey in a study of water chemistry of the Illinois River (Kothandaraman, V., R. A. Sinclair, and R. L. Evans. 1981. Water chemistry of the Illinois waterway. Illinois State Water Survey Circular 147, 23 pp., not seen, cited in Cahill and Steele). Sampling of 28 stations along the entire river in 1977-78 showed that the concentrations of total phosphate were lower in the lower section of the river (0.39 mg/1, river miles 3-75) than for the upper section (0.52 mg/1, river miles 231-271).

Unpublished Report. The U.S. Fish and Wildlife Service's Rock Island Field Office is currently preparing a report on a survey for contaminants in sediments and fish of the Illinois River from sites extending from Chicago to the Mississippi River. In 1989, four bottom sediment samples (ponar dredge) were taken from Swan Lake, as well as one composite fish sample. Sediment samples were analyzed for 23 inorganic elements (including selenium and mercury), 25 organochlorine compounds, 14 polynuclear aromatic hydrocarbon compounds, and percent oil/grease. All of the chlorinated hydrocarbons listed in your letter were tested for, except PCBs (hexachlorobenzene was examined). This District has received only that portion of the draft report that presents concentrations of organochlorine compounds in sediments.

None of the chlorinated hydrocarbons (including hexachlorobenzene) were detected in sediment samples taken from Swan Lake (lower level of detection = 0.01 ppm for sediments and tissues). Microtox and 94-hour fathead minnow bioassays were conducted on the sediment samples for each study site, but the results of these studies have not been forwarded to us. Likewise, we have not seen the results of analyses of fish tissues for contamination. Percent moisture of sediment samples from Swan Lake was included with the data on organochlorine compounds. As already mentioned, the Service's report is in draft form and not for public release, and the Rock Island office can provide additional information if you need it.

District Testing. To fulfill the testing requirements of the Illinois Environmental Protection Agency (IEPA) for Section 401 water quality certification, the St. Louis District conducted supernatant tests of sediment and disposal waters at Swan Lake. Sediment and background water samples were taken from 6 sites in Swan Lake in 1990. Five parameters [total suspended solids, total volatile suspended solids, ammonia-nitrogen as N, lead (total), and zinc] were examined. The analysis did not reveal significant levels of lead or zinc. With regard to the other three parameters, the IEPA has indicated that its water quality concerns will be met if the dredge is encircled by a flotational collar with impervious silt screen. Employment of this measure will keep the dredging site isolated, and the collar and curtain will be kept in place until the quality of interior water returns to ambient levels. Water quality monitoring for total suspended solids, pH, temperature, P, and NH3 will be conducted on a weekly basis. Use of the collar and curtain was included in the Draft DPR.

The parameters in your list for which we have not gathered or referenced data include chemical oxygen demand and cyanide.

SECONDARY WATER QUALITY IMPACTS

Agricultural Activities. The U.S. Fish and Wildlife Service and the Illinois Department of Conservation are not planning any additional agricultural activities on lands under their management located adjacent to Swan Lake. There is no reason to believe that the proposed project will encourage additional agricultural activities within watersheds outside the project area that drain into Swan Lake. Conversely, the proposal includes the construction of 95 water and sediment control basins, 55 ponds, and 40 terraces on private lands which should result in a net decrease of farmed acreage within the watersheds.

Recreational Use. Recreation was addressed on p. 69 of the main report. Access to Swan Lake from the Illinois River will no longer be available, but two new boat launching ramps will be constructed to allow access from land. Recreational and commercial fishing on the lake is currently limited because of the shallow depths. There is essentially no recreational (motor) boating on the lake now. Creation of deep water as a byproduct of dredging may result in a small increase in recreational and commercial fishing but not recreational boating. There has not been any change in management plans to increase recreational use on the lake. There is no proposal for marina development in the vicinity of the project site.

Vegetation Plantings. The use of grasses to vegetate the islands was proposed for two reasons. First, the newly created islands would require immediate stabilization of the substrate, and grasses are often used for this purpose. Second, the U.S. Fish and Wildlife Service wants to create island nesting habitat for mallards, and grasses are often used to create suitable habitat. The Service plans to maintain grassy vegetation on only some of the islands, whereas the remainder will be allowed to undergo natural vegetational succession. Structural and species diversity will increase on the unmanaged islands as woody and other herbaceous species invade and become established.

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CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
MARK FRECH, DIRECTOR

March 28, 1991

Mr. Owen D. Dutt
Department of The Army
Planning Division
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Sir:

I have reviewed the Swan Lake Rehabilitation and Enhancement Main Report and propose the following comments: On page 34, second paragraph, you state no pumps are proposed for the Upper Swan Fuller Lake Compartment. This was due to the fact that the way it was pumped in the past had proven adequate.

In the past the area has been pumped from the Illinois River into the Fuller Lake Area and allowed to flow by gravity in the Upper Swan Lake, to the levee. The area then is allowed to slowly fill-up until it backs into the Fuller Lake Area. This proves to be quite slow and is inadequate as management of the two areas cannot be accomplished on a separate basis. A dedicated pump for this area would make compartmentalization possible and at the same time add to the enhancement of the area.

I also agree with the comment given by Neil Booth, Site Superintendent of Mississippi River Area concerning borrow sites to establish moist soil units.

I want to thank you for the opportunity to review this document and to provide my comments, my thanks also to the St. Louis C.O.E. for their efforts in this matter.

Sincerely,

David Harper

David Harper
District Wildlife Biologist

DH:msw

cc: Deck Major
Rick Messinger
Neil Booth

SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
ILLINOIS DEPARTMENT OF CONSERVATION--DAVE HARPER
MARCH 28, 1991

ST. LOUIS DISTRICT RESPONSES

Pumping Requirements. The District concurs with the Department, and a dedicated 20,000 GPM reversible pump will be included for the Upper Swan/Fuller Lake portion of the project.

Borrow Pit Configuration. The District concurs with the Department; the borrow pits will be placed and otherwise configured so as to optimize their utility as wetlands habitat.

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office memorandum

to: District Engineer - St. Louis District C.O.E.

from: Neil Booth - Mississippi River Area Site Superintendent

date: March 25, 1991

subject: Comments on Swan Lake Draft DPR

In reviewing the subject document, my major areas of interest were the sections dealing with Fuller and Upper Swan Lakes. I have two concerns regarding the execution of the HERP.

1) On page 34, in the second paragraph, there is a discussion regarding dedicated pumping facilities for Fuller / Upper Swan Lakes. Water level management, and the ability to do so, is a major component of quality habitat development. When a multitude of management areas rely on one cache of pump systems, the ability to manage for high quality output becomes overshadowed by the need for quantity.

In keeping with the purposes of HERP, it is logical and necessary to provide all the tools required if enhancement is the ultimate goal. I must reiterate my position that a dedicated pump station be incorporated for the Fuller / Upper Swan Lakes portion of this project.

2) In appendix N, page N-6, the plate reflects a linear borrow area adjacent to the riverside levee, from Hadley Landing south to the Fuller Lake public access area. I would recommend that a better approach would utilize multiple borrow sites which could be developed into either moist soil or static march units as opposed to a road ditch along the levee tow. Development of wetland units would provide additional habitat units instead of merely obtaining dirt for construction.

I would like to thank you for the chance to review this document, and thank the St. Louis C.O.E. for their efforts in this matter of mutual concern.

NB/pw
c: Bill Donels
Rick Messinger
Deck Major
Dave Harper

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MARK FRECH, DIRECTOR

April 9, 1991

Mr. Owen D. Dutt
Department of the Army
Planning Division
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, MO. 63103-2833

Dear Mr. Dutt:

Thank you for the opportunity to comment on the Swan Lake Rehabilitation and Enhancement Main Report. I have reviewed this document and offer the following comments:

1. Page 34, second paragraph - Serious thought should be given to a dedicated pump facility in the Fuller/Upper Swan Lake portion of the project in order to provide quality management of these compartments on a separate basis. Such a facility will improve management capabilities and thus increase recreational potentials.

2. Appendix N, page 6 - I recommend multiple borrow pits in selected moist soil or static marsh units rather than a linear borrow area adjacent to the riverside levee from Hadley Landing to Fuller Lake. This technique would provide the ability to enhance such areas and thus provide important additional habitat units.

Please keep me on the mailing list of commenters for this and other Corp projects.

Sincerely,

Decker Major
Regional Wildlife Administrator

DM:msw

SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
ILLINOIS DEPARTMENT OF CONSERVATION--NEIL BOOTH
MARCH 25, 1991

ST. LOUIS DISTRICT RESPONSES

Pumping Requirements. The District concurs with the Department, and a dedicated 20,000 GPM reversible pump will be included for the Upper Swan/Fuller Lake portion of the project.

Borrow Pit Configuration. The District concurs with the Department; the borrow pits will be placed and otherwise configured so as to optimize their utility as wetlands habitat.

SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
ILLINOIS DEPARTMENT OF CONSERVATION--DECK MAJOR
APRIL 9, 1991

ST. LOUIS DISTRICT RESPONSES

Pumping Requirements. The District concurs with the Department, and a dedicated 20,000 GPM reversible pump will be included for the Upper Swan/Fuller Lake portion of the project.

Borrow Pit Configuration. The District concurs with the Department; the borrow pits will be placed and otherwise configured so as to optimize their utility as wetlands habitat.

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[redacted]
BRENT MANNING, DIRECTOR

April 22, 1991

Mr. Owen D. Dutt
Acting Chief, Planning Division
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Mr. Dutt:

As requested in your letter of March 7, 1991 we have reviewed and offer the following comments of the Swan Lake Draft Definite Project Report.

During the pre-draft DPR meeting held January 23, 1991 it was agreed to that the water management plan would be reworded to indicate that the project design provides the physical conditions necessary for creating a wide spectrum of strategies for waterfowl and fisheries management. That the precise manner in which the lake will be managed will evolve during the initial years of the project. This fine tuning of the management plan will take into account the results of biological response studies to access alternative water control regimes. This fact should be reflected throughout the entire report.

- ES-1 paragraph 2 - Calhoun Point is an HREP not a Demonstration Area.
- ES-5 - How hillside sediment control remains an unanswered question and hopefully a policy will be developed for the sixth annual addendum to provide guidance.
- Pages 5 & 6 - Maps should be clearer so that the river and lake shorelines show.
- Page 18 - first paragraph, insert **and feeding efficiency after spawning success**
- Page 22 - Dredging - Hydraulic dredging cannot be considered due to spoiling would be too costly and utilizing too much space.

- Page 22 - Table 6 (continued), item (g) under Design Requirements: raising and maintaining the lake at 1-ft over normal pool for 3 months during fall and winter in the lower compartment would preclude fish movement from the river to the lake; this would be completely unacceptable.

- Page 24 - Table 7, last item under Goal: should read **Provide habitat for over winter survival of fish**

- Page 28 - paragraph 5, line 13, add: **before overtopping occurs at the upstream end** to the end of the sentence

- Page 33 - paragraph 5: To say that Swan Lake will no longer be connected to the river has serious negative implications to fish populations in the Illinois River and is not, in the strictest sense, accurate. Our agencies have agreed that the lower compartment will, after the initial drawdown period, be open to the river continuously until our research findings indicate otherwise.

- Page 34 - second paragraph: As concluded at the pre-draft DPR review meeting January 23, 1991 a fixed couch pump would be included in this project for Fuller Lake - IDOC operation.

- Page 35 - paragraph 6: To determine whether or not fish screens will be needed, we'll need to know what the intake velocity at pump intake will be. If the intake velocity is > 0.3 ft/sec, fish screens will be needed.

- Page 39 - Table 13: The S corresponding to **Plan C & Allow Free Movement for Fish**, again does not reflect the interagency agreement concerning fish management in the lower compartment. Therefore, change **S** to **Y** and, if need be footnote appropriately.

- Page 46 - New Lake Closure - Also concluded at the pre-draft meeting the new lake closure would be moved south to accommodate fish and wildlife management concerns.

- Page 50 - paragraph 6: This paragraph needs to be changed to reflect the fact that the State (specifically IDOC, including Division of Fisheries) will be involved in this planning effort to assure that fishery benefits are included in the project.

- Page 57 - Table 20 (continued), under Monitoring Plan: the phrase **Cooperate with SIU-C on fish movement studies** also needs to go in the row corresponding to **Allow free movement for fish between river and later fall/early winter period.**

- Page 58 - paragraph 1: Another case of the 'Closure problem', mentioned above; change to read ... **periodic closure.**

- Page 59 - The cost of land acquisition for EMP projects are not funded by the program in accordance with the letter of 5 February 1988, from the Office of the Chief of Engineers.

- Page 60 - The Illinois Department of Conservation will not fund rehabilitation costs as the non-federal sponsor.

- Page 61 - The SCS and Calhoun County SWCD are to construct and maintain the hillside features so they should be monitoring the effectiveness of these features as part of their operation and maintenance obligation. This should eliminate the need for EMP to monitor the hillside.

- Page 64 - paragraph 3: change to read: **Except during very high water and periods during critical fish movement ...**

- Page 68 - paragraph 1: Regarding 'critical times of the year': there should be a statement here indicating that these critical times have not been thoroughly delineated but that ongoing and future, project funded research during and after construction will give us the necessary details.

- Page 68 - paragraph 2: This statement, again does not reflect the interagency agreement concerning the management of the lower compartment of the lake. This agreement overrides "the guidelines under which the refuge was established", thus, strike this phrase so that sentence reads: **...would be managed for fish to the maximum extent possible.**

- Page 73 - The Illinois Department of Conservation is not responsible for the total operation and maintenance costs, but only the 25% of the Fuller Lake operation and maintenance costs.

APPENDICES

- C-12 paragraph 5: Change to read **...would be periodically closed off**

- C-15 paragraph 4: The second statement of this paragraph is conjecture and does not accurately reflect impacts to riverine fish populations if the lake is, indeed, closed off for long periods of time. Change statement to include the interagency agreement to operate the lower compartment for optimum benefit to the riverine fishery.

- Appendix D: add Dr. Robert Sheehan to the distribution list

Although the term **large slackwater fishes** was used in the AHAG evaluation of the project, it's not appropriate in terms of the goals and objectives of this HREP. In addition to the primary objective of improving the lake habitat for waterfowl, the project will benefit resident (Swan Lake) fish populations and, if prudently managed as agreed upon, will benefit Illinois River fish populations. Thus, habitat for fish in general will be improved. Therefore, recommend changing **large slackwater fish** **(or slackwater fish)** to **fish** or **fish populations** throughout these documents, except in Appendix J Project Habitat Quantification. This change needs to be made on, at least, the following pages: 16, 19 (Table 5), 25 (Table 7), 67 (paragraph 8), 81 (paragraph 2) and 86 (paragraph

6 - twice). There may be other places so **the document needs to be thoroughly scanned for this phrase.**

With regard to the AHAG, I agree with the FWS Coordination Act Report in that the methodology does not address the importance of riverine fish use of backwaters in general nor of Swan Lake specifically. This fact needs to be noted in Appendix J.

The opportunity to review and comment on the Swan Lake Definite Project Report is appreciated.

Sincerely,

Bill Donels

William R. Donels
Environmental Management Program Manager
Division of Planning

BD:bg

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SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
ILLINOIS DEPARTMENT OF CONSERVATION--BILL DONELS
APRIL 22, 1991

ST. LOUIS DISTRICT RESPONSES

RESPONSES TO GENERAL COMMENTS:

Water Management Plan Wording. The District concurs. Revisions have been made to the report text including the executive summary and the detailed description of the selected plan.

RESPONSES TO SPECIFIC COMMENTS:

ES-1 para. 2. The text has been revised per your comment.

ES-5. The language of the Draft 6th Addendum supports the concept of local watershed treatment for hillside sediments when it represents a significant site-specific problem and where no foreseeable treatment of the problem would occur in the absence of a project.

Pages 5 & 6. The shorelines have been highlighted per your comment.

Page 18. Text revised per your comment.

Page 22. Text revised per your comment.

Page 22. In view of the fact that the compartments are being designed for a wide spectrum of potential management strategies, this design requirement applies equally to all compartments.

Page 24. Text so revised.

Page 28. Text so revised.

Page 33. Text has been reworded to state "...the refuge portion of Swan Lake would no longer be dependably connected to the river."

Page 34. The paragraph has been reworded to indicate our meeting agreement regarding the upper Swan/Fuller Lake pump.

Page 35. Water velocity near the pump would be about 1.25 ft/sec. This is higher than the Department's recommended maximum water velocity of 0.3 to 0.5 ft/sec to avoid fish entrainment (telephone conversation 13 June 91 between Dave Gates (SLD) and Butch Atwood (IDOC).

The District has evaluated the problem and has concluded that provision should be made for a fish screen device; however, it is anticipated that such a device would reduce, but not eliminate, the potential for fish entrainment. In evaluating the design for this feature, two factors were considered: (1) the location of the screen and (2) the sizing of the screen.

The most obvious location to place a fish screen is at the gate entrance to the pump chamber. Using a chain hoist, a gate placed at this location would still be manageable (10-foot wide) from a maintenance standpoint. The water velocity at this location would be 0.75 ft/sec. To achieve a position where water velocity would drop to 0.5 ft/sec would require additional wall modifications, and one would require a screen opening of 15 feet. While possible to create such an opening, the design of a screen with a mesh small enough to exclude young fish, while at the same time not creating a water flow capacity problem, does not appear to be feasible. The District believes that the screen mesh should not be less than 1.5 inch x 1.5 inch, or else significant amounts of debris will collect, thus impeding water flow.

Since fish not able to pass through a 1.5 inch opening would likely be able to withstand a water velocity of at least 0.75 ft/sec, the most cost-efficient screen would be one placed at the 10-foot wide chamber opening. With the use of such a screen, some mortality of younger fish would be expected. In view of the fact that mortality factors can act in a compensatory fashion, the overall significance of entrainment could be minor. Furthermore, it should be noted that in actual river management practice, the need for fish screens has been ignored.

The Final DPR includes a fish screen with 1.5 inch x 1.5 inch mesh be placed at the 10-foot chamber opening. The significance of this screen in reducing fish entrainment should be evaluated as part of the biological response studies. If the Department has some alternative fish screen designs that might apply, the District will give consideration to these designs during the preparation of Plans and Specifications.

Page 39. Text so revised.

Page 46. As agreed, the structure has been relocated. The structure is now located opposite R.M 7.2. This new location represents the southern most placement of the structure that does not drastically alter the units hydrology. The page 46 text has been adjusted to reflect this new location.

Page 50. Text so revised.

Page 57. Text so revised.

Page 58. Text so revised.

Page 59. The cost of lands acquisition has been deleted from the TABLE 21 cost estimate summary.

Page 60. Original Response: Rehabilitation, as indicated on page 60 of the text, is based on mutual agreement. From your statement we must assume that the project would not be rehabilitated in the event of a major structural failure.

Revised Response: In July 92 the District sought clarification from IDOC, Bill Donels, on its position regarding rehabilitation. IDOC indicated that at the time that it made this statement, State staff were under the false impression that rehabilitation costs were 100 percent Federal. IDOC now supports the terms of rehabilitation as currently stated in the Environmental Management Program Annual Addendum.

Page 61. We disagree. The Corps has the ultimate responsibility for the monitoring effort. In the program to date, the fact that a project feature has been cost-shared 75 percent Federal and 25 percent non-Federal, has not altered cost allocation on monitoring as 100 percent Federal.

Page 64. Text so revised.

Page 68. Text so revised.

Page 68. The Service has indicated that the phrase "...within the guidelines under which the refuge was established" cannot be deleted. This statement is the basis for the Service's Refuge Compatibility Statement. However, in recognition of your concern, the District has adjusted the DPR text to better reflect our interagency understanding on the future management of the site. The paragraph now reads "...The Swan Lake refuge compartments (2,563 acres) would be managed for fish to the maximum extent possible within the guidelines under which the refuge was established. However, the Service has voiced considerable flexibility in this regard. It has been agreed between the agencies that while waterfowl management remains the primary focus of this EMP project, major emphasis will also be given to the fisheries resource, particularly in the lower lake compartment. The precise manner in which the lake compartments will be managed will evolve during the initial years of the project. This fine tuning of the management plan will take into account the results of biological response studies to access alternative water control regimes."

Page 73. Text so revised

Page C-12. Text so revised.

Page C-15. Text so revised.

APPENDIX D. Dr. Sheehan's name has been added to the list.

Reference to Slackwater Fishes. The text has been adjusted per your comment.

Reference to AHAG Limitations. We agree with your comment. The present state-of-the-art for the AHAG does not yet take into account the exchange of fish between the river and backwater. This limitation is now so noted in APPENDIX J.

OTHER ILLINOIS DEPARTMENT OF CONSERVATION CONCERNS

Other IDOC concerns expressed, but not mentioned in the preceding letters from the Department, are described as follows:

Culvert Pipe Invert. IDOC requested that the invert of the culvert pipe at the upper Swan/Fuller Lake management unit be changed from 417 NGVD to 416 NGVD to be more compatible with management needs.

Action Taken. The District has changed the pipe invert to 416 NGVD.

Post-project Corps Hosted Coordination Meetings. IDOC believes that post-project meetings between the Corps, USFWS, and IDOC are needed to reassess the water management plan for the project area in view of incoming results from the biological response monitoring studies.

Action Taken. The District concurs, and annual or more frequent meetings will be held in connection with the preparation of the Co-op Agreement Annual Management Plan for the site.

Swan Lake Interior Closure Realignment. IDOC and the USFWS have requested that the middle lake closure be moved back to its original location. While they recognize that the District moved the structure upstream as a cost savings measure, they feel that the changed degree of emphasis between waterfowl management interests in the middle lake compartment and fisheries management interests in the lower lake compartment is unacceptable.

Action Taken. The District has shifted the alignment back to its original location.

Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway/Springfield, Illinois/62764

March 29, 1991

SUBJECT: Swan Lake Rehabilitation and Enhancement Project
Calhoun County

District Engineer
St. Louis District, Corps of Engineers
ATTN: Plan Formulation Branch (CELMS-PD-F)
1222 Spruce Street
St. Louis, Missouri 63103-2833

Gentlemen:

Thank you for your recent submittal of the February 1991 Draft Definite Project Report. We have determined that most of the project will lie in the floodway of the Illinois River. Therefore, an Illinois Department of Transportation, Division of Water Resources (IDOT/DWR) permit will be required. An application packet is enclosed for your convenience.

We have some concerns regarding the proposed levee and closures. The plans show that the levee will run along the Illinois River for approximately 10 miles and will have an average height of about 7'. The average top elevation is approximately 427.0'. The 100-year flood elevation at the site is 441.0'. Therefore, the levee should have no appreciable impact on 100-year flood flows. However, the report states that the top of levee elevation represents a stage that corresponds to an approximate recurrence interval of 2 to 3 years. The top elevations of the proposed enclosure and downstream control structure are essentially the same as the average levee height. It is requested that a detailed hydraulic analysis be performed to determine what flooding impacts, if any, the structures would have on upstream and downstream properties. The flooding event corresponding to a stage just before levee overtopping should be utilized. The structures will be permissible if the analysis demonstrates that, considering both singular and cumulative effects, flood damages will not be increased outside the project right-of-way. Our requirements for levees are enclosed for your convenience. The proposed pump sites, islands, water control structures, and boat ramps are relatively minor projects and appear to be permissible.

Since Swan Lake is contiguous to the Illinois River, the lake is considered a public body of water. Accordingly, it must be

District Engineer
St. Louis District, Corps of Engineers
Page 2
March 29, 1991

demonstrated that the construction will not result in:

1. An obstruction to, or interference with, the navigability of the public body of water;

2. An encroachment in the public body of water; or

3. An impairment of any rights, interests or uses of the public in any public body of water or in the natural resources connected therewith.

To address these potential impacts, please provide the following supplemental information along with the application:

1. An evaluation of the benefits to the public interest in the body of water which would result from the activity;

2. A discussion of the measures to be provided in project design, construction and operation which would minimize and/or mitigate the negative impacts; and

3. An analysis of the extent and permanence of the activity's encroachment on the body of water and of any impairment the activity would have on the rights, interests or uses of the public in the body of water and in the natural resources connected therewith. The analysis shall consider both the activity alone and the combined effects of similar activities which exist and/or could be lawfully undertaken in the locality. The analysis should be expressed in quantitative terms to the fullest extent practicable.

If you have any questions or comments, please feel free to contact Robert Pugh of my staff at 217/782-3862.

Sincerely,

Dennis L. Kennedy, P.E., Head
Technical Analysis and Permit Unit

DLK:RWP/4206r
cc: Calhoun County (Janet Droege)

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

Plan Formulation Branch
Planning Division

Mr. Don Vonnahme, Director
Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway
Springfield, Illinois 62764

Dear Mr. Vonnahme:

This letter is in response to your March 29, 1991, letter of comment on the Draft DPR for the Swan Lake Habitat Rehabilitation and Enhancement Project (HREP). Per your request, a permit application has been prepared and is enclosed as Enclosure 1. The following paragraphs address other concerns mentioned in your letter.

Levee/Closures Concerns. The low earthen levee was designed to prevent frequent Illinois River floods depositing sediments within the Swan Lake and Fuller Lake areas. This approximately 8 mile long levee will have an average height of 3 feet above the natural high ground on the peninsula between the Illinois River and Swan Lake. The average height of the levee is 6 to 7 feet since most of the construction of the levee takes place on lower ground adjacent to Swan Lake to make use of the excavated ditch material removed from the lake. The average levee crown elevation is 427 NGVD construction grade, but after settlement it will be about 426 NGVD.

The impacts of the proposed low levees for Swan and Stump Lakes on upstream water surface profiles are judged to be insignificant. An HEC-2 water surface profile analysis was performed on the Illinois River with the low levees proposed at both the Swan Lake project as well as the proposed Stump Lake project directly across the river. A range of floods from the 2-year through the 500-year recurrence interval were tested for both existing and proposed conditions (Enclosure 2).

For the 5-year through the 500-year flood events no impact on the water surface elevations occurs, since the low levees are considerably overtopped. Likewise, for events more frequent than the 2-year, there is essentially no impact since the combination of the regulated pool at Mel Price Lock and Dam and the low flows in the Illinois River produces stages below the natural high banks along this reach.

The most relevant flooding event with regard to the two proposed low levee projects is the 2-year event. With both the Swan Lake and Stump Lake levees in-place, the maximum increase in the water surface profile is at the upstream end of the projects. The impact would be about 0.1 feet.

Lands just upstream of the project consist of leveed farmland and Corps owned lands managed for fish and wildlife purposes. The project would not significantly impact these areas. Structures in the floodplain immediately adjacent to the river typically consist of cabins on Corps leased lands. These cabins are typically on stilts, with the floors of most of the structures being well above the top of the proposed levee.

Navigability. The closure of the lower lake opening to the Illinois River will not cause an obstruction to commercial navigation traffic. The structure merely forms an extension of the existing bankline and therefore does not protrude out into the river.

Traditional small boat traffic access from the river to the lake will be obstructed by the closure structure. To offset this impact, two boat ramps will be constructed along the lake's west shore. Due to the increased shallowness of the lake in recent years, small boat movement has been difficult. Lake dredging for the creation of the levee and islands will create a network of deepwater channels linking up with the boat ramp areas. This should facilitate small boat movement.

Water Encroachment. The project will not represent an encroachment of the lake. The lake presently serves as a wildlife refuge, the perpetuation of the goals of which is the intent of the Swan Lake HREP project. The future quantity and quality of this lake area as a wetlands habitat supporting waterfowl and fish populations will be improved.

Rights, Interests or Uses. The refuge is maintained for the enjoyment of the general public, providing opportunities for commercial and sport fishing, wildlife observation, wildlife photography and similar activities. The proposed Swan Lake habitat improvements will enhance, not detract from, that refuge goal.

Construction of the project will cause some change on the lake's hydrology sufficient to affect approximately 92 acres of lands along the west shore of the lake up to elevation 424 NGVD. To compensate landowners for damages to those lands, the U.S. Fish and Wildlife Service will acquire those lands by either fee title or by flowage easements.

Other Information. The enclosed DPR also contains an integrated Environmental Assessment (EA) for the project. The EA addresses in detail many topics dealing with the project's impacts. The DPR appendices also provide quantitative information on many of the project's effects (e.g. APPENDIX DPR-J provides the project's habitat quantification).

If the Department has any additional questions, please call Dave Gates, Swan Lake Study Manager, at 314/331-8478.

Sincerely,

James D. Craig
Colonel, U.S. Army
District Engineer

Enclosures

JOINT APPLICATION FORM

1. Application Number (to be assigned by Agency)

2. Date 26 (Day) 7 (Month) 91 (Year)

3. For agency use only (Date Received).

4. Name and address of applicant

U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Telephone no. during business hours A/C (314) 331-8451
A/C ( )

5. Name, address, and title of authorized agent

Owen D. Dutt
Acting Chief, Planning Division
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Telephone no. during business hours A/C (314) 331-8451
A/C ( )

6. Project Description and Remarks: Describe in detail the proposed activity, its purpose, and intended use. Use attachments if needed.

The Attachment 1 Definite Project Report (DPR) describes in detail the proposed Swan Lake Habitat Rehabilitation and Enhancement project. See project plan maps p. ES-4 and p.38, project features description p. ES-3 and p's. 45-48, the project goals and objectives p. ES-2. The back of the DPR Main Report provides the project design drawings. The intended project purpose is habitat improvement compatible with the operational mandates of the Mark Twain National Wildlife Refuge. The Section 404 analysis is provided by APPENDIX C of the DPR.

7. Names, address, and telephone numbers of all adjoining and potentially affected property owners, including the owner of subject property if different from applicant.

Project could affect certain private properties via hydrology effects to elevation 424 NGVD. The U.S. Fish and Wildlife Service will acquire the affected property by fee title or by flowage easements. DPR APPENDIX R shows the general location of the affected lands Attachment 2 provides a list of purported landowners based on tax assessment records. There could be others. In the event the project is approved, a formal landowners' meetir will be called to explain or answer questions relating to real estate acquisition.

8. Location of activity

Swan Lake
Name of waterway at location of the activity

Legal Description:

1/4	Sec.	Twp.	Rge.	P.M.
		T6N	RIW	
		T7N	RZW	

Address:

Adjacent to Illinois River Miles 5 - 13 (Brussels & Nutwood 7½ Min Quadrangle)
Street, road, or other descriptive location

Brussels
In or near city or town

Hardin
Name of Local Governing Community

Calhoun — County
Illinois — State
62047 — Zip Code

9. Date activity is proposed to commence October 1992 Estimated Time of Construction 2 years

10. Is any portion of the activity for which authorization is sought now complete? ____ Yes X No If answer is "Yes" give reasons in item 6.

Month and Year the activity was completed ________ Indicate the existing work on drawings.

11. List all approvals or certifications required by other federal, interstate, state, or local agencies for any structures, construction, discharges, deposits, or other activities described in this application. If this form is being used for concurrent application to the Corps of Engineers, Illinois Department of Transportation, and Illinois Environmental Protection Agency, these agencies need not be listed.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval
IEPA	Water Quality Certification	Unknown	Dec 6, 1990	Jun 14, 1991(See Atch 3
IEPA	Permit to Burn	- To be applied for after project approval -		
Corps	Section 404 Permit	- To be applied for after project approval -		

12. Has any agency denied approval for the activity described herein or for any activity directedly related to the activity described herein. ____ Yes X No
(If "Yes", explain in item 6.)

13 Application is hereby made for authorizations of the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities

Signature of Applicant or Authorized Agent

OWEN D. DUTT, Acting Chief, Planning Division
Typed or Printed Name of Applicant or Authorized Agent

NCR FORM 426
12 SEP 90

Enclosure 1

Supervisor of Assessments
Calhoun County
Roberta L. DeLany   Hardin, Illinois 62047   P.O. Box 30?
C.I.A.O.   Ph.(618) 576-804?

April 18, 1991

Purported Owners

U. S. Army Corps of Engineers
Real Estate Division
Attn: Dianne Jones
1222 Spruce
St. Louis, Missouri 63103-2833

Dear Ms. Jones

Listed below is a list of names and addresses you requested by phone.

Sec./Twp./R	Name	Address	Phone
8/13/1	Patricia A. & Diane Baalman	Meppen, IL 62064	618-396-2535
8/13/1	Golden Eagle Wildlife Preserve, Inc.	%Mark Arneson, Inc. Arneson Const. Co. 34 Crown Manor Chesterfield, MO 63005	Unknown
8/13/1	Anthony Zamarioni	800 E. Lake St. Collinsville, IL 62234	Unknown
6/13/1	John L. & Mary Turner	425 Sheration Dr. Belleville, IL 62223	Unknown
6/13/1	Mrs. Frank Logeman	Brussels, IL 62013	Unknown
31/12/1	Gilbert Kinder (Now owned by Carl H. Wittmond	Brussels, IL 62013	618-883-2345
31/12/1	Brussels Land, Inc.	% R. L. Brady 1937 Chamfers Farm Rd. Chesterfield, MO 63005	Unknown
25/12/2	(Small Tracts)		
	Hazel Bimslager	Brussels, IL 62013	618-883-2322
	Susan A. Wofford	Brussels, IL 62013	Unknown
	Carl B. & JoAnn Kiel	Brussels, IL 62013	Unknown
25/12/2	Lawrence Bimslager (Now owned by Carl Wittmond)	Brussels, IL 62013	618-883-2345
25/12/2	Cecelia Bonner	Brussels, IL 62013	618-883-2185
25/12/2	Albert Middeke (Now owned by Hytek Pork, Inc.	% Swine Manage. Co. 1620 Superior St.-Box 754 Webster City, Iowa 50595	

25/12/2	Bernard Brinkman	Brussels, IL 62013	618-396-2434
24/12/2	Clifford Hillen	1808 Meyer Blvd. Blue Springs, MO 64015	Unknown
24/12/2	Edward Hillen	Meppen, IL 62064	618-396-2550
24/12/2	James Klaas (Now owned by Sievers Bros. Pork Manage. % Roy Sievers	Batchtown, IL 62006	618-396-2566

If we can be of further assistance, please let us know.

Sincerely

Roberta L. DeLany
Supervisor of Assessments

RLD:gfs

EFFECT OF BOTH SWAN LAKE & STUMP LAKE PROPOSED LEVEES
ON UPSTREAM WATER SURFACE PROFILES--1/ 2/
5, 10, 25, 50, 100 & 500-YEAR RETURN PERIODS

River Mile	Location	Increase In Depth Over Without Project Conditions (Feet) Return Period (Years)						
		2	5	10	25	50	100	500
13.5	Upstream Limits of Swan Lake & Stump Lake Proposed Levees	.13	0	0	0	0	0	0
21.6	Hardin Gage	.07	0	0	0	0	0	0
31.7	Kampsville	.05	0	0	0	0	0	0
43.2	Pearl Gage	0	0	0	0	0	0	0
56.0	Florence Gage	0	0	0	0	0	0	0
70.8	Meredosia Gage	0	0	0	0	0	0	0

(#) Net increase over future without project condition.

1/ Levee overtops at approximate 2-year recurrence interval, or 426 NGVD.

2/ Assumes Grafton is in a regulated pool situation, i.e. <420 NGVD with a mean elevation of 419.6 NGVD. Grafton is in a regulated situation 90 percent of the time.

Enclosure 2

Calhoun County Soil & Water Conservation District
P.O. Box 516 - Hardin, IL 62047 - Phone 576-2723

May 22, 1991

Dear Sirs,

This letter is being written to assure you that the Calhoun County Soil and Water Conservation District, (CCSWCD), is in support of the proposed Swan Lake Habitat Rehabilitation and Enhancement Project (HREP).

If any assistance is needed in this project, please feel free to contact our office.

Sincerely,

Kenneth J. Friedel

Kenneth Friedel
CCSWCD Chairman

Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive / P.O. Box 19484 / Springfield, Illinois / 62794-9484

January 28, 1992

SUBJECT: Levee Construction
Swan Lake Rehabilitation and Enhancement Project
Illinois River Floodplain
Calhoun County

Swan Lake Study Manager
U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attention: Dave Gates

Gentlemen:

Thank you for your application for permit for the subject project and response to our March 29, 1991 letter.

After a review of the submitted information, we concur with your analysis of the project. The Swan Lake project, in conjunction with a similar project on Stump Lake, is estimated to increase the water surface elevation by 0.13' during the 2-year recurrance interval at the upstream project limits. No stage increases will occur for recurrance intervals greater than 2 years since the proposed levee will be overtopped. Accordingly, the proposed project meets our requirements as they apply to the Illinois River floodplain.

However, it is required that flood easements be obtained for all areas inundated behind the levee during the 100-year recurrance interval on the drainage basin of Swan Lake, or the maximum pool elevation of the lake (426.0 NGVD) whichever is higher.

Finally, the Department requests further consideration be given to the accessability of the general public to the lake upon completion of the project. Closure of the lake outlet would appear to greatly reduce the convenience of accessing its waters from the Illinois River.

Upon receipt of the requested information, we will continue to review your application. Please contact Dennis Luebbe of my staff at 217/782-3862 if you have any questions or comments.

Sincerely,

Dennis L. Kennedy, P.E., Head
Technical Analysis and Permit Unit

DLK:DML:lmt

cc: Illinois Department of Conservation
Illinois Environmental Protection Agency
Calhoun County (Donna Powers)

April 28, 1992

Plan Formulation Branch
Planning Division

Mr. Dennis L. Kennedy
Technical Analysis and Permit Unit
Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive
P.O. Box 19484
Springfield, Illinois 62794-9484

Dear Mr. Kennedy:

This is in response to your letter of January 28, 1992 regarding the Swan Lake Habitat Rehabilitation and Enhancement Project (HREP), Calhoun County, Illinois.

In late January, Dave Gates of my staff and Dennis Luebbe of your staff discussed the Department's permit concerns. Mr. Luebbe indicated, and the letter states, that the Department is concerned that landowners be fairly compensated for project induced interior impacts from hillside runoff. Mr. Luebbe indicated that in the District's analysis we had considered only the effects of a 50-year flood event, not a 100-year event, as required by the Department.

Mr. Gates explained that the use of a 50-year event for the flowage easement elevation of 424 NGVD was based on a 50-year project life. After consulting with the project's hydrologist, Mr. Gates was able to provide the following additional information. The original 50-year event determination was based on a worst case scenario. It was assumed that the lake was being managed at a maximum water level of 421 NGVD when it was hit with the 50-year event. This 421 elevation is high; in actuality the lower lake will more probably be managed at a maximum elevation of 419.5 and the middle lake at 420.5. Also, as part of the worst case situation, it was assumed that the system was closed; in actuality it might be possible to open the gates in anticipation of a severe flood event. However, assuming the worst, the lake would rise to 423.6 NGVD. Since our contour maps were in 2-foot increments we rounded up to the nearest contour line or 424 NGVD. Reexamination of the data indicated that the elevation of a 100-year event would be exactly elevation 424 NGVD. Accordingly, a flowage easement line of 424 NGVD is sufficient for a 100-year event.

Your January 28 letter requested that further consideration be given to the accessibility of the general public to the lake upon completion of the project. The District has included two boat ramp areas along the lake's west shore in an attempt to offset a loss of river access to the lake. During the Plans and Specifications phase of the project, the District will take an additional look at the lower lake compartment. This unit will likely be managed at normal pool elevation much of the year. It may be possible to increase the width of the stop-log chambers sufficient for boat access. However, the acceptability of this approach would have to be coordinated with the refuge staff. In the past, the Service has expressed a desire to restrict boat access from the river.

We hope that this additional information will facilitate your review of our permit application. If you have any further questions please contact Mr. Gates at 314-331-8478.

Owen D. Dutt
Chief, Planning Division

Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive / P.O. Box 19484 / Springfield, Illinois / 62794-9484

May 26, 1992

SUBJECT: Levee Construction
Swan Lake Rehabilitation and Enhancement Project
Illinois River Floodplain
Calhoun County

Swan Lake Study Manager
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTENTION: David Gates

Gentlemen:

Thank you for your recent facsimile of hillside data for the subject project.

To clarify the runoff volumes attributed to the watershed behind the levee, please submit a location sheet of the previously transmitted sub-basins. We compute a drainage area of 42.7 square miles vs. your 34.9 square mile submittal. In addition, please comment on the source of your precipitation data. Was Bulletin 70 (Illinois State Water Survey, 1989) data used?

Upon receipt of the requested information we will continue to process your application. If you have any questions or comments please contact Dennis Luebbe of my staff at 217/782-3862.

Sincerely,

Dennis L. Kennedy, P.E., Head
Technical Analysis and Permit Unit

DLK:DML:crn

Dennis L. Kennedy, P.E., Head
Technical Analysis and Permit Unit
Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive
P.O. Box 19484
Springfield, Illinois 62794-9484

Dear Dennis:

The following provides the information that you requested from the District in your letter of May 26, 1992.

The source of the precipitation data was the National Weather Service TP 40.

Our previously provided runoff analysis for Swan Lake considered only that portion of the project area affecting Swan Lake Refuge. The Upper Swan and Fuller Lake area (USFLA) includes a drainage area of 7.6 square miles. This area plus the previous analyzed area of 34.9 square miles equals 42.5 square miles, and is very close to your estimate of 42.7 square miles for the entire watershed.

The USFLA was not included in the original analysis since it would not result in potential impacts to adjacent properties. IDOC will manage the unit post-project in the same manner that it did prior to project installation. Historically, management of the USFLA has not been a point of contention with adjacent property owners.

It may be of interest to note that the Corps owns land adjacent to the USFLA to a higher elevation than in the refuge portion of the lake complex (i.e. to about 425 NGVD).

A drainage area and sub-basins location sheet is being mailed to your office.

If you have any further questions, please contact me at 314-331-8478.

Sincerely,

Dave Gates

Dave Gates, Study Manager
Plan Formulation Branch
Planning Division

Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive / P.O. Box 19484 / Springfield, Illinois / 62794-9484

June 8, 1992

SUBJECT: Permit No. 21087
Swan Lake Habitat Rehabilitation
and Enhancement Project
Illinois River
Calhoun County

U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Gentlemen:

We are enclosing Permit No. 21087 authorizing the subject project. In addition to the general conditions of the permit, this approval is subject to the following special condition:

1. This permit is based, in part, on the acquistion of flood easements on all properties affected by the project below elevation 424.0 NGVD.

If any changes in the plans or location of the work are found necessary, revised plans should be submitted promptly to this office so that they may receive approval before work thereon is begun. When the work is done, please provide written notification that the project has been completed in accordance with the approved plans and conditions of the permit.

Please acknowledge receipt of this permit by having the attached acceptance blank properly executed and returned to us within sixty (60) days from the date of the permit.

Sincerely,

David R. Boyce

David R. Boyce, P.E.
Chief, Floodplain Management Section

RECEIVED
REGULATORY OFFICE
ST. LOUIS DISTRICT
1992 JUN 11 PM 3:10

DRB:DML:crn
Enclosure
cc: Illinois Environmental Protection Agency (IEPA)
Calhoun County

ENCL 4

STATE OF ILLINOIS

Permit
Nº 21087

Department of Transportation

Division of Water Resources
2300 South Dirksen Parkway
Springfield, Illinois 62764

Permission Is Hereby Granted, this 8th day of June 19 92

To

U. S. ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

To construct the Swan Lake Habitat Rehabilitation and Enhancement project in the Illinois River Floodplain in Calhoun County,

in accordance with an application dated July 26, 1991, and the specifications and plans entitled UPPER MISSISSIPPI RIVER SYSTEM - ENVIRONMENTAL MANAGEMENT PROGRAM DEFINITE PROJECT REPORT, (SL-5) WITH INTEGRATED ENVIRONMENTAL ASSESSMENT, SWAN LAKE REHABILITATION A ENHANCEMENT, MAIN REPORT AND TECHNICAL APPENDICES, POOL 26 ILLINOIS RIVER CALHOUN COUNTY, ILLINOIS, (Drafted February 1991)

filed with the Department of Transportation and made a part hereof, and subject to the terms and special conditions contained herein:

Examined and Recommended:

David R. Boyce

~~Chief, Bureau of Resource Management~~
David R. Boyce, Chief, Floodplain Management Section

Approval Recommended:

Donald R. Vonnahme
Director

APPROVED:

Kirk Brown
Secretary

cc: IEPA Calhoun County

(9193—5M Sets—12-83)

(over)

This Acceptance Must Be executed Before Work Is Started — See Condition G

Permit
Nº 21087

STATE OF ILLINOIS

Department of Transportation

Division of Water Resources

2300 South Dirksen Parkway
SPRINGFIELD, ILLINOIS 62764

The undersigned permittee, personally, or if a corporation by its duly authorized officers, hereby accepts the permit bearing the same serial number as this coupon subject to all the conditions named therein, on this ____________ day of ______________ 19____, at ______________________, Illinois.

____

If a corporation affix seal here.

By ______________________________

By ______________________________

B-44c

THIS PERMIT is subject to the following conditions:

(a) This permit is granted in accordance with an act entitled: "AN ACT in relation to the regulation of the rivers, lakes and streams of the State of Illinois," approved June 10, 1911, as amended. (Ill. Rev. Stat., ch. 19, par. 52, et. seq.)

(b) This permit does not convey title to the permittee or recognize title of the permittee to any submerged or other lands, and furthermore, does not convey, lease or provide any right or rights of occupancy or use of the public or private property on which the project or any part thereof will be located, or otherwise grant to the permittee any right or interest in or to the property, whether the property is owned or possessed by the State of Illinois or by any private or public party or parties.

(c) This permit does not release the permittee from liability for damage to persons or property resulting from the work covered by this permit, and does not authorize any injury to private property or invasion of private rights.

(d) This permit does not relieve the permittee of the responsibility to obtain other federal, state or local authorizations required for the construction of the permitted activity; and if the permittee is required by law to obtain approval from any federal agency to do the work, this permit is not effective until the federal approval is obtained.

(e) The permittee shall, at his own expense, remove all temporary piling, cofferdams, false work, and material incidental to the construction of the project, from the floodway, river, stream or lake in which the work is done. If the permittee fails to remove such structures or materials, the state may have removal made at the expense of the permittee. If future need for public navigation or public interests of any character, by the state or federal government, necessitates changes in any part of the structure or structures, such changes shall be made by and at the expense of the permittee or his successors as required by the Department of Transportation or other properly constituted agency, within sixty (60) days from receipt of written notice of the necessity from the Department or other agency, unless a longer period of time is specifically authorized.

(f) The execution and details of the work authorized shall be subject to the supervision and approval of the Department. Department personnel shall have right of access to accomplish this purpose.

(g) The permittee shall file with the Department a properly executed acceptance of all terms and conditions of the permit within sixty (60) days of receipt of the permit; however, starting work on the construction authorized will be considered full acceptance by the permittee of the terms and conditions of the permit.

(h) The Department in issuing this permit has relied upon the statements and representations made by the permittee; if any statement or representation made by the permittee is found to be false, the permit may be revoked at the option of the Department; and when a permit is revoked all rights of the permittee under the permit are voided.

(i) If the project authorized by this permit is located in or along Lake Michigan or a meandered lake, the permittee and his successors shall make no claim whatsoever to any interest in any accretions caused by the project.

(j) In issuing this permit, the Department does not approve the adequacy of the design or structural strength or the structure or improvement.

(k) Noncompliance with the conditions of this permit will be considered grounds for revocation.

(l) If the work permitted is not completed on or before December 31, 1995 this permit shall be void.

THIS PERMIT is subject to further special conditions as follows:

1. This permit is based, in part, on the acquistion of flood easements on all properti affected by the project below elevation 424.0 NGVD.

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT. CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

AUG 11 1992

REPLY TO
ATTENTION OF:
Project Management Branch
Programs and Project Management Division

Mr. David R. Boyce
Floodplain Management Section
Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive
P.O. Box 19484
Springfield, Illinois 62794-9484

Dear Mr. Boyce:

Enclosed is a signed acceptance receipt for permit No. 21087 regarding the Swan Lake Habitat Rehabilitation and Enhancement Project in Calhoun County, Illinois.

Per your request you will be notified when the project has been completed.

Sincerely,

Richard Bartel, maj, act cdr
for James D. Craig
Colonel, U.S. Army
District Engineer

Enclosure

ORGANIZATION REVIEW COMMENTS

ON DRAFT DPR/EA

DUCKS UNLIMITED INC.

DUCKS UNLIMITED, INC.
LOWER MISSISSIPPI/GULF COAST REGIONAL OFFICE
Suite D
101 Business Park Drive
Jackson, Mississippi 39213
(601) 956-1936

March 20, 1991

District Engineer
U.S. Army Engineer Dist., St. Louis
Attn: Mr. Owen Dutt,
Planning Div., PD-F
1222 Spruce Street
St. Louis, Mo. 63103-2833

Dear Mr. Dutt:

Thank you for the invitation to attend a public meeting on the Swan Lake Habitat Rehabilitation and Enhancement Project. The undertaking certainly appears to be an impressive one and potentially beneficial to wetland wildlife.

This area of Illinois is outside The DU Southern Regional Office management purview. For this reason, I have taken the liberty of forwarding your correspondence to Dr. Roger Pederson, North Mississippi Flyway MARSH Coordinator, for his review and action. Dr. Pederson's address is: 3720 Stonewood Ct. Eagon, Mn. 55123, Phone: (612) 683-0441.

Many thanks for considering DU's participation and comments regarding this important project.

Sincerely,

Donald W. Thompson
Habitat Dev. Supv.
Southern Reg. Office

cc: Bob Hoffman, David Wesley,
Roger Pederson

DUCKS UNLIMITED INC.

ROGER L. PEDERSON, PH.D.
MARSH COORDINATOR
NORTH MISSISSIPPI FLYWAY

3720 Stonewood Court
Eagan, Minnesota 55123
(612) 683-0441

24 June 1991

Mr. Clarence Puel
Planning Division
C.O.E. - St. Louis Division
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Clarence:

Please find enclosed information relative to Ducks Unlimited's M.A.R.S.H. program. As we discussed over the phone, I would be interested in receiving a MARSH proposal for the Swan Lake project (see enclosed example). Extending COE's influence to address sedimentation problems that originate from off-river landuse is an extremely worthwhile aspect of the Swan Lake project. I look forward to reviewing the MARSH proposal and if you have any additional questions, please feel free to contact me.

Sincerely,

Roger L. Pederson

Roger L. Pederson
MARSH Coordinator

cc: T. Miller, Illinois Department of Conservation
J. Shank, Illinois Ducks Unlimited

Enclosure

April 15, 1991

District Engineer
St.Louis District, Corps of Engineers
Attn: Plan Formulation Branch (CELMS-PD-F)
1222 Spruce Street
St.Louis, Missouri 63103-2833

Dear Colonel Corbin;

In reviewing the Draft Definite Project Report, (D.P.R.) regarding the Swan Lake Habitat Rehabilitation and Enhancement Project, (H.R.E.P.), Migratory Waterfowl Hunters Inc. has listed as attachments to this correspondence our specific comments and concerns.

In addition our review noted key components of the (H.R.E.P.) falling short of what M.W.H.I. sees as important project objectives from the standpoint of waterfowl resource management. It appears to M.W.H.I. that cost cutting measures and lack of agreement between the Corps of Engineers and the Soil Conservation Service on transfer of E.M.P. funding to complete upland silt reduction could seriously reduce the effectiveness of the Swan Lake Project. Without adequate silt reduction measures this (H.R.E.P.) could result in having no positive impact on Swan Lake as an enhanced resource for fish and wildlife, or for extending the life of the lake. M.W.H.I. would rather see the C.O.E. spend the total monies allocated for E.M.P. on one or two (H.R.E.P.) initiatives that address high quality commitment toward management of the waterfowl resource, with emphasis on project life. Our concept of the Swan Lake (H.R.E.P.) according to the Draft (D.P.R.) is something less than a top notch,-do it right the first time-, project.

On behalf of Migratory Waterfowl Hunters Inc. we thank the C.O.E. for this chance to air our comments and concerns on the Draft (D.P.R.) for the Swan Lake (H.R.E.P.). The rehabilitation of Swan Lake has long been top priority for M.W.H.I.. Our club looks forward to seeing a quality product.

Sincerely,

Greg Franke

Greg Franke
Director M.W.H.I.

cc. Senator Dixon
Congressman Durbin
Congressman Costello

SWAN LAKE EMP - HREP DRAFT PLAN

PUBLIC COMMENT SHEET

NAME: M.W.H.I.

ADDRESS: P.O. Box 8009
Alton, Il 62002

COMMENTS ON THE SWAN LAKE PLAN:

Borrow to build the exterior closing levee on the north end of Fuller Lake should come from areas within the upper Swan/Fuller Lake impoundment to create lower grades to enhance moist soil plant production.

SWAN LAKE EMP-HREP DRAFT PLAN

PUBLIC COMMENT SHEET

NAME: M.W.H.I.

ADDRESS: P.O.Box 8009
Alton, IL 62002

COMMENTS ON SWAN LAKE PLAN:

According to the Draft (D.P.R.) the interior levee of Swan Lake is not designed for motor vehicle use. Considering that water control is the main objective of waterfowl management, and incorporated within the interior levee is a water control structure crucial to both the North and South Swan Lake impoundments, M.W.H.I. strongly advises this levee be designed for maintenance vehicle use.

SWAN LAKE EMP - HREP DRAFT PLAN

PUBLIC COMMENT SHEET

NAME: M.W.H.I.

ADDRESS: P.O.Box 8009
Alton, IL 62002

COMMENTS ON THE SWAN LAKE PLAN:

The North and South impoundments of Swan Lake have dedicated water control structures, consisting of couch pumps, 87 H.P.power units, and 1000 gal portable fuel tanks. Given I.D.O.C.'s lack of proper pumping equipment, and keeping with the intentions of (H.R.E.P.), the upper Swan/Fuller Lake complex likewise requires this water manipulating equipment. M.W.H.I. requests that this equipment be dedicated and added as part of the final (D.P.R.)

SWAN LAKE EMP - HREP DRAFT PLAN

PUBLIC COMMENT SHEET

NAME: M.W.H.I.

ADDRESS: P.O.Box 8009
Alton, IL 62002

COMMENTS ON SWAN LAKE PLAN :

The upland silt reduction work slated to be accomplished by S.C.S but not as yet approved by C.O.E. is the most life sustaining part of the Swan Lake project. No other single portion of the entire (H.R.E.P.) is as important to the project. This upland silt reduction must take place or this project will certainly be rendered a bust. M.W.H.I. urges C.O.E. to take the necessary steps required to transfer funds to S.C.S. for the upland silt reduction phase of the Swan Lake (H.R.E.P.)

SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
MIGRATORY WATERFOWL HUNTERS, INC.--GREG FRANKE
APRIL 15, 1991

ST. LOUIS DISTRICT RESPONSES

RESPONSES TO SPECIFIC COMMENTS:

Borrow Pit Configuration. The District concurs with MWHI; the borrow pits will be placed and otherwise configured so as to optimize their utility in moist soil plant production.

Levee Maintenance Vehicle Use. ED-DG

Pumping Requirements. The District concurs with MWHI, and a dedicated pump will be provided at upper Swan/Fuller Lake as part of the overall water regulation mechanism for this site.

Hillside Sediment Control Program. The Final DPR includes the subject program. Contrary to what was indicated in the Draft DPR, the program must be cost-shared as 75 percent Federal and 25 percent non-Federal. The Calhoun County Soil and Water Conservation District (CCSWCD) has indicated its intent to serve as the non-Federal project sponsor.

RESPONSES TO ADDITIONAL LETTER COMMENTS:

Project Effectiveness. The goal of the HREP is not to arbitrarily cut costs, although costs are a key project consideration. Our objective is to define the environmental objectives for the project, and then determine the most cost-effective means of achieving those objectives. For example, if a 36" gated culvert pipe will achieve a desired management objective, then why incorporate a more costly 48" pipe to achieve the same output. On the HREP we are looking for "the biggest bang for the buck." The District believes that the Swan Lake HREP objectives have not been compromised and that they have been achieved at the lowest possible dollar cost (something that all of us as taxpayers should appreciate).

Once again, the hillside program has been included as an integral part of the project.

MISSOURI CHAPTER
of
The Wildlife Society

P. O. BOX 372
COLUMBIA, MISSOURI 65205

April 18, 1991

District Engineer
U.S. Army Engineer District, St. Louis
Attn: Planning Division, PD-F
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Sir:

This is in response to your public meeting announcement for the Swan Lake, Calhoun County, Illinois Habitat Rehabilitation and Enhancement Project.

We support your efforts to restore and protect the wetland habitats of Pool 26, Illinois River. With more than half of the North American historical wetland habitat base gone and losses continuing at a rate of nearly 1/2 million acres per year, it is encouraging to see major projects directed at wetland restoration and protection. Man's alteration of the landscape has been so dramatic that the only hope of reversing soil and habitat losses is through dramatic steps. In the short-term, disturbance to the riparian corridor will occur due to removal of vegetation and excavation of soil, but the future protection of wetland basins involved and improvement of water quality will benefit a wide range of fish and wildlife species.

There is much that isn't known about the complex workings of wetland systems, but in recent years much has been learned about managing water levels to promote natural vegetation and making wetland areas attractive to a broad base of wetland wildlife. The ability to manage water levels will allow managers to promote a diversity of wetland habitat in a consistent manner. With so little wetland habitat remaining in rivers with drastically altered hydrologies, each project that results in wetland habitat restoration and enhancement becomes of paramount importance. In our view, the Swan Lake Rehabilitation and Enhancement Project is such a project.

Sincerely,

John W. Smith

John W. Smith, President
Missouri Chapter - TWS

JWS:rms
cc: Executive Board
Larry Mechlin
Norm Stucky

SIU

Southern Illinois University at Carbondale
Carbondale, Illinois 62901-6511

Cooperative Fisheries Research Laboratory
618-536-7761

27 April 1991

Dave Gates
Plan Formation Branch, CELMS-PD-F
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Dave;

I am writing in regard to some concerns and suggestions I have concerning the Swan Lake Rehabilitation and Enhancement Main Report. I have also enclosed lists of fish species we collected from Swan Lake and Batchtown Slough during our fall, winter, and spring samples for your information and use. Swan Lake was sampled during the 1987-1988 and the 1988-1989 field season; Batchtown was sampled only during 1988-1989.

I have two substantive problems with the report. The first is that it is not clear that the primary management goal for the lower compartment will be to provide overwintering and reproductive habitat for fish. The second matter is that we do not yet know when fish must have access to backwaters; I thought that it was agreed that the lower compartment would remain open to the River at all times, until such information becomes available.

The report in numerous places does not reflect the agreement reached on this matter by all interested parties, including Refuge personnel (an agreement made at two separate meetings if I remember correctly). I know this is National Wildlife Refuge Land, but I do not believe that the use of HREP funds would be approved unless the needs of fish are recognized and considered, both in terms of physical habitat enhancement and project management. The whole idea of the MREMP is to improve the Mississippi River ecosystem, not further subdivide into smaller independent units. If slackwater river fishes are not provided access to and from backwaters as necessary for overwintering and reproduction, then, functionally, Swan Lake would be acting like an independent ecosystem as far as fish are concerned. Benefits, no matter how great, to resident fish would not compensate for impacts on Mississippi River fish populations; the very organisms HREPs are supposed to enhance.

In regard to this matter, statements ambiguous and/or contrary to this agreement appear on pages 22 (Table 6), 24 (Table 7), 33 (paragraph 5), 39 (Table 13), 64 (paragraph 3), 68 (paragraphs 1 & 2), and Appendix P. The last paragraph on page 67 (continued on 68) is a fairly accurate assessment of this agreement, but I don't believe that Refuge personnel agreed to manage the middle compartment in this manner.

As we discussed, a lot more could be done with the islands (described on pages 31 and 47). I applaud the idea of making the islands different heights to give them a more natural look, but planting only grass will give them a golf course appearance. They could be seeded with vegetation that would be more natural as well as more functional. Diversity in the animal community can be expected to follow diversity in the plant community. Since we expect changes in water levels, semi-aquatic plants would seem to be a better choice for the base of the islands, whereas upland flora would probably be more appropriate for the higher elevations. Let's not restrict our thinking to grasses either; why not rushes, shrubs, trees, etc.? The leading experts on lowland and upland Mississippi River flora can be found in the Botany Department at SIU, and I'm sure they would be happy to provide some advice.

The islands are to be situated on either side of the channel excavations serving the two boat ramps (Plates 2 & 3). We can anticipate that boat traffic will be heaviest in the excavated channels, and this will make the sides of the islands adjacent to these channels susceptible to erosion. The other sides of the islands will be subject to wind-induced wave action and erosion because of the extensive fetch. The islands should be stabilized to ensure their longevity and to ensure that they do not slump into the deep areas that are excavated for fish. I suggest a mixture of rock and woody-debris bank-stabilizing structures on the long sides of the islands to overcome this problem. Again, both rocks and woody debris provide unique habital characteristics, promoting diversity in the animal community.

I note that the biological response scope of work prepared by Bob Gates, Chuck Suprenaut, and myself did not make it into the Report. This is something we can discuss at our meeting on May 1.

Sincerely,

Robert J Sheehan

Robert J. Sheehan
Assistant Professor of Zoology and
Assistant Director, CFRL

:enclosures

SLD RESPONSE TO DRAFT DPR
COMMENTS FROM
SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE--ROBERT SHEEHAN
APRIL 27, 1991

ST. LOUIS DISTRICT RESPONSES

Fisheries Data. We thank you for the update information on Swan Lake and Batchtown area fisheries sampling. The biological data appendix to the DPR has been revised to include the new information for Swan.

Statement of Management Goal. This project poses semantics difficulties. On the one hand, everyone acknowledges the importance of Swan Lake, particularly lower Swan Lake, as overwintering and reproductive habitat for fish, while on the other hand, the refuge has a mandate to operate the refuge with waterfowl as the primary focus. From a practical sense, based on our interagency meetings, we know it will be possible to accomplish both objectives. The difficulty is putting this understanding into words mutually satisfactory to all parties. The wording of Draft DPR page 68 has been modified in an attempt to more clearly reflect our understanding. It now reads "...The Swan Lake refuge compartments (2,563 acres) would be managed for fish to the maximum extent possible within the guidelines under which the refuge was established. However, the Service has voiced considerable flexibility in this regard. It has been agreed between the agencies that while waterfowl management remains the primary focus of this EMP project, major emphasis will also be given to the fisheries resource, particularly in the lower lake compartment. The precise manner in which the lake compartments will be managed will evolve during the initial years of the project. This fine turning of the management plan will take into account the results of biological response studies to access alternative water control regimes."

Backwater Access. It is the District's understanding from past meetings that initially the lower lake will be left open year-round, except during significant sediment carrying flood events. This would be the mode of operation until the biological response monitoring studies have been completed, at which time the overall management strategy for this and other lake compartments will be reassessed.

Agreements Recognition. The Final DPR makes a number of references to prior meeting understandings. The needs of fish have been given considerable consideration throughout the planning of this HREP project, as evidenced by the project's inclusion of fish passage structures in both the lower and middle lake compartments, fish screens, deepwater channels, modified water regulation, and biological response studies. This emphasis has been included in recognition of the regional importance of this lake to the riverine fisheries.

Ambiguous/Contrary Statements.

Page 22 (TABLE 6). This table represents the design criteria for the different project features. The project design is intended to provide the physical conditions necessary for creating a wide spectrum of strategies for waterfowl and fisheries management. Accordingly, both lower and middle Swan Lake must meet the full range of potential operational requirements encompassed by both fish and waterfowl management needs. We see no contradiction in the design criteria as described.

Page 24 (TABLE 7). It is not clear what in this table could be interpreted as an ambiguous or contrary statement.

Page 33. It is unclear what problem exists with the wording of this paragraph. One change that has been made is the insertion of the word "dependably" before the words "connected to the river".

Page 39. A revision included in this table is a change in the "S" in the column titled "Allow Free Movement for Fish" to a "Y".

Page 64 (Paragraph 3). The second sentence now reads "...Except during very high water and periods during critical fish movement, Swan Lake would be closed off from the Illinois River by the riverside levee and lower lake closure."

Page 68 (Paragraphs 1 & 2). The wording of the first paragraph now includes "...during critical times of the year (to be more clearly delineated by ongoing and future research) and the utility of the lake as fish habitat will be greatly increased." The wording of the second paragraph now includes "...The Swan Lake refuge compartments (2,563 acres) would be managed for fish to the maximum extent possible within the guidelines under which the refuge was established. However, the Service has voiced considerable flexibility in this regard. It has been agreed between the agencies that while waterfowl management remains the primary focus of this EMP project, that major emphasis will also be given to the fisheries resource, particularly in the lower lake compartment. The precise manner in which the lake compartments will be managed, will evolve during the initial years of the project. This fine tuning of the management plan will take into account the results of biological response studies to access alternative water control regimes..."

APPENDIX P. This section now includes some minor wording revisions.

Page 64. The paragraph has been adjusted to indicate the greater emphasis on fish movement in the lower compartment as opposed to the middle compartment.

Island Plantings. With the project's bottom consolidation and stabilized water levels, aquatic and emergent wetland plants should flourish near the islands shore areas without any additional intervention. The use of grasses on higher elevations to vegetate the islands was proposed for two reasons. First, the newly created islands would require immediate substrate stabilization, and grasses are often used for this purpose. Second, the U.S. Fish and Wildlife Service wants to create island nesting habitat for mallards, and grasses are often used to create suitable habitat. The Service plans to maintain grassy vegetation on only some of the islands, whereas the remainder will be allowed to undergo natural vegetational succession. Structural and species diversity will increase on the unmanaged islands as woody and other herbaceous species invade and become established.

Islands Shoreline Erosion Protection. The District concurs that consideration should be given to islands shoreline erosion protection. To what extent shoreline damages would be a problem is difficult to predict. We recommend an experimental strategy be applied. Due to the high cost of stone revetment, we have opted for vegetation plantings as a means of shore protection. The islands would be placed in three categories. One-third of the islands would be left untreated as experimental controls, one-third would be treated with willow wattling bundles at the water/land interface, and one-third would be treated with wattling at the toe with scattered willow cuttings distributed to an elevation 123 feet up the slope of the island. The willows would be obtained locally along the lake shore. Depending on the availability of willow material, more than one growing season might be required to fully implement this feature. The cost of the feature (about $50,000) would primarily be a labor, not a material, or equipment cost. It's possible that with volunteer labor, the cost of this feature could be further reduced. The use of rock was not considered for the shore protection, due to the considerable added costs of material and equipment.

Biological Response Monitoring Scope of Work. The Final DPR report provides an update on the progress being made on the biological response monitoring scope of work.

April 15, 1991

* Please notify me as to who received the draft report that was to have been mailed. I would think that an adjoining landowner should be notified. I never received anything.

SWAN LAKE EMP-HREP DRAFT PLAN

PUBLIC COMMENT SHEET

NAME: Frank W. Logeman, Estate - Lila Mae Logeman, ADM.

ADDRESS: Box 1F

Brussels, Il 62013

COMMENTS ON SWAN LAKE PLAN: I feel like this project was handled very poorly. There are not too many landowners that are affected, and I feel they should have been notified by letter about the project, and especially about the meeting. I would have never known about the meeting if my renter had not notified me. At that time I contacted a friend to get some ideas, and he told me there was a notice posted in the tavern. When I called the tavern on Thursday before the meeting, the owner told me he was ready to throw it away. I picked it up at that time, therefore, it was no longer posted there.

I feel this may be more harmful to my property. In order for this to work, it will depend on how much cooperation that you get from the farmers in the hilly areas of the area. No one seemed to know whether or not they would cooperate.

(If additional space is needed, continue your comments on the reverse side)

If a large rainfall occurred on a week-end, and the lake stage was high, there would be no one there to pump this water shed for a couple days. Therefore, there would be more crop damage than there is now before this project.

At the meeting they wanted me to make a decision as to whether I wanted to sell the property or grant the Government an easement. I could never get the amount of acreage that would be effected. All anyone would say was a "litty bitty piece." I met with Patti Myers afterwards, and it is my understanding it should be approximately 1.7 acres. She also told me it may be 2-3 years before there would be anything decided on this.

I am still undecided whether I would sell or grant an easement. At this time I am leaning more towards the easement, but I need to know how much the Government would need to use this area, and if I could still use the acreage as I decided, or if the Government would make the decision.

I feel like the landowners should be given more specific information before they are expected to make a decision. For example, some policy question

I am warning you at this time that you

DATA REQUIRED BY PRIVACY ACT OF 1974

Authority: Paragraph 11, ER 1105-2-502.

Principal Purpose: To obtain information for use in distributing announcements of public meetings so as to create an atmosphere of public understanding, trust, and mutual cooperation among interested parties.

Routine Use: Information collected is used to compile official mailing lists and to record public participation.

Mandatory or Voluntary Disclosure and Effect on Individual Not Providing Information: Disclosure is voluntary. No effect on individual not providing information; however, individual may not receive future public meeting notices, fact sheets, or pertinent information.

had better not make any decision about my property without notifying me in advance.

AGENCY REVIEW COMMENTS
ON FINAL DPR/EA AND
SECTION 404/SECTION 10
PUBLIC NOTICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE

MARION FIELD OFFICE (ES)
RURAL ROUTE 3, BOX 328
MARION, ILLINOIS 62959

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

'92 AUG 14 AM 9:02

August 12, 1992

Colonel James D. Craig
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

ATTN: CLEMS-RD (P-1852)

Dear Colonel Craig:

This is in response to Public Notice P-1852, dated July 15, 1992. The U.S. Army Corps of Engineers has applied for a Section 10/404 permit for construction activities associated with the Swan Lake Habitat Rehabilitation and Enhancement Project (HREP). The Swan Lake HREP is located adjacent to the west bank of the Illinois River between river miles 5 and 13 in Calhoun County, Illinois.

These comments are provided under the authority of and in accordance with the Fish and Wildlife Coordination Act, as amended; the Endangered Species Act of 1973, as amended; and the U.S. Fish and Wildlife Service (Service) Mitigation Policy.

Project features include about 8.8 miles of levee which will be constructed along the river to reduce siltation and provide water control independent of the river. Other construction activities include an interior dike, two island groups, dredging, hillside sediment control, and water control structures with pumping units.

The Service concurs with the Corps of Engineers determination that this project is not likely to adversely affect any federally threatened or endangered species. There is no designated critical habitat in the project area at this time. This precludes the need for further comment on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should the project be modified or new information indicate endangered or threatened species may be affected, consultation should be initiated.

Approximately 11 acres of non-forested wetland will be destroyed by the project. This will be mitigated in kind by the creation of about 20 acres of wetland habitat in borrow sites.

About 95 acres of forested wetland will be lost due to construction of the levee along the river. Use of the Habitat Evaluation System (HES) has determined that this will result in a loss of 77 Average Annual Habitat Units (AAHU's) as mentioned in Appendix DPR-J of the Definite Project Report with Environmental Assessment (DPR-EA). The DPR-EA states that with the project, existing interior bottomland hardwoods are expected to increase in habitat quality due to protection from frequent flooding. According to the HES analysis, a total of 71 AAHU's will be derived from implementation of the project. This is due in part to the expected regeneration of mast tree species. It is also based on the assumption that mature mast producers are present over the entire project life. A plan needs to be developed to describe exactly how this will be realized since the interior sample sites for the HES analysis scored zero for the number of mast trees present.

To mitigate for the remaining 6 AAHU's, the Service and Illinois Department of Conservation have agreed to initiate habitat quality improvements on the west side of Swan Lake. The improvements by the Service will include planting of mast species in 15 acres of forested areas where there are currently no mast species and increasing coverage of understory and groundcover components in 15 acres of forested areas where current coverage is low. Likewise, 7 acres of mast tree plantings and 7 acres of increased groundcover coverage will be required on IDOC land.

The Service concurs with to the issuance of this permit. Thank you for the opportunity to comment on Public Notice P-1852.

Sincerely,

Thomas M. Groutage

Thomas M. Groutage
Assistant Field Supervisor

cc: IDOC (Schanzle, Glosser)
IESPB (Lauzon)
IEPA (Yurdin)
USEPA (Steurer)
USFWS (Bornstein, Drews, Nelson)

SLD RESPONSE TO FINAL DPR
COMMENTS FROM
U.S. DEPARTMENT OF THE INTERIOR--TOM GROUTAGE
AUGUST 12, 1992

ST. LOUIS DISTRICT RESPONSES:

Endangered Species Act. If the project is to be modified or new information indicates endangered or threatened species may be affected, consultation will be initiated.

Mitigation for Non-forested Wetlands. The USEPA has suggested a mitigation ratio of 1:1.5 for non-forested wetland acres lost to wetland acres created. About 8 acres of non-forested wetland will be permanently lost due to construction of the closure structures. On the other hand, about 20 acres of new non-forested wetland habitat will be created from shallow borrow areas needed for project construction (giving a ratio of 1:2.5).

Mitigation for Forested Wetland. The information the District previously provided regarding mature mast producing trees being present over the entire project life was in error. The habitat evaluation performed using the HES method did not include the assumption that mature mast producers are present over the entire project life. The habitat quality indices (HQI) used in the habitat quantification analysis are presented in APPENDIX J of the DPR. Note that under the future with project condition, the HQI for target year 2 (one year after construction) is 0.51, or only 0.01 greater than the HQI for existing conditions. For target year 50, the HQI is 0.76. The analysis assumes that the change in HQI from year 2 to year 50 is linear, or gradual. This is consistent with the gradual growth of trees from seedlings to mature individuals. The HQIs used in the analysis do not reflect the presence of mature individuals over the period from year 2 to 50.

The acreages figures for the forestry management program have been adjusted upward, from 15 to 23 acres for the USFWS portion of the program, and from 7 to 10 acres for the IDOC portion of the program. This has the effect of offsetting the 6 AAHUs deficit at a 1:1.5 ratio rather than at a 1:1 ratio of replacement.

Permit Issuance. The District acknowledges the Service's concurrence in the issuance of a Section 10/404 permit for the project.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

August 19, 1992

Mr. Owen D. Dutt
Chief, Planning Division
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Mr. Dutt:

RE: Comments on the Swan Lake Habitat Rehabilitation and Enhancement Project Final Definite Project Report with Integrated Environmental Assessment

This letter is in response to your request for comments on the above subject document. The responsible program offices have reviewed the material and we provide the following comments for your consideration and action.

The public notice states that 95 acres of forested woodlands would be lost due to the construction of the levee along the river, and an additional 11 acres that would be displaced due to the construction of the interior dike. The acreage would vary dependent upon the levee height and the percent of hillside sediment control. The levee height should be constructed to maximize the amount of forested wetland created.

No net loss of forested woodlands should occur provided the natural succession of bottomland forest is not further affected by future projects. While mitigation is not required for the forested wetland, the opportunity for mitigation on areas of the refuge that have been farmed or otherwise degraded should be considered.

We request that a formalized mitigation plan be prepared outlining the mitigation of nonforested wetlands lost due to project implementation. The ratio of mitigation should be 1:1.5 of wetlands lost to wetlands created. The mitigation plan should also include discussion of the possible impacts of altered hydrology as a result of project construction and adverse impacts that may be caused by the placement of sediment and water control structures.

We are concerned with the hillside erosion and the continued sedimentation of Swan Lake. The suggested sediment traps appear to be a temporary fix rather than a solution. You may wish to consider the use of vegetation strips along agriculture fields to reduce sediment runoff, and diverting the runoff away from the erosion sensitive areas. Also, the discontinuation of agriculture practices near the hillsides and the encouragement of vegetative growth on the hillsides would help alleviate sediment transport.

Upon completion, this project should provide benefits to the waterfowl, woodlands, and fishery of the Swan Lake complex. We are encouraged by your continued support of programs such as this one to enhance existing aquatic habitats along the Mississippi River corridor.

If you have any questions, please write to me or call Mr. Dewayne Knott at (913) 551-7299. We look forward to working with you on future Upper Mississippi River projects, and thank you for the opportunity to comment.

Sincerely,

Dewayne L. Knott for

Lynn Kring, Acting Chief
Environmental Review
and Coordination Section

SLD RESPONSE TO FINAL DPR
COMMENTS FROM
U.S. ENVIRONMENTAL PROTECTION AGENCY--LYNN KRING
AUGUST 19, 1992

ST. LOUIS DISTRICT RESPONSES

Levee Hieght Versus Forested Wetland Created. The height of the levee was determined primarily by how well a given height would keep out sediment, the cost of that structure, and the habitat benefit (in HUs) provided by that height. The footprint of the levee (or acres of wetland lost) was not a primary consideration in determining height.

Forested Wetlands Mitigation. It should be noted that the St. Louis District has received differing opinions on the need for mitigation from the Region 5 (Chicago) and Region 7 (Kansas City) offices of the USEPA. Your office has indicated no mitigation required, while the Chicago office has recommended replacement at a ratio of 1:1.5. Accommodating the broader request, measures have been developed with IDOC and USFWS to offset the net loss in habitat value of forested wetlands affected by the project. Final DPR Appendix J describes a forest management program proposed by the two project sponsors to improve habitat quality of existing forest. The program described in the appendix does not include the creation of forested wetlands from areas that are now cropland. The sponsors may have opportunities to include such a measure in the new forestry management program.

Nonforested Wetlands Mitigation. SECTION III of APPENDIX DPR-J addresses the loss of 8 acres of nonforested wetlands. The section also concludes that because of the creation of nonforested wetland habitat from 20 acres of shallow borrow areas, no mitigation will be required for this wetland type. Probable impacts of altered hydrology are discussed on pages 72 and 74-76 of the Main Report. Probable impacts associated with the construction of water control structures are not all known, especially with respect to riverine fishes. The biological response analysis will include efforts to determine the effect of specific types of water control structures on lake-river fish movement (see page Q-10 of APPENDIX DPR-Q). Probable effects of the upland sediment control program are described on pages 74 and 76 of the Main Report.

Hillside Sediment Control Program. The District strongly believes that a two pronged approach to hillside sediment control is needed. Sediment basins, terraces, and ponds provide the backbone to the program, and provide a degree of reliability for sediment control not achievable through non-structural land treatment measures alone. However, we recognize that the efficiency and longevity of these structures would be enhanced by the implementation of non-structural land treatment efforts. Accordingly, project initiated farm planning (accounting for an estimated 11 percent reduction in sediment release) is an integral part of the program and will include the application of best management practices. Measures similar to those that you have described would fall into this category.

nt Manning
Director

John W. Comerio
Deputy Director

Bruce F. Clay
Assistant Director

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
[redacted]

August 27, 1992

RECEIVED
REGULATORY OFFICE
ST. LOUIS DISTRICT
1992 AUG 31 PM 1:31

Colonel James D. Craig
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833
Attn: CLEMS-RD (P-1852)

Dear Colonel Craig:

This is in response to Public Notice P-1852, dated July 15, 1992, concerning the Environmental Management Program's Swan Lake Habitat Rehabilitation and Enhancement Project along the Illinois River in Calhoun County.

The Department concurs with the Corps of Engineers' determination that this project is not likely to adversely affect any federal or state threatened or endangered species; however, we have a concern that the construction season for the river levee be limited to the time when bald eagles are not present (approximately between March 1 and November 15). The exact dates for the construction season could be determined by observing the time of fall arrival and spring departure of eagles in a given year.

Also, every effort should be made in locating the river levee to limit removals of potential perch and nest trees during levee construction. If the habitat now available to bald eagles at Swan Lake can be maintained as the project moves forward, the Department concurs with the issuance of the permit.

Thank you for the opportunity to comment.

Sincerely,

Brent Manning

Brent Manning
Director

BM:BD:mk

SLD RESPONSE TO FINAL DPR
COMMENTS FROM
ILLINOIS DEPARTMENT OF CONSERVATION--BRENT MANNING
AUGUST 27, 1992

ST. LOUIS DISTRICT RESPONSES

Timing of Construction Versus Bald Eagle Impacts. The U.S. Fish and Wildlife Service (letter dated August 12, 1992) has concured with the District's approach to eliminate adverse impacts to the bald eagle as presented in the District's Biological Assessment (see Final DPR Appendix J). That approach notes that the project's construction activities would likely take place outside of the winter months (or as you have indicated the period between November 15 and March 1), thus avoiding potential conflicts with wintering bald eagles. It further notes, that consideration will be given during the preparation of Plans and Specifications to sequencing construction activities (and this includes the river levee) in a way that eliminates the potential for impact to bald eagles. It was recognized that construction taking place during the winter months could decrease eagle use at Swan Lake; however, it was judged that such impacts would be short-term and not considered consequential.

Removal of Trees Versus Bald Eagle Impacts. As indicated in the District's Biological Assessment, large trees, especially eastern cottonwoods close to water, are the preferred perches used by eagles. Most tree clearing will be along the edge of the east shore of the lake. Vegetation in this zone consists primarily of willows and younger aged silver maples. As such, important eagle perching habitat will not be impacted. We are unaware of the presence of nest trees at the project area. If in the future, new information of this type becomes known, cosultation with the U.S. Fish and Wildlife Service would be initiated.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Copy

'92 SEP 24 AM 10:46

REPLY TO THE ATTENTION OF:
WQW-16J

SEP 22 1992

Colonel James D. Craig
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attn: Gary Lee (CELMS-RD)
Public Notice No. P-1852

Dear Colonel Craig:

This letter is in response to Public Notice No. P-1852, issued on July 15, 1992, for the U.S. Army Corps of Engineers (Corps). First of all, we appreciate the extension of the comment period in order for us to provide a more thorough review of the Environmental Assessment. The Corps has applied for a Section 10/404 permit for construction activities associated with the Swan Lake rehabilitation and enhancement project along the west bank of the Illinois River in Calhoun County, Illinois. This project is part of the Environmental Management Program for the Upper Mississippi River. The purpose of the project is to remove sediment and silt that has deposited along the river and to construct water control structures that will reduce flooding and allow for control of water levels in the Swan Lake area. In turn, this is expected to provide enhanced habitat for migratory waterfowl and fish. The Swan Lake area is managed by the U.S. Fish and Wildlife Service (U.S. FWS) and the Illinois Department of Conservation (IDOC).

Approximately 95 acres of forested wetland will be impacted by the construction of the levee along the river and 11 acres of non-forested wetland will be lost in order to build the interior dike and other related structures. The 11 acres of non-forested wetland will be mitigated with 20 acres of in-kind wetland habitat created in borrow sites. The mitigation for the forested wetland will be compensated for by the benefits derived from the habitat improvement and enhancement. In addition, a forestry management program, while separate from the Swan Lake project, will provide some additional compensation for the lost forested wetland. In reviewing this project in accordance with the Section 404(b)(1) Guidelines, we question the adequacy of the compensatory mitigation for the 95 acres of forested wetland.

The Corps' Habitat Evaluation System (HES) was used to determine and evaluate the impact to forested wetlands from the project. According to the HES methodology, it was determined that the proposed project will result in the loss of 77 average annual habitat units (AAHUs). The expected benefit from the project due to reduced flooding and subsequent growth of forested wetland was determined to be 71 AAHUs. In order to provide for the additional 6 AAHUs, a forestry management program is proposed that includes habitat improvements on 15 acres of U.S. FWS land and 7 acres of IDOC land.

We have several concerns regarding the HES evaluation and proposed mitigation. First of all, it is stated in the mitigation MOA between the Corps and U.S. EPA that acreage replacement may be used as a reasonable surrogate for no net loss of wetland functions and values. According to Region 5's mitigation guidance, we recommend a minimum of 1.5 acres of wetland replacement for each acre of wetland lost. Compensatory mitigation is typically determined on an acreage replacement basis. One of the major concerns we have is how the loss and replacement of 77 AAHUs relates to acreage replacement of the lost wetland functions and values of 95 acres of forested wetlands. If there is some relationship, it appears that the HES evaluation may only provide a 1:1 replacement of forested wetland functions and values. For forested wetlands, we require higher than a 1.5:1 replacement ratio because so few forested wetland areas remain in Illinois and forested wetland replacement has not yet been demonstrated.

Another concern is that the mitigation for the 95 acres of impacted forested wetland will include enhancement of existing forested wetland. The 71 AAHUs that have been determined as the project benefit are due to the reduced flooding of the wetter forested wetlands and subsequent growth of the drier oak-hickory forested wetlands. This is basically an enhancement of the wetter forested wetlands to drier climax forested wetlands. We do not typically accept enhancement of existing wetlands as adequate compensatory mitigation for wetlands lost.

A forestry management program is proposed in order to provide for the 6 AAHUs that the project will not provide. This program includes habitat improvements on 15 acres of U.S. FWS land and 7 acres of IDOC land. The improvements will include planting of mast producing trees and increasing coverage of understory and groundcover plant species. This also appears to be enhancement of existing forested wetlands which we do not accept as adequate compensatory mitigation..

In addition, the HES methodology, which is a community-based evaluation, assumes that the mast producing trees of the forested wetland are present during the lifetime of the project. This assumption does not account for the fact that the mast producing trees will be maturing during the project's duration, and beyond, provided that the habitat is well managed. The HES evaluation ould account for the time required for the maturation of oak-hickory forested wetlands.

Therefore, the proposed mitigation using the HES methodology appears to be less than what we would recommend as adequate compensatory mitigation for forested wetlands. Since we recognize the benefits of enhanced migratory waterfowl and fishery habitat that will result from the proposed Swan Lake project, we will not object to the Section 404 permit issuance for this project. We recommend, however, that opportunities for additional mitigation be explored that largely include restoration of forested wetlands. We will accept some of the compensatory mitigation as wetland enhancement since we recognize the value of the oak-hickory forested wetlands that are expected to result from the project.

If there are any questions or wish to discuss this further, please contact Denise Steurer of my staff at (312) 886-2783.

Sincerely yours,

Charles Orzehoskie

Charles Orzehoskie, P.E.
Chief, Wetlands Regulatory Unit

cc: Groutage, U.S. FWS
Schanzle, IDOC
Yurdin, IEPA
Anderson, Fenedick, U.S. EPA

**SLD RESPONSE TO FINAL DPR
COMMENTS FROM
U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)--CHARLES ORZEHOSKIE
SEPTEMBER 22, 1992**

ST. LOUIS DISTRICT RESPONSES:

Compensatory Mitigation Procedure. The February 6, 1990 Memorandum of Agreement (MOA) between the Corps and the EPA states that "In the absence of more definitive information of the functions and values of specific wetlands sites, a minimum of 1 to 1 acreage replacement may be used as a reasonable surrogate for no net loss of functions and values."

The District has applied the Habitat Evaluation System (HES) procedure to evaluate the need for forested wetland habitat mitigation. This methodology has been used within the Lower Mississippi Valley Division of the Corps for over 10 years, and represents a far more definitive readout on habitat value than what has typically been applied to standard permit actions. HES is a community-based method that looks not only at the functional value of habitat in terms of acreage, but also equally important its functional value in terms of habitat quality. It is the product of these two factors that is used to determine overall habitat value.

The MOA also states that "Functional values should be assessed by applying aquatic site assessment techniques generally recognized by experts in the field and/or the best professional judgment of federal and state agency representatives, provided such assessments fully consider ecological functions included in the Guidelines."

It is the District's contention that the most significant functional value operative at Swan Lake, as a component of the Mark Twain National Wildlife Refuge, is habitat value.

Team participants in the HES mitigation analysis included representatives of the St. Louis District, the U.S. Fish and Wildlife Service, and the Illinois Department of Conservation. To evaluate impacts on the quality of forested wetlands, the team preferred the community-based approach of HES over a species-based approach. The reason for this preference was two-fold. First, the team assumed that the community-based approach could "paint a more complete picture" concerning the ability of the ecological system to support fish and wildlife; the evaluation species used in a species-based approach would presumably provide a "fragmented" assessment. Second, the use of a community-based approach would avoid the need for species trade-offs when establishing mitigation goals using a species-based approach. Based on the current state-of-the-art, the District believes that the application of the HES method to Swan Lake was appropriate. However, having said that, we recognize that habitat assessment methods for wetlands are still undergoing modifications for improvement. There currently is no "universally" accepted method that adequately addresses all aspects of wetland functions and values. The District is willing to explore alternative methods on future projects.

Level of Mitigation. The MOA states that "...this ratio may be greater where the functional values of the area being impacted are demonstrably high and the replacement wetlands are of lower functional value or the likelihood of success of the mitigation project is low. Conversely, the ratio may be less than 1 to 1 for areas where the functional values associated with the area being impacted are demonstrably low and the liklihood of success associated with the mitigation proposal is high."

Taking into account both the habitat quantity and quality in determining habitat functional value, the HES analysis has determined there is a need to offset a project loss of 6 AAHUs of forested wetlands habitat. Based on a 1:1

replacement ratio habitat improvements to 22 acres would be sufficient to make up for this functional loss of habitat. The U.S. Fish and Wildlife Service and the Illinois Department of Conservation have proposed a forestry management program to improve the habitat to a level atleast equal to this magnitude of loss. However, based on your agencies expressed misgivings with existing evaluation methodologies, the replacement ratio has been modified to 1:1.5. Thus, a total of 33 acres will be actively managed.

It should be noted that the Kansas City office of EPA (see August 19, 1992 letter) expressed the opinion that no mitigation was required for forested wetlands. By moving to the 1:1.5 replacement ratio, the District is accommodating the broader of the requests from your agency.

<u>Location of Managed Acres</u>. The specific acres to be improved by forest management management have not yet been identified. It is possible that some of this mitigation can take place on existing lowland crop sites that are capable of supporting forested wetland vegetation. The District will coordinate further with the Service and state on your recommendation.

<u>Assumption Regarding Mast Trees</u>. The HES method did not include an assumption that mature mast producers are present over the entire project life. The habitat quality indices (HQI) used in the habitat quantification analysis are presented in the Final DPR Appendix-J. Note that under the future with project condition, the HQI for target year 2 (one year after construction) is 0.51, or only 0.01 greater than the HQI for existing conditions. For target year 50, the HQI is 0.76. The analysis does not reflect the presence of mature individuals over the period from year 2 to year 50.

ORGANIZATION REVIEW COMMENTS
ON FINAL DPR/EA

Golden Eagle Wildlife Preserve

August 3,1992

Dear Sir,

We at Golden Eagle Wildlife Preserve heartily approve of and congralulate you on the vision and scope of your proposed project. Conservation of wetlands and improvement of all wildlife habitat is, in our opinion, of paramount importance in maintaining and enriching our planet.

Let me tell you about GEWP. We are a licensed Illinois hunting preserve. Chartered in 1985. We consist of eight members. We manage our croplands, forest and uplands to the best of our ability, to enhance wildlife populations of every kind. Our property is home to very many wildlife species including ducks, geese, pheasant, quail. turkey, deer, rabbits, beaver, muskrat, eagles, herons, and a multitude of song birds and shore birds. We raise and annually release appoximately 250 pheasants and 200 quail. We provide and maintain wood duck nesting boxes at several sites on our property. We anually include in our farming plan appoximately 20 acres of wildlife food plots. Our ultimate goal, so far unattained despite several attempts, is to be included in the 10 year federal set-aside program so that we can establish permanent wetlands and natural prarie uplands on our ± 100 A of farmable land.

As you know, conservation is defined as the wise use of a natural resource, and to this end I will tell you that the primary recreational activity at GEWP is duck hunting. We annually flood ± 12 acres to the east of our creek and ± 20 acres to the west of the creek. At the north end of our property to a depth of about 2 1/2 feet. Here in lies the reason for the following questions.

Our system of dikes, levees, gate valves, and pumps, & wells, in which we have invested a large sum of money, is fragiley engineered at best. In large part we depend on gravity, the present grade of our creek, the slope of our land, and the height of Swan Lake at normal pool to accomplish our flooding and draining objectives.

There fore will you please answer the following questions.

A. How high will lower Swan Lake be maintained and ultimately how low can it be pumped?

A1. How will the proposed lake heights impact our present levees on the north side of sec. 8?

B. Will our levees be part of the new levee systems on the south shore of lower Swan?

C. Will the fields inside our levee be unfarmable due to a higher water table?

D. Will the sediment basins impact water flow in our creek?

E. Will our creek be dredged or changed in any way?

E1. Will the delta accretions from our creek north of sec. 8 be removed?

F. Will the new lake height impact our 2 wells? And our pumping ability?

G. Will any sediment basins be located on our property? If not why not?

H. How will we be compensated for the ‡ 2A. of land needed for the project?

I. Why will lower Swan only be managed for fish? Ducks and geese traditionally have used this area in great numbers in the past.

J. What will happen to the trees and vegetation to the north of and to the east of sec. 8?

K. What kind of road is to be built on our eastern boundry - the acess road to the boat ramp?

L. Will there be any provisions to guard against tresspassing or vandilism of our property?

M. We depend on a low water bridge accross our creek to provide access to the western half of our farm. This is the only access we have to this acerage. A higher water level in the creek will obviously be a problem.

Sincerely,

G L Oehmen

G. L. Oehmen

GATES/lehr/8478

November 15, 1992

Planning Division
Plan Formulation Branch

Dr. Gregory Oehmen
1924 Rustic Oak
Chesterfield, Missouri 63017

Dear Dr. Oehmen:

This is in answer to your letter of August 3, 1992 inquiring about the possible effects of the Swan Lake Habitat Rehabilitation and Enhancement Project on the Golden Eagle Wildlife Preserve (GEWP). We apologize for the lateness of our response, but an extremely heavy workload in Planning Division recently has necessitated this delay. Our responses are provided in the same alphabetical sequence in which your questions were furnished (copy enclosed).

A. Adjacent lower Swan Lake will usually be maintained at normal pool, but no higher than elevation 420.0 NGVD except (1) for several days after a large local storm event (until the runoff has flowed into the Illinois River through the proposed drainage structures), or (2) if the Illinois River has overtopped the proposed riverside levee. The levee provides only a 2-to 3-year recurrence interval level of protection, so levee overtopping will occur frequently. The maximum drawdown elevation for Swan Lake will be 417.0 NGVD; such a drawdown would occur about once in eight years to reconsolidate the lake bottom.

A1. The proposed lake heights will not impact your present levees on the north side of Section 8.

B. Your GEWP levees on the south shore of lower Swan will not be part of the new proposed levee system.

C. The fields inside your levee will not be affected by induced higher groundwater. In fact, the groundwater table in your fields should remain at a fairly constant level equal to that usually experienced at normal pool.

D. The sediment basins are not designed to be flood control basins. They will only detain runoff from a rainfall event long enough to allow the incoming sediment to settle. Basically, the volume of water that flows into the basin is the same volume which flows out.

E. None of the tributary creeks will be dredged or changed.

E1. The existing delta accretions will not be removed or altered. No trees or vegetation on the deltas will be destroyed.

F. Assuming your 2 wells are deep wells, that penetrate the main Illinois River aquifer (not a perched aquifer), there will be no impact on your wells and their ability to pump sufficient water.

G. No, we have opted for trapping the sediment at its source in the uplands.

H. The U.S. Fish and Wildlife Service will be responsible for the acquisition of any project affected private lands.

I. Lower Swan will be managed at a normal pool elevation most of the year. This water regime will greatly facilitate fish movement between the river and lake, this situation is not possible under the water regimes of middle Swan Lake and upper Swan/Fuller Lakes. However, with enhanced aquatic vegetation development due to improved sedimentation/water level/wave control, lower Swan is expected to greatly expand waterfowl resting and feeding habitat within the lower lake.

J. Since water levels will be maintained at normal pool during the growing season, no adverse effects on tree vegetation are anticipated. Minor vegetation clearing will be required where the lake closure ties into high ground north of Section 8.

K. This road would be 1,200-feet long, 12-feet wide, built to a minimal elevation of 424 NGVD, and topped with 6-inches of aggregate road course.

L. We suggest that you bring this concern to the attention of the U.S. Fish and Wildlife Service (Ms. K.L. Drews, Brussels District Site Manager, 618-883-2524). The posting of signs along the road adjacent to your property may be appropriate.

M. As indicated in A. above, this higher level in the lake would be at elevation 420.0 NGVD which is only a foot higher than the current normal pool in Swan Lake. Secondly, contour mapping adjacent to the lake indicates the location of the low water bridge to be on much higher ground at elevation 430.0 NGVD

In conclusion, we do not see any potential for the Swan Lake project to impact adversely on the flooding and draining objectives of the GEWP. If you have any additional questions, please contact our Swan Lake study manager, Mr. David Gates at telephone 314-331-8478.

Sincerely,

Owen D. Dutt
Chief, Planning Division

Enclosure

APPENDIX DPR-C

CLEAN WATER ACT, COMPLIANCE DOCUMENTATION

FOREWORD

APPENDIX DPR-C provides the Clean Water Act Section 404(b)(1) Evaluation Report for the Swan Lake project. This documentation was forwarded to the Illinois Environmental Protection Agency, Section 401 Water Quality Certification has been granted (see attached 14 June 1991 IEPA letter). A Section 404 Public Notice was released 15 July 1992. District responses to letters of comment received are included in APPENDIX DPR-B.

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM
SWAN LAKE HABITAT REHABILITATION
POOL 26, MISSISSIPPI RIVER, CALHOUN COUNTY, ILLINOIS

SECTION 404(b)(1) EVALUATION REPORT ON THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES

I. PURPOSE OF THIS EVALUATION

The proposed habitat rehabilitation and enhancement at Swan Lake along the west bank of the Illinois River between river miles (RM) 5 and 13 in Mississippi River Pool 26, Calhoun County, Illinois, would involve placement of dredged and fill materials into waters of the United States. Section 404 of the Clean Water Act established a permit program for the purpose of regulating discharges of dredged or fill material into such waters. Under Section 404(b) of the Act, proposed discharges of dredged or fill material must conform to guidelines which are to be developed by the Administrator, Environmental Protection Agency. On 5 September 1975 in accordance with Section 404(b)(1), the Environmental Protection Agency published regulations, 40 CFR 230, which outline criteria and procedures for evaluating activities subject to Section 404. On 24 December 1980 revised Section 404(b)(1) guidelines were published which became effective 30 March 1981. It is mandatory that the guidance be applied to all proposed discharges of dredged or fill material subject to approval under Section 404. This evaluation will address proposed discharges of dredged and fill material required for the habitat rehabilitation and enhancement of Swan Lake.

II. PROJECT DESCRIPTION

A. Location. Swan Lake is located in the Calhoun Division, Brussels District, of the Mark Twain National Wildlife Refuge (MTNWR), with part of the upper end of the lake complex in the Fuller Lake State Fish and Waterfowl Management Area. The entire lake complex is situated along the west bank of the Illinois River between RM 5 and 13, Mississippi River Pool 26, Calhoun County, Illinois (FIGURE 1). The project area is on Federal and state lands presently managed for fish and wildlife purposes by the U.S. Fish and Wildlife Service and the Illinois Department of Conservation. The Melvin Price Locks and Dam No. 26 at Alton, Illinois, is located about 23 miles downstream of the lake. The nearest townships are Grafton to the east and Brussels to the west. The city of St. Louis is situated about 35 miles to the south. Access to the west shore of the lake is by various roads off of Highway 1 near Brussels, or by water from the Illinois River. Pere Marquette State Park, Stump Lake State Fish and Waterfowl Management Area, and the Gilbert Lake Division-Brussels District of MTNWR are all located near the east bank of the Illinois River just across from Swan Lake.

B. General Description. The Swan Lake complex consists of approximately 4,600 acres of Federal lands and water, managed for fish and wildlife purposes by the U.S. Fish and Wildlife Service and the Illinois Department of Conservation.

PROJECT LOCATION MAP

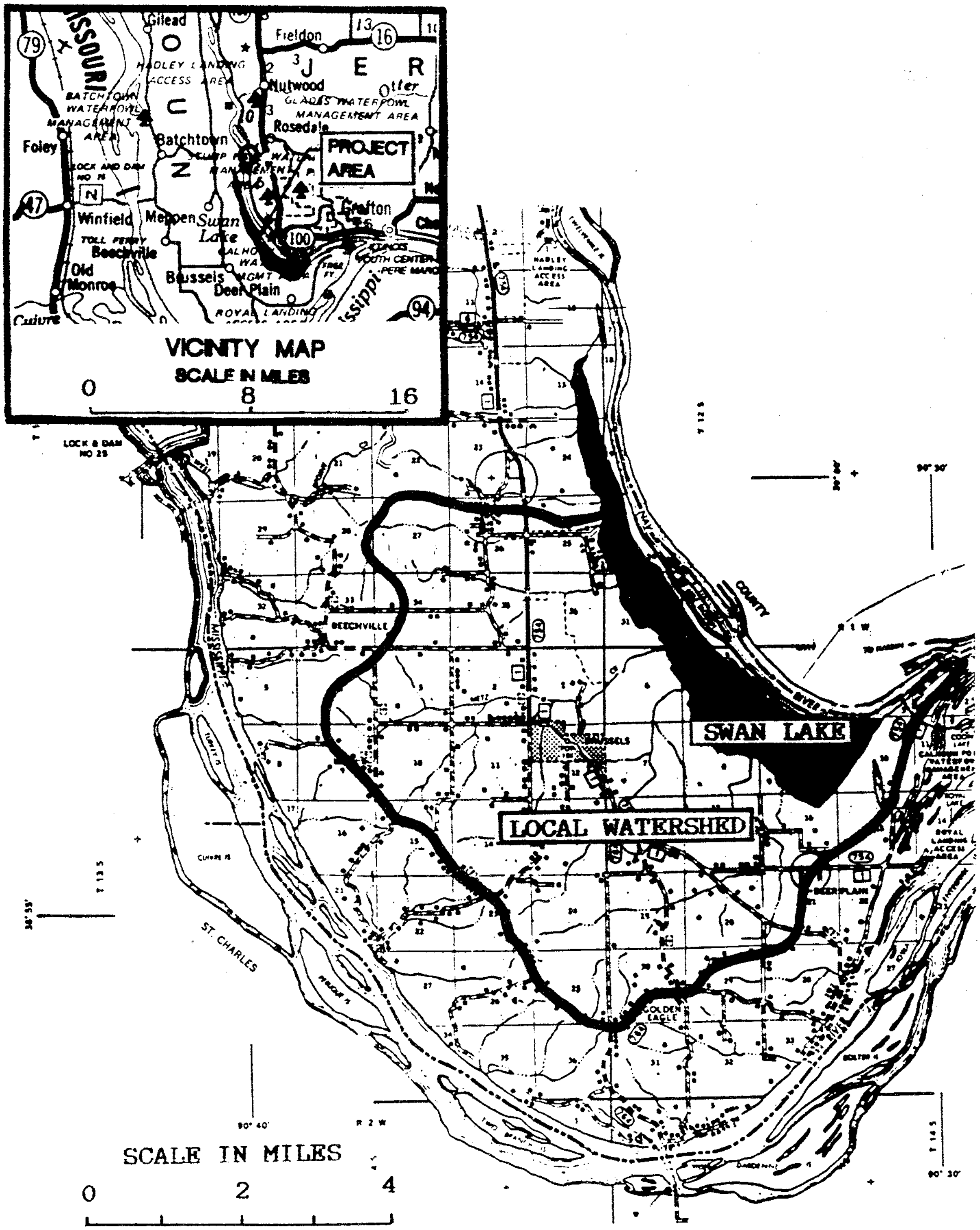


Figure 1A

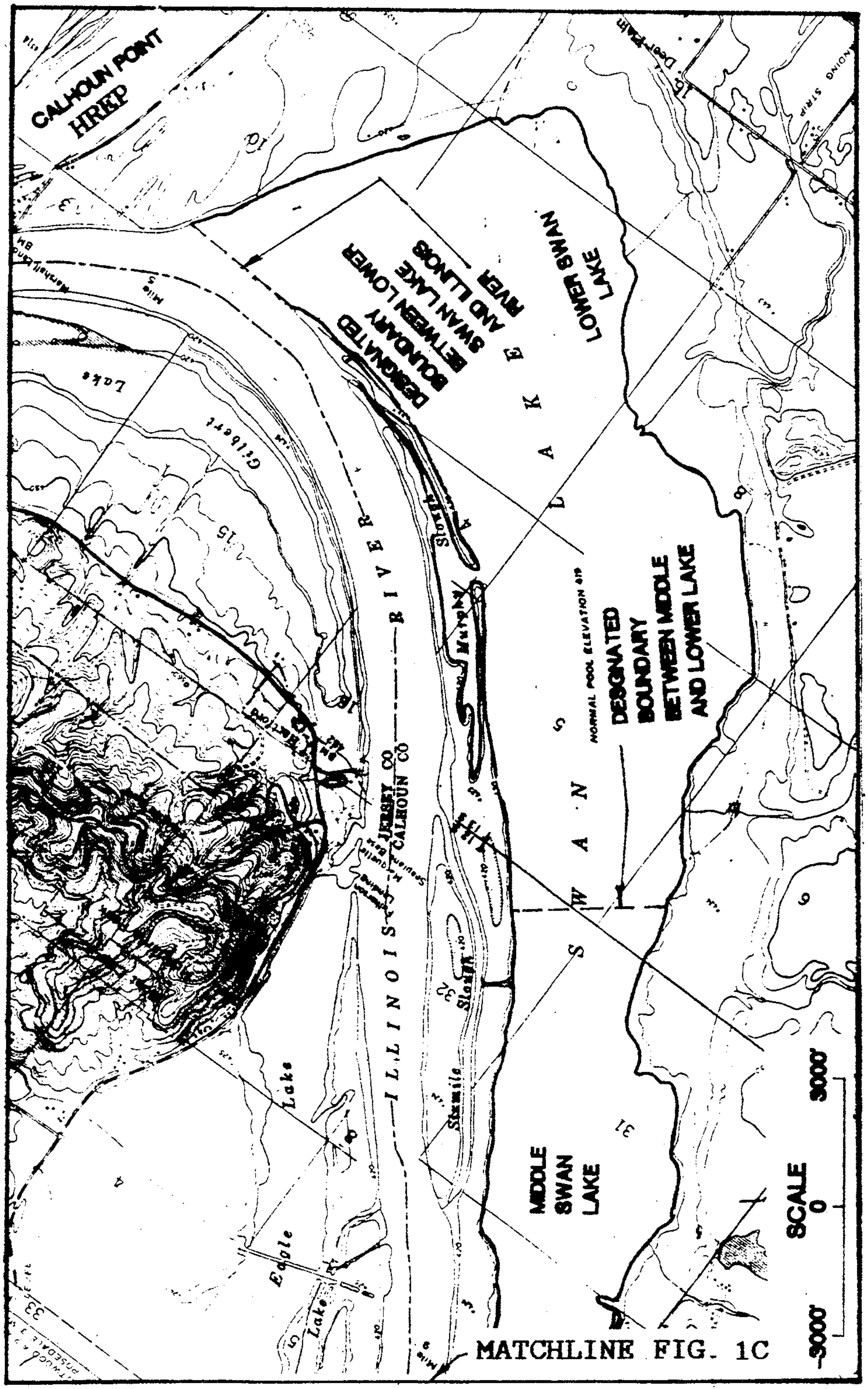
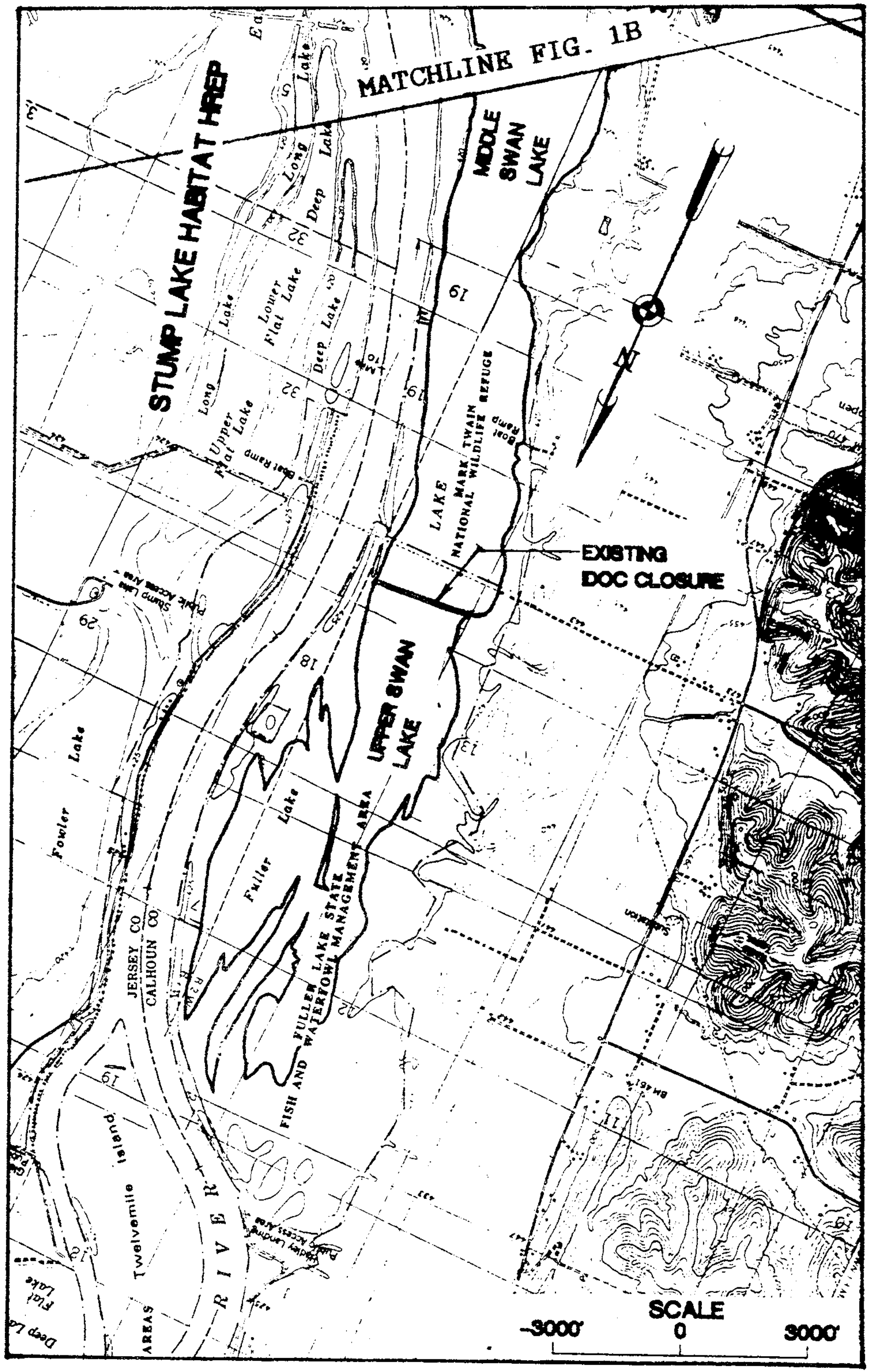

CALHOUN POINT HREP
LOWER SWAN LAKE
DESIGNATED BOUNDARY BETWEEN LOWER SWAN LAKE AND ILLINOIS RIVER
ILLINOIS RIVER
SWAN LAKE
NORMAL POOL ELEVATION 419
DESIGNATED BOUNDARY BETWEEN MIDDLE AND LOWER LAKE
JERSEY CO
CALHOUN CO
MIDDLE SWAN LAKE
SCALE
-3000'
0
3000'
MATCHLINE FIG. 1C

Figure 1B



MATCHLINE FIG. 1B
STUMP LAKE HABITAT HREP
MIDDLE SWAN LAKE
MARK TWAIN NATIONAL WILDLIFE REFUGE
EXISTING DOC CLOSURE
UPPER SWAN LAKE
FULLER LAKE STATE FISH AND WATERFOWL MANAGEMENT AREA
JERSEY CO
CALHOUN CO
Twelvemile Island
RIVER
Fowler Lake
Fuller Lake
Long Lake
Upper Flat Lake
Lower Flat Lake
Deep Lake
Boat Ramp
Public Access Area
SCALE
-3000'
0
3000'

Figure 1C

Swan Lake has served as a prime wetland/backwater area providing important spawning and nursery areas for river fishes. The lake complex is also used extensively by migratory waterfowl as well as other wetland wildlife species. The area is particularly important because it is the only major refuge area in the immediate area, particularly for waterfowl, and also because it is the only major backwater available to fish in the lower Illinois River. Swan Lake represents about 40% of the total backwater habitat for Pool 26 and about 10% of all backwater habitat on the Illinois River.

The major problems affecting Swan Lake include sedimentation, water fluctuations, shallow water depth, waves, turbidity, and a soft lake bottom. Sedimentation has been identified as the most significant resource problem affecting the Upper Mississippi River System. In the Illinois River valley, similar to many major rivers, sedimentation has resulted in the aggradation and disappearance of off-channel water habitat, thereby reducing the size and number of areas available to fish for spawning and rearing young. The loss of such wetlands has also negatively impacted waterfowl populations. Major sources of sediments coming into Swan Lake are from the Illinois River during floods and from small tributary streams in the local watershed. Although Swan Lake still retains extensive large areas of open water, sedimentation has continued to reduce water depth. Most of the lake is less than 3 feet deep and only one hole in the lake has been identified as being deeper than 5 feet. Furthermore, a combination of high waves, the unconsolidated bottom, and high water turbidity have prevented the establishment of submergent aquatic plants in the lake, thereby reducing the quality of the habitat for fish and waterfowl. In addition, because the lake is so shallow, water temperatures are unstable and often extreme - very cold in the winter and warm in the summer - further risking the survival of both resident and river fish using the backwater.

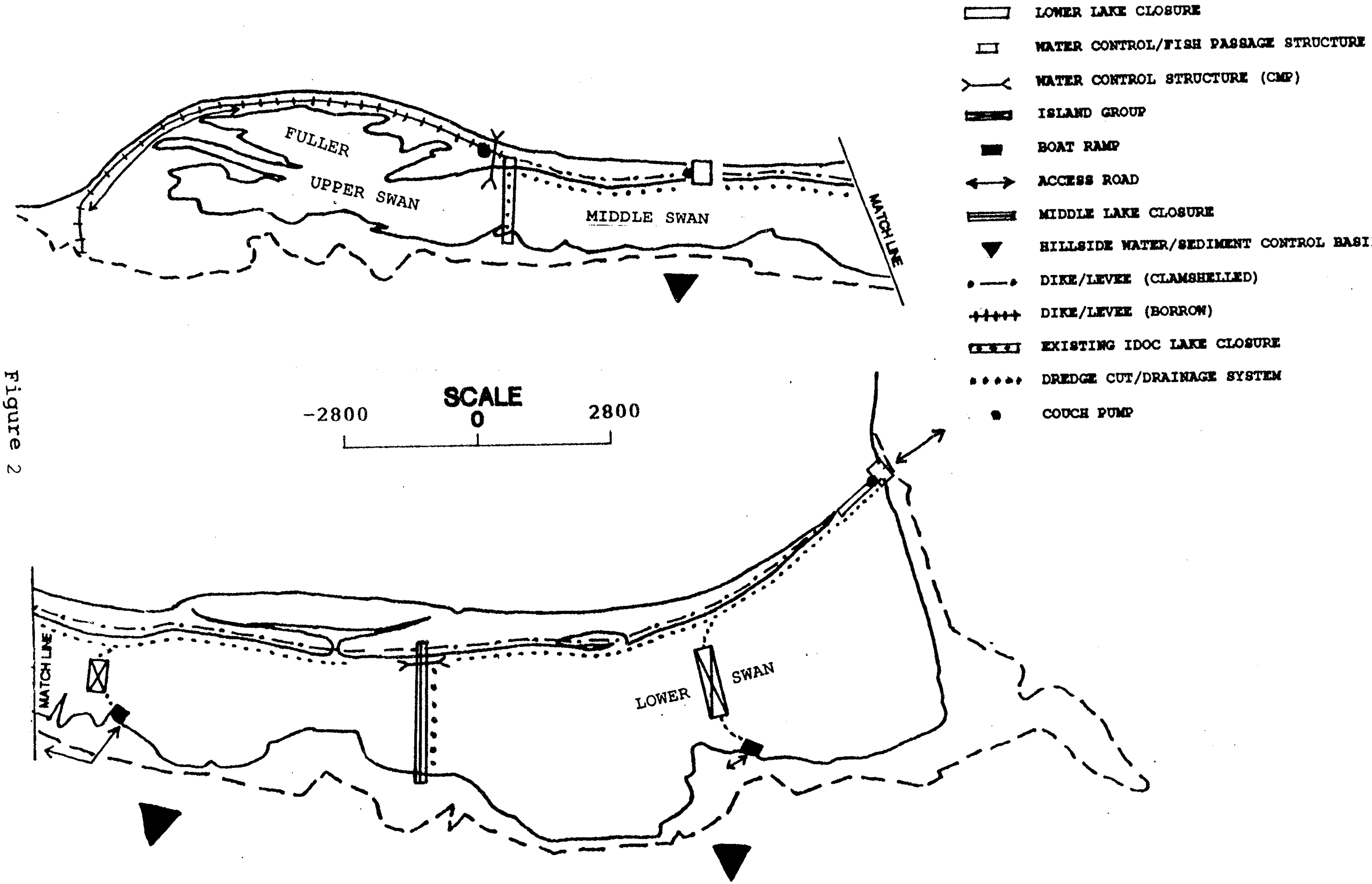
Following is a general description of the recommended plan. Specific features of the project are presented in TABLE 1 with those components of the project which are subject to Section 404 jurisdiction so indicated. The recommended plan is depicted in FIGURE 2.

To retard the deposition of sediment from the Illinois River into the project area, a 46,700-feet long dike/levee would be constructed on the slender peninsula of land between Swan Lake and the Illinois River. At its south end, this dike/levee would close off the entrance of the lake to the river. At both ends the dike/levee would tie into high ground.

To retard the deposition of sediment from tributary streams feeding into middle and lower Swan Lake, 276 water and sediment control basins and 30 ponds would be constructed. Each of these impoundments would be less than five acres in size. Until the location of these structures has been determined, the need for Section 404 authorization is unknown. The Calhoun County Soil and Water Conservation District will ensure that compliance is met.

To provide a means for controlling water levels within Swan Lake, the lake will be subdivided into three large compartments by the construction of an interior closure and the rehabilitation of an existing closure. Several water control structures will be placed in the levee and in the closures. In addition, portable pumps will be used to assist in water level control.

Figure 2



SELECTED PLAN
SWAN LAKE

TABLE 1

Components of the Recommended Plan and their relation to Section 404 Jurisdiction

Feature	404 Approval Needed
1. Riverside dike/levee (earthen and stone material. elevations from 425.5 to 427.1 NGVD, 3-6 feet high and about 46,700 feet long	Yes
2. Middle lake closure (total length: 3,000 feet)	Yes
3. Rehabilitation of existing Fuller Lake closure	Yes
4. Lower Swan Lake closure at confluence with Illinois River (stone-capped/soil core) about 3,400 feet long	Yes
5. Creation of islands in lower and middle Swan Lake from mechanically-dredged sediment	Yes
6. Upland sediment control program with Calhoun County Soil and Water Conservation District	Possibly
7. Water control/fish passage structures (combination sluice gate, slide gate, and stop logs)	
a. Lower Swan Lake structure to river (one unit)	Yes
b. Middle Swan Lake structure to river (one unit)	Yes
8. Water control structure from Fuller Lake to river (at two locations)	Yes
9. Portable water pumps	No
10. Mechanical (clam-shell) dredging in lake	Yes
11. Borrow pits for dike/levee construction - total of 20 acres to provide fill material	No
12. Fish and wildlife management including plantings for waterfowl and water level control for both fish and wildlife.	No
13. Boat ramp improvements on west bank, lower and middle Swan Lake	Yes
14. Real estate acquisitions	No

To improve the lake's fish habitat, sections of the lower lake will be deepened and fish passage structures will be constructed to permit fish movement between the Illinois River and the interior waters.

C. Alternatives. Three project alternatives were considered: Alternative A, No Federal Action; Alternative B, Wetlands Excavation; and Alternative C, Wetlands Management. Alternative A was rejected because it would do nothing to alleviate the sedimentation and water control problems that must be addressed if habitat is to be improved. Large-scale excavation (Alternative B) also was considered unacceptable because it would not reduce future sedimentation, nor would it allow for water management within Swan Lake. Alternative C was found to be fully responsive to the project objectives, and was designated as the Selected Plan. It would significantly reduce the sedimentation rate, and would provide water management capabilities.

For Alternative C, options that were considered include design and structural alternatives involving variations in levee location and heights, type of water control structures and fish passages to be used, and number and location of closure structures.

The planning process also took into consideration the avoidance of placement of dredged or fill material into waters of the United States in conjunction with the construction of project features. For most project features, it was not possible to avoid placing such material into waters of the United States because most of the 4,583-acre project area (all but the 538 acres of cropland) is subject to Section 404 jurisdiction. The water control structures are water-dependent, as are the closure structures, boat ramps, islands, and cofferdam. Alinement alternatives for the riverside levee/dike were limited because the strip of land between the river and the management units is quite narrow.

D. Authority and Purpose. Public law (PL) 95-502 authorized the construction of a new dam and 1,200-foot lock at Alton, Illinois, and directed the Upper Mississippi River Basin Commission to prepare a comprehensive Master Plan for the Management of the Upper Mississippi River System. The Basin Commission completed the Master Plan report and submitted it to Congress on 1 January 1982. The report recommended an environmental management program that included construction of habitat rehabilitation and enhancement projects.

The 1985 Supplemental Appropriations Bill (PL 99-88), signed into law by President Reagan on 15 August 1985, provided initial authorization and appropriations for an environmental management program for the Upper Mississippi River System. A more comprehensive authorization was later provided by the Water Resources Development Act of 1986 (PL 99-662).

The two goals of the project are to enhance migratory waterfowl habitat and to enhance habitat for fishes. Specific objectives for attaining the waterfowl goal are (1) decreasing sedimentation into the lake complex, (2) providing a means to control water levels in the lake complex, (3) increasing reliable food production for waterfowl, and (4) increasing total wetland values for migratory waterfowl.

Objectives for the fisheries goal are (1) increasing the depth of the lake, (2) reducing sedimentation into the lake complex, (3) increasing the photic zone, (4) increasing the available cover, and (5) increasing the total habitat values for fishes.

E. General Description of Dredged or Fill Material

1. General characteristics of Material (grain size, soil type).

a. Riverside Dike/Levee. The proposed riverside dike/levee will be constructed of earthen material and some stone. For the segment from RM 5.5 to 10.6, the earthen material will be obtained by clamshell dredging of sediments from Swan Lake. These sediments consist of silts, sands, and clays. Aggregate road course material will be placed on top of the dike/levee from RM 5.5 to 9.8, and the lowermost 2,000 feet will be covered by C-stone to serve as an overflow structure. For the segment from RM 10.6 to 13.0, earthen material will be obtained from local borrow sites; no stone will be used on this segment.

b. Lower Lake Closure and Interior Swan Lake Closures. The structure to be constructed across the lower section of Swan Lake will consist of stone. Those portions of this structure that will be exposed to Illinois River currents, ice scour, and wavewash will be constructed of Grade B limestone (1,200 pound maximum size). The less exposed sections will be constructed with Grade C limestone (400 pound maximum size). Some Grade A stone will be placed on the river side of the lower lake closure. The middle lake closure structure will consist of an earthen core and a stone cap. The stone cap will consist of Grade C limestone. Grade C stone will also be used to cap the existing Fuller Lake closure structure.

c. Water Control and Fish Passage System. Water control and fish passage structures will be constructed of concrete, and backfilled with hand-placed crushed stone underlain with uncompacted crushed stone. Grade C limestone (1,200-pound maximum size) will be placed on top of the crushed stone to bring the sites up to the top elevation of the levee/dike or closures. Any soft organics and fine silts will be excavated from the foundation of the structures to provide a firm base.

d. Islands. Islands will be constructed with sediments dredged from Swan lake. These sediments will consist of silts, sands, and clays.

e. Other Project Components. Construction of the two boat ramps and two parking lots will employ aggregate base stone. The four road segments will consist of aggregate road course.

2. Quantity of Material (cubic yards).

The following quantities of fill and dredged materials will be required to construct the project:

Earthen (dredged sediment)	245,689 cubic yards
Earthen (borrow, semi-compacted)	68,952 cubic yards
Grade C stone	33,126 tons
Grade B stone	5,834 tons
CA-10 crushed stone	17,215 tons
Crushed Stone	228 tons
Quarry run stone	290 tons
6" minus stone	406 tons
1" minus stone	468 tons
Aggregate course base	34 tons
Concrete	480 cubic yards
Asphaltic concrete	13 cubic yards

Nearly all of this material will be placed either below the plane of ordinary high water of the Illinois River (421 feet NGVD) or into jurisdictional wetlands.

a. Riverside Dike/Levees. Construction of the dike/levee (including the lower lake closure) from river miles 5.5 to 13.0 will require the permanent placement of 192,240 cubic yards of excavated sediment, 64,815 cubic yards of semi-compacted earthen fill, and 32,131 tons of stone.

b. Interior Lake Closures. The following quantities will be required to construct or repair these two structures.

	earthen (cubic yards)	stone (tons)
middle lake closure	12,200 (sediment)	11,250
Fuller lake closure	-	______

c. Water Control Structures. The construction of gravity drains and a fish passage/water control structure (including pumping plants) will require the permanent placement of about 410 cubic yards of concrete, 895 tons of stone, and about 200 cubic yards of semi-compacted earthen fill. The cofferdam used to install gravity drains "in-the-dry" will require the temporary placement of about 5,270 tons of stone.

d. Islands. The proposed islands call for the permanent placement of about 41,249 cubic yards of lake sediments.

e. Other Project Components. Construction of boat ramps and roads will require the permanent placement of about 3,937 cubic yards of semi-compacted earthen fill, and about 2,932 tons of stone.

3. Source of Material. Earthen material will be obtained either from sediments mechanically dredged from the bottom of Swan Lake or from soils taken from borrow areas excavated parallel to the interior side of the levee. Rock and crushed stone will be obtained from commercial stone quarries in the vicinity of Calhoun county.

F. Description of the Proposed Discharge Sites

1. Location. The location of all structures are shown in FIGURE 1.

2. Size (acres). The components of the project will require a total of 132 acres for construction rights-of-way, of which about 112 acres will be filled.

	acres
river dike/levee (excludes lower closure structure)	95
lower closure	4
middle closure	4
lower lake control structure	<1
middle lake control structure	<1
islands - lower lake	4
islands - middle lake	2
boat ramps	<1
roads	3
borrow areas	20
	132

3. Type of Site (confined, unconfined, open water). All disposal sites will be unconfined, with the exception of one for a water control structure, which will involve the use of a temporary cofferdam. Construction of the islands, middle lake closure structure, lower lake closure structure, cofferdam, and boat ramps (in part) will take place in open water.

4. Types of Habitat. Most of the sites proposed for disposal of fill or dredged material are terrestrial. The most common terrestrial habitat type to be affected is bottomland forest on the Illinois River floodplain. Cropland on the floodplain will also be affected, as will cropland in upland areas. Aquatic habitats are also proposed as disposal sites, and include open water in Swan Lake and shallower areas at the lake's margins.

5. Timing and Duration of Discharge. A construction start has been tentatively scheduled for Fiscal Year 1993. Depending on local weather and flooding conditions, the estimated period of construction for the entire project is 12 to 36 months.

G. Description of Disposal Method (hydraulic, drag line, etc.). Earthen material obtained from borrow pits and stone to be used for construction will probably be trucked in to the disposal site and dumped, and pushed into place by dozer or large back hoe. Sediments taken from Swan Lake by clam shell dredging will be side-cast to the disposal site and later worked into position with heavy equipment.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determination.

1. Substrate Elevations and Slope. The narrow peninsula of land between Swan Lake and the Illinois River is relatively flat, and varies in elevation from about 420 to 425 feet NGVD (normal pool of the Illinois River is about 419.5 feet NGVD). Landside of Swan Lake the floodplain rises to about 430 feet NGVD, and terraces between the floodplain and upland lie between 430 and 450 feet NGVD. Uplands within the watershed of tributaries to Swan Lake reach elevations up to about 675 feet NGVD. The lowest elevation of the bottom of Swan Lake is about 414 feet NGVD, whereas the average bottom elevation is about 416 feet NGVD. Slopes within the project area are about 1-2 percent. The crown of the riverside dike/levee will rise above the substrate from 3 to 6 feet (up to 427 feet NGVD). Islands will rise above the Swan Lake surface to 423-426 feet NGVD. Roads, boat ramps, and parking lots will be constructed to 424 feet NGVD.

2. Sediment Type. The existing bed of Swan Lake consists of a mixture of clay, sands, silts, and organics. The material to be obtained from borrow pits is also alluvial in origin.

3. Dredged/Fill Material Movement. The nearly flat substrate at the proposed disposal sites and lack of current in Swan Lake at normal pool stages will contribute to the stability of materials used for construction of structures. Flooding from the Illinois River and wind-generated waves on Swan Lake are forces that will cause dredged and fill materials to move if they are not properly stabilized.

4. Physical Effects on Benthos (burial, changes in sediment type, etc.). Within Swan Lake, there will be loss and burial of some benthic organisms as a result of the construction of the closures, dike/levee, water control/fish passages, and islands. However, the submerged portions of these structures should be recolonized within 1 year or so, possibly with different assemblages of benthic organisms. The rock material of the closure structures and dike/levee will provide a different but favorable substrate for benthic recolonization. Reducing the sedimentation rate within the lake complex should also benefit the benthic fauna. Overall, the proposed construction of the earthen levee should have a beneficial impact on benthic organisms.

5. Other Effects. After construction is completed, there will be more control over the lake habitat which will result in an increase in the value of the lake complex.

6. Actions Taken to Minimize Impacts.

The primary actions to minimize erosion, slumping, or lateral displacement of dredged and fill materials, and thereby avoid or minimize adverse impacts on the substrate, include the following: use of stone materials sized to withstand the forces of floodwaters; retention of sediment dredged for construction of the dike/levee by placement of bales of straw as a silt barrier adjacent to the lakeside toe of the dike/levee; compaction of earthen materials for the dike/levee and interior closure structures; establishing stable structure slopes; construction during dry weather periods; covering of island structures with a commercial stabilization fabric prior to establishment of vegetative cover; and revegetation of islands and other earthen structures.

B. Water Circulation, Fluctuation and Salinity Determinations

1. Water

a. Salinity. Not applicable.

b. Water Chemistry. The dredging of portions of the lake bottom and creation of islands with sediment will temporarily affect water chemistry by resuspending bottom sediments and associated compounds. Based on 24-hour settlement tests, suspended material is expected to settle rapidly and water chemistry is not expected to be impacted to any significant degree by the project. Confirmation of this will be included with state water quality certification.

c. Clarity. Currently Swan Lake has very low water clarity due to a combination of shallow depths, unconsolidated bottom, exposure to periodic high winds, and small boat traffic within the lake. Short-term increases are expected during clam shell dredging operations, creation of islands, and construction of levee closures and water control/fish passage structures. However, the completed project is expected to reduce overall turbidity (i.e., increase clarity).

d. Color. No significant change.

e. Odor. The project is not expected to have a significant impact on water odors.

f. Taste. The project is not expected to significantly impact water taste.

g. Dissolved Gas Levels. Dissolved oxygen levels in Swan Lake are usually fairly high due to the high wave action even though water levels are shallow, water temperatures are high during the summer, and plant decomposition is occurring. Deepwater dredging cuts in the lake for island development and dike/levee construction should reduce the likelihood of significant drops in oxygen throughout the year. Minor short-term decreases in dissolved oxygen levels may occur as a result of water disturbances during construction, but it is expected that levels in the lake will remain sufficiently high (i.e., > 5 mg/l) for fish and other aquatic organisms.

h. Nutrients. Some nutrients will be released to the water column during the excavation of sediments from the bed of Swan Lake. Resuspension tests show that ammonia concentrations could exceed state water quality standards if water temperatures are high enough.

i. Eutrophication. The project is not expected to have a significant impact on eutrophication of the water column.

j. Water Temperature. Because the lake is shallow, its water temperatures are unstable. For example, winter water temperatures in Swan Lake vary greatly, from about 0 to 10° C. The project will create deep areas within the lake and these deep sections should have more stable winter temperatures (about 3° C). In addition, during warmer months of the year, water in the newly created deeper areas of the lake would be relatively cool and less affected by high air temperatures.

2. Current Patterns and Circulation

a. Current Patterns and Flow. The project would alter existing circulation and flow patterns. Swan Lake would be periodically closed off from the Illinois River by the lower lake closure. In addition the lake will be divided into three major compartments separated by two interior closures. The riverside dike/levee and lower rock closure would prevent flow through the lake during minor flood events except by way of the water control structures. The riverside levee would be overtopped by flood events with recurrence intervals of once in 3 years or greater, protecting the lake from sediment deposition during minor flood events.

b. Velocity. The riverside dike/levee will eliminate uncontrolled flow across Swan Lake during flood events up to a 3-year exceedance frequency (also refer to section 3, below, on Normal Water Level Fluctuations).

c. Stratification. Stratification does not normally occur in the lake or in the adjacent Illinois River. Due to the great surface area of the lake, the relatively shallow depth, and frequent wind action, stable, long-term stratification would be uncommon.

d. Hydrologic Regime. Without the dike/levee, filling of Swan Lake due to sediment deposition during each minor flood event would cause further degradation. Major flooding will overtop the levee (and sediment will continue to be deposited during these events). However, no changes in profiles in the adjacent Illinois River are likely.

The dike/levee system with its water control structures and pump units would permit flexibility in controlling water levels. Changes in profiles within the lake complex are discussed below.

3. Normal Water Level Fluctuations (tides, river stage, etc.). The riverside dike/levee is intended to serve as a sediment barrier. In combination with the drainage ditch, water control structures, and pump units, the normal water level fluctuations in the Swan Lake complex will be altered. Water levels will be managed in the range of 419.0 and 420.5 NGVD. The project is not expected to significantly change profiles in the adjacent Mississippi River. See Appendix DPR-P for a detailed description of the tentative water regulation plan.

4. Salinity Gradients. There are no salinity gradients in the project area.

5. Actions That Will Be Taken to Minimize Impacts. Swan Lake will be connected to the Illinois River at its upper, middle, and lower end via water control structures. Most construction activities will take place during the low water season which should reduce the potential for erosion. A floatational collar with impervious silt screen will be placed around the dredge during operations to confine water quality impacts (reduced clarity, altered water chemistry) to the dredging site. Earthen structures will be seeded to prevent erosion.

C. Suspended Particulate/Turbidity Determinations

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site. Swan Lake usually has high turbidity as a result of the shallow, unconsolidated bottom and high wind and wave action. Turbidity will increase over base conditions in local areas during clam shell dredging operations and subsequent placement of sediment in the water for the construction of islands, the dike/levee, and closures. However, any such increases in turbidity are expected to be minor and short term. These elevated turbidity levels will be confined to the immediate vicinity of the worksite through the use of an encircling floatational collar and impervious silt screen. The collar and screen will be kept in place until the quality of water within the enclosure returns to ambient levels. Overall, the project is expected to reduce turbidity. This change will be accomplished by reducing wind and wave action through the creation of islands which will act as wind breaks.

2. Effects (degree and duration) on Chemical and Physical Properties of the Water Column. The project would have a minimal impact on the resuspension of materials in the water column in the vicinity of the construction activities.

a. Light Penetration. Light penetration may show temporary and localized decreases during project construction as a result of short term increases in turbidity. Overall, light penetration is expected to increase as a result of reducing wind action by the construction of islands.

b. Dissolved Oxygen. The lake does not have a problem with dissolved oxygen levels and construction activities associated with the project will have no significant impact on dissolved gas levels.

c. Toxic Metals and Organics. Resuspension tests were carried out for lead, zinc, and ammonia with sediments from the lake bottom. Resuspension tests show a high level of organic matter present, but most total suspended solids settle out within 24 hours. Confirmation of this will be included with state water quality certification.

d. Pathogens. There is no reason to believe any pathogens exist in any of the proposed areas of excavation.

e. Aesthetics. Clearing of trees for borrow material and levee construction will have a negative impact on the aesthetic quality of the area. Construction activities would also have a short-term impact on the aesthetic value of the area. The overall project should enhance the fish and wildlife, as well as the wetland value of the area and increase the aesthetic quality of the site.

f. Water Temperature. See discussion on water temperatures above (Section II.B.1.j)

3. Effects on Biota

a. Primary Production, Photosynthesis. Minor short-term impacts to primary production and photosynthetic processes are expected to occur in the immediate vicinity of dredging sites and construction sites involving the placement of sediment into open water. These impacts should be confined to the area enclosed by the proposed floatational collar and impervious silt screen which will surround the worksite. In the long-term, primary production and photosynthesis should increase lake-wide because the islands will lower turbidity levels by decreasing wind and wave action. Aquatic vegetation expansion resulting from the project will also help to dissipate wave action and further increase primary production and photosynthesis.

b. Suspension/Filter Feeders. A short-term reduction in suspension/filter feeders due to increased suspended sediments is expected to be minor. This impact should be confined to the immediate vicinity of clam shell dredging and construction sites in open water.

c. Sight Feeders. Sight feeders will experience short-term, minor adverse impacts due to increased turbidity levels. These effects should be confined to the area enclosed by the proposed floatational collar with impervious silt curtain during the construction process. Sight feeders should benefit over the long term as a result of the proposed islands' reduction in turbidity levels, increased vegetation, deeper water, and solid bottom.

4. Actions taken to Minimize Impacts. The majority of construction activities would take place in the dry and then only during the low water season which should reduce the potential for erosion. Earthen levees will be seeded to prevent erosion. The islands will be covered with a commercial stabilization fabric prior to stabilization with vegetative cover. While in operation, the clam shell dredge will be encircled with an impervious silt curtain supported by a floatational collar. Two curtain and collar systems will be used, allowing the dredge to advance while turbidity levels within the first system return to ambient conditions.

D. Contaminant Determinations. There has not been an analysis for contamination of the bottom sediment and borrow material to be used for island and levee construction. However, except for potentially high levels of ammonia, there is no reason to believe that these materials are contaminated with anything harmful to the local biota or humans.

E. Aquatic Ecosystem and Organism Determinations

1. Effects on Plankton. The project is not expected to adversely impact plankton. Plankton may be benefitted due to the anticipated reduction in turbidity levels due to construction of islands and resultant decrease in wind and wave action.

2. Effects on Benthos. Benthic organisms in the immediate vicinity of the closures and water control structures, as well as lake sites to be excavated, will probably be destroyed by excavation of sediments or burial by rock fill during the construction activities. Any disturbance would be short term. Benthic organisms are expected to rapidly colonize the rock dike. In the long term, the rocky substrate associated with the closure structures should provide for different benthic assemblages and possibly increase the diversity of the local benthic fauna. Reduction of the sedimentation rate in the lake complex should also benefit benthic organisms by providing for more stable habitats.

3. Effects on Nekton. The term "nekton" refers basically to larger, free-swimming aquatic organisms, such as fishes. During high flow periods most of Swan Lake is connected to the Illinois River and functions as spawning and nursery areas for fish during the spring and early summer. During the winter, the more stable temperatures in the newly created deeper areas would probably benefit the local fish populations by preventing complete freeze over of the shallow waters and maintaining more optimal conditions for their food resources.

In the future, if the project is not constructed, it is expected that continued sedimentation will continue to reduce water storage capacity. A raised topographic level would further reduce the depth of water in the lake, thereby reducing the usefulness of the area as a spawning and nursery area. If no rehabilitation project is constructed, the spawning and nursery function of the lake will be greatly reduced or eliminated due to sedimentation and natural succession of the area.

Construction of the closures will reduce access by river fishes to the lake complex. Since (per the interagency agreement) greater emphasis will be given to riverine fisheries in lower Swan than middle Swan, the significance of this impact will be greater in middle Swan Lake. However, middle Swan would still have large sections of permanent water and would maintain large resident populations of fish - even if isolated from the main river for long periods. Fish passages connecting Fuller Lake directly with the Illinois River would also improve fish movements over that of existing conditions.

Management of flow and water levels would improve the aquatic habitat year round. The creation of deeper areas is expected to reduce the risk of winter fish kills and reduce the risk of high water temperatures and extreme drops in dissolved oxygen levels during summer. Overall, management of the area for aquatic species would increase the overall productivity of the lake complex.

4. Effects on Aquatic Food Web. Loss or disruption of the benthic community would result at the sites for construction of rock structures in Swan Lake. However, recovery following construction should occur rapidly. Placement of stone would benefit some benthic species important in the food chain. Overall long-term impacts are expected to be positive.

5. Effects on Special Aquatic Sites.

a. Sanctuaries and Refuges. Most of the Swan Lake rehabilitation and enhancement project falls within the Calhoun Division of the 25,300-acre Mark Twain National Wildlife Refuge, a collection of Federal lands along the Mississippi River specifically managed for fish and wildlife by the U.S. Fish and Wildlife Service. In addition, the upper section of Swan Lake, which includes Fuller Lake, is part of the Fuller Lake State Fish and Waterfowl Management Area. These lands are managed by the Illinois Department of Conservation. The project is expected to benefit the purpose of the wildlife areas.

b. Wetlands. The 4,600-acre project area consists of 950 acres of forested wetland, 3,100 acres of nonforested wetland (open water), and 550 acres of cropland. Placement of fill or dredged material will result in the loss of 95 acres of forested wetland and 14 acres of nonforested wetland.

c. Mud Flats. Mud flats have been created where there was once deep water along the edges of Swan Lake as a result of the high rate of sedimentation and filling of the lake. Deepening of sections of the lake will eliminate some of the existing mud flats. However, without the project, most of the mud flats would gradually disappear as a result of colonization of the areas by willows and other woody species. The project will allow for dewatering of management compartments and exposure of mud flats for moist soil management.

d. Vegetated Shallows. The project is expected to benefit vegetated shallows by a combination of reduction of water turbidity, and management for aquatic plants.

e. Coral Reefs. None in the project area.

f. Riffle and Pool Complexes. The project will not impact riffle and pool complexes.

6. Threatened and Endangered Species. No Federally threatened or endangered species or their critical habitat are expected to be adversely affected by the proposed action. The St. Louis District has prepared a Biological Assessment of the project on endangered species which will be reviewed by the U.S. Fish and Wildlife Service.

7. Other Wildlife. Levee construction activities would disturb wildlife in the immediate project area. The clearing of about 95 acres of

forested wetland for levee construction and maintenance easements represents a loss of habitat and the wildlife which it supports. In the long term, wildlife associated with the wetland is expected to benefit due to the rehabilitation of the lake complex and its increased lifespan.

8. Actions to Minimize Impacts. The effects on the aquatic ecosystem would be minimized by promptly compacting and revegetating newly constructed earthen levees to avoid erosion. Contractors will be required to submit an environmental protection plan to include protection methods and procedures for avoiding landscape defacement, providing for water and air pollution prevention, for disposal of solid and chemical waste and of cleared and grubbed material, and for protecting fish and wildlife resources. In addition, the contractor shall be required to conduct a training course emphasizing environmental protection. Government inspectors will oversee construction projects to ensure that personnel, equipment, and construction techniques meet all contract specifications, including environmental requirements.

F. Proposed Disposal Site Determinations

1. Mixing Zone Determination. A mixing zone is not needed because there will be no return water to the water column.

2. Determination of Compliance with Applicable Water Quality Standards. The project would comply with applicable water quality standards.

3. Potential Effects on Human Use Characteristic

a. Municipal and Private Water Supply. No municipal water supply will be adversely impacted by project construction.

b. Recreational and Commercial Fisheries. Currently Swan Lake is open to both commercial and sport fishing in accordance with Illinois fishing regulations. However, due to sedimentation and the shallowness of the lake, use of the lake for both recreational and commercial fisheries is extremely limited. Even shallow craft boats are easily grounded within the lake. Area sport and possibly commercial fishing is expected to improve with the project as a result of improved management and water level control for the lake complex. Access by road to the lake will include boat ramps along the west shore of the lake.

c. Water Related Recreation. Water related recreation (i.e., boating, fishing, etc.) is not expected to be significantly impacted by the authorized project.

d. Aesthetics. Clearing of trees for borrow material and levee construction will have a negative impact on the aesthetic quality of the area. The creation of shallow standing water in borrow areas should enhance the wetland value of the area and increase the aesthetic quality of these areas. The increased usage of the area by waterfowl would be perceived as enjoyable to those viewing the waterfowl feeding in the site.

e. Parks, National and Historical Monuments, national Seashores, Wilderness Areas, Research Sites, and Similar Preserves. The project will not impact any of these resources.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. The Environmental Management Program should have a positive impact on the Upper Mississippi River System.

H. Determination of Secondary Effects on the Aquatic Ecosystem. There are no known significant secondary impacts to the aquatic ecosystem that will be caused by the project.

IV. FINDINGS OF COMPLIANCE OF THE RESTRICTIONS ON DISCHARGE

In our evaluation of discharges proposed in connection with the Swan Lake Rehabilitation and Enhancement Project, the Environmental Protection Agency's Section 404(b)(1) Guidelines of 24 December 1980 were applied without significant adaptation. Testing procedures outlined in subpart G of the guidelines were not required since the proposed placement would consist of soils and sand taken from within the floodplain, and our review of the work disclosed no "reason to believe" that contaminants would be released to the waterway. However, muck excavated from Swan Lake was analyzed for heavy metals and oil products. Materials proposed for use in levee construction on land will be obtained from borrow areas that are well removed from potential sources of contamination. The placement activities would not violate the toxic effluent standards of Section 307 of the Clean Water Act.

The wetland rehabilitation project would not jeopardize the existence of Federally listed endangered or threatened species or their critical habitat.

The proposed construction of a riverside dike/levee, rock closures, and installation of water control structures would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values would not occur.

The quality and quantity of habitat for migratory waterfowl and other wetland species is expected to increase. It is also expected that slackwater river fishes will benefit from the proposed activities. The fish spawning and nursery function of Swan Lake will be increased in the future due to a reduction in sedimentation and deepening of the lake.

All appropriate and practicable measures have been taken through application of procedures contained in Subpart H of the Guidelines to insure minimal adverse effects of the proposed discharges. These measures include compaction and seeding of the newly constructed levee to avoid erosion into the project area and the adjacent Illinois River.

On the basis of the guidelines, the proposed levee construction is specified as complying with the requirements of these guidelines with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the affected aquatic ecosystem.

Following its review of the draft DPR, the Illinois Environmental Protection Agency issued a letter (see letter attached) granting conditional water quality certification under Section 401 of the Clean Water Act. It is this District's intent to comply with IEPAs conditions.

12 DEC 91
Date

James D. Craig
Colonel, U.S. Army
District Engineer

WE

Illinois Environmental Protection Agency · P. O. Box 19276, Springfield, IL 62794-9276

217/782-0610

U.S. Army Corps of Engineers (Calhoun County)
Swan Lake HREP (Swan Lake)
Log #C-1163-90

June 14, 1991

Department of the Army
St. Louis District
Corps of Engineers
210 North 12th Street
St. Louis, Missouri 63101

Dear Mr. Blanchar:

This Agency received a request on December 6, 1990, from the U.S. Army Corps of Engineers, St. Louis District requesting necessary comments for environmental consideration concerning the Swan Lake Habitat Rehabilitation and Enhancement Project (HREP). The proposed project will consist of the construction of a riverside dike/levee, water level controls, drainage system, closure structure, and ramp in Swan Lake. The proposed project is located in and along the west bank of the Illinois River between Illinois River miles 5 and 13 in Calhoun County, Illinois. We offer the following comments.

Based on the information included in this submittal, it is our engineering judgment that the proposed project may be completed without causing water pollution as defined in the Illinois Environmental Protection Act, provided the project is carefully planned and supervised.

These comments are directed at the effect on water quality of the construction procedures involved in the above described project and is not an approval of any discharge resulting from the completed facility, nor an approval of the design of the facility. These comments do not supplant any permit responsibilities of the applicant towards this Agency.

This Agency hereby issues certification under Section 401 of the Clean Water Act (PL 95-217), subject to the applicant's compliance with the following conditions:

1. The applicant shall not cause:

    a. violation of applicable water quality standards of the Illinois Pollution Control Board, Title 35, Subtitle C: Water Pollution Rules and Regulations;

    b. water pollution as defined and prohibited by the Illinois Environmental Protection Act; and

    c. interference with water use practices near public recreation areas or water supply intakes.

2. The applicant shall provide adequate planning and supervision during the project construction period for implementing construction methods, processes and cleanup procedures necessary to prevent water pollution and control erosion.

3. Any spoil material excavated, dredged or otherwise produced must not be returned to the waterway but must be deposited in a self-contained area in compliance with all State statutes, regulations and permit requirements with no discharge to the waters of the State unless a permit has been issued by this Agency. Any back filling must be done with clean material and placed in a manner to prevent violation of applicable water quality standards.

4. All areas affected by construction shall be mulched and seeded as soon after construction as possible. The applicant shall undertake necessary measures and procedures to reduce erosion during construction. Interim measures to prevent erosion during construction shall be taken and may include the installation of staked straw bales, sedimentation basins and temporary mulching. All construction within the waterway shall be conducted during zero or low flow conditions.

5. The applicant shall implement erosion control measures consistent with the "Standards and Specifications for Soil Erosion and Sediment Control" (IEPA/WPC/87-012).

6. This certification becomes effective when the Department of the Army, Corps of Engineers, includes the above conditions #1 through 5 as conditions of the requested permit issued pursuant to Section 404 of PL. 95-217.

This certification does not grant immunity from any enforcement action found necessary by this Agency to meet its responsibilities in prevention, abatement, and control of water pollution.

Very truly yours,

Thomas G. McSwiggin

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

TGM:JCH:jk/1802q,6-7JCH

cc: IEPA, DWPC, Records Unit
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APPENDIX DPR-D

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APPENDIX DPR-D

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APPENDIX DPR-E

HYDROLOGY AND HYDRAULICS

FOREWORD

APPENDIX DPR-E represents the hydrologic/hydraulic effort leading to the proposed project. The appendix provides a discussion of climate, existing hydraulics and project hydraulics.

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT

SWAN LAKE PROJECT
REHABILITATION AND ENHANCEMENT
POOL 26, ILLINOIS RIVER MILES 5.0-13.0

APPENDIX E

HYDROLOGY AND HYDRAULICS

General. The Swan Lake project area, shown on Plate 1 of the main report, is located on the Illinois River, between river miles 5.0 and 13.0 and is comprised of Swan Lake. This appendix will present the hydrologic/hydraulic effort leading to the proposed improvements to the Swan Lake area and the existing Fuller Lake State Fish and Wildlife Waterfowl Management Area.

Climate. The climate of the Illinois region in which Swan Lake is located is typical midwestern, with warm, humid summers and cold, relatively-dry winters. Normal temperature extremes range from 100 degrees or more in mid-summer to below zero in mid-winter. The average annual temperature in the local area is 51 degrees.

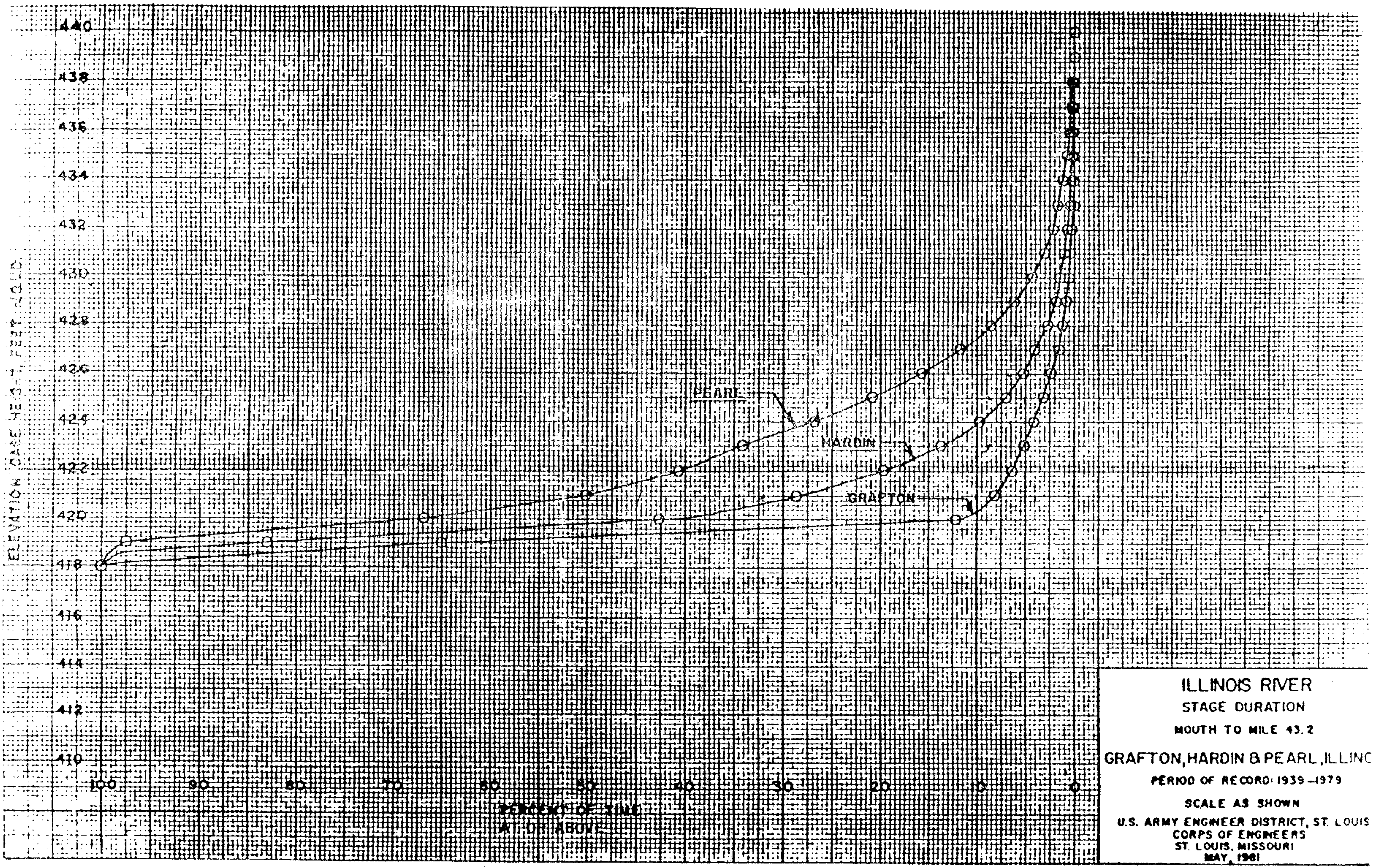
Significant precipitation occurs in every month of the year, with the greatest amounts normally in April-May and the least in January-February. The area averages slightly under 35 inches precipitation per year, with about 24 inches of snowfall in a typical winter. Average annual evaporation is not available for this immediate area. TABLE E-1 gives average monthly precipitation totals at Grafton, Illinois, about five miles downstream of Swan Lake, and average monthly evaporation totals at the National Weather Service gate at St. Louis.

TABLE E-1

Average Monthly Precipitation and Evaporation

Month	Precip. (in.)	Evap. (in.)	Month	Precip. (in.)	Evap. (in.)
January	1.66	0.69	July	3.69	5.85
February	2.05	1.01	August	3.15	4.87
March	3.25	2.00	September	3.04	3.48
April	3.70	3.24	October	2.42	2.32
May	3.90	4.59	November	2.65	1.22
June	3.56	5.24	December	2.22	0.69

Existing Hydraulics. Illinois River stages at Swan Lake are controlled by regulation at Melvin Price Locks and Dam. The pool stage at the dam is 419.0 NGVD under normal conditions, and exceeds 419 NGVD only during flows approaching bankfull or greater. As shown on FIGURE E-1, which gives the annual stage-duration relationship at Grafton, Illinois (five miles downstream), stages are less than 420 NGVD more than 90% of the time on an annual basis. Minimum stages occur during floods when the pool goes "on tilt" and proceeds to an open river condition. Minimum regulated stage is 414 NGVD at the dam and about 418 NGVD at the downstream end of Swan Lake. At this point, all gates at Melvin Price Locks and Dam are out of the water. As flood flows continue to increase, the minimum, regulated stage increases as well, with the only effect of the locks and dam being a small local swellhead just upstream of the dam. Exterior elevations at the downstream end of Swan Lake less than 418 could only occur during a loss of pool, a situation which has not happened since the early 1950's.



ELEVATION ... FEET ...
440
438
436
434
432
430
428
426
424
422
420
418
416
414
412
410
100
90
80
70
60
50
40
30
20
10
0
PERCENT OF TIME
AT OR ABOVE
PEARL
HARDIN
GRAFTON
ILLINOIS RIVER
STAGE DURATION
MOUTH TO MILE 43.2
GRAFTON, HARDIN & PEARL, ILLINC
PERIOD OF RECORD: 1939 – 1979
SCALE AS SHOWN
U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
MAY, 1981

FIGURE E-1

a. Floods. Illinois River discharge- and stage-frequency relationships for the reach have been well established from previous analytical and physical model studies. Flood-frequency relationships at the downstream and upstream end of the Swan Lake Project are shown on TABLE E-2.

TABLE E-2

Stage - Frequency

Frequency (yrs)	Mile 5.0 Elevation (NGVD)	Mile 13.0 Elevation (NGVD)
2	424.5	425.5
5	429.9	430.6
10	432.6	433.3
25	435.5	436.1
50	437.7	438.0
100	440.0	440.1

The flood-of-record occurred in 1973 and reached an elevation of about 437.0 NGVD at Grafton. FIGURE E-2 shows the stage-hydrograph for Grafton for the period of record (1939-1979).

b. Sedimentation. Sedimentation data on the Illinois River in the reach are essentially non-existent. Because of the low velocities through the navigation pools at normal flows, the sediment load consists of silts and clays which settle very slowly. During a rising river, water backs into Swan Lake via the opening at the lower end of the lake causing deposition. During floods, when open-river conditions exist, the natural levees along the riverfront are overtopped and deposition occurs in both the Swan and Fuller Lake areas. Also, deposition is occurring in Swan Lake as a result of hillside runoff from the 31 square mile basin draining into it. No continuous records of deposition in the area have been kept, but several studies indicate that deposition is occurring at a rate in excess of 0.50 inches per year, and this loss of water depth has been recognized as a problem for some time. Swan Lake has become less desirable as fish habitat as the water depth has decreased substantially.

Project Hydraulics. To minimize continued sediment deposition from the Illinois River and the substantial hillside drainage, and to improve management of the system for wildlife habitat, a number of alternatives were evaluated. Primary components of the recommended plan are shown on Plates 2 through 3 of the main report and consist of a low riverfront earthen levee, one low interior earth embankment which separates Swan Lake into two compartments, a reversible pumping system in each compartment for filling or draining each separately, a sluice gated gravity drain for conveying water between the two compartments, sluice gated gravity drains and structures with stop logs connecting each compartment to the Illinois River, island wind breaks in each compartment and a sediment retention program administered by the Soil Conservation Service (SCS) in the hillside drainage basin.

a. Riverfront Levee. A low earthen levee was designed to prevent frequent Illinois River floods from depositing sediments within the Swan Lake and Fuller Lake areas. The levee will extend from approximate river mile 5.0 to 13.0, tieing into higher ground at each end, forming a closed levee system. This approximately 8 mile long low levee will have an average height of 3 feet above the natural high ground on the peninsula between the Illinois River and Swan Lake. The average height of the levee is 6 to 7 feet since most of the construction of the levee takes place on lower ground adjacent to Swan Lake to make use of the excavated ditch material removed from the lake. An HEC-2 water surface profile analysis was performed on the Illinois River with the low levees proposed at both the Swan Lake project as well as the proposed Stump Lake project directly across the river. A range of floods from the 2-year through the 500-year recurrence interval were tested for both existing

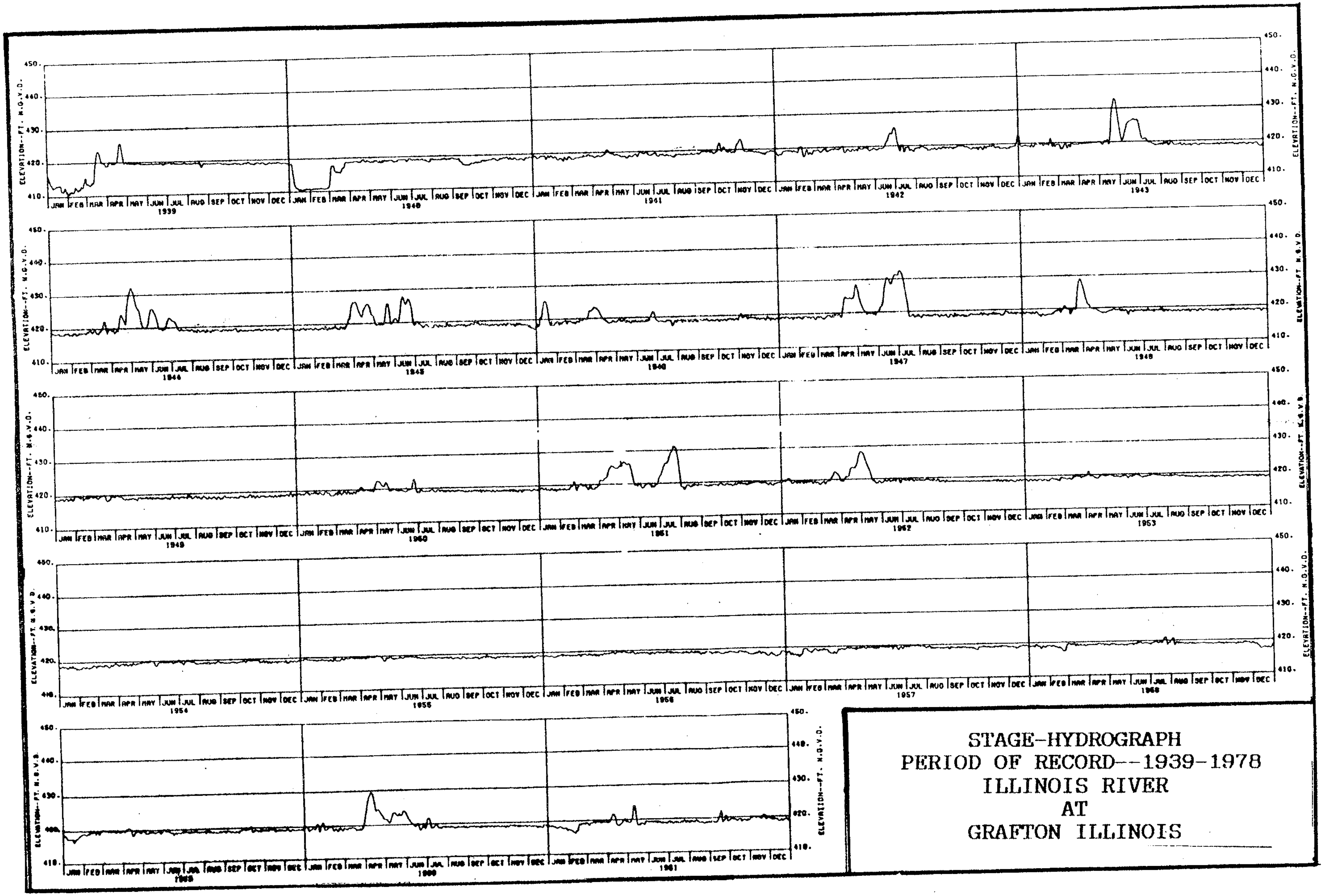

STAGE-HYDROGRAPH
PERIOD OF RECORD--1939-1978
ILLINOIS RIVER
AT
GRAFTON ILLINOIS
ELEVATION--FT. N.G.V.D.
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961

FIGURE E-2A

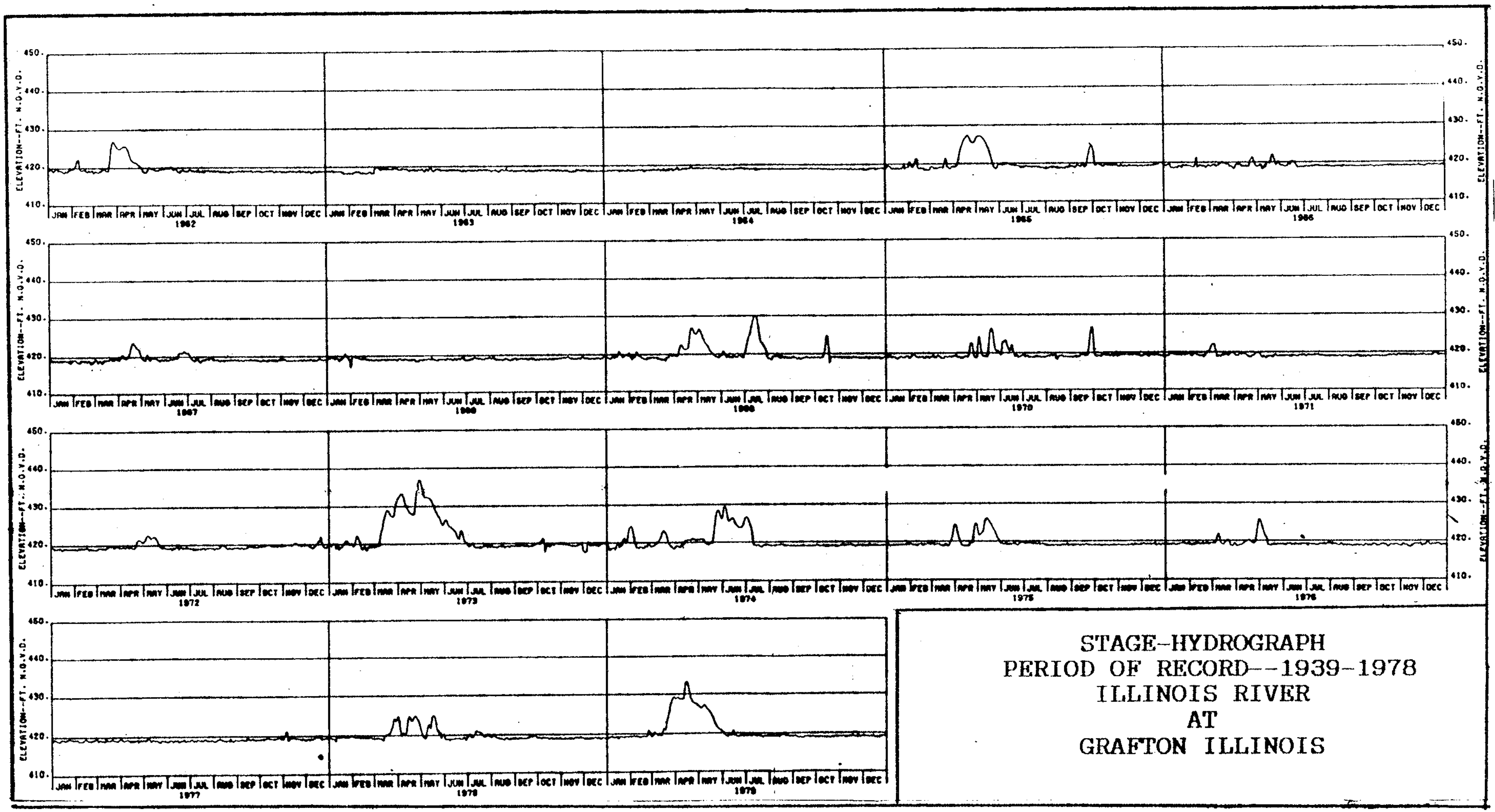

STAGE-HYDROGRAPH
PERIOD OF RECORD--1939-1978
ILLINOIS RIVER
AT
GRAFTON ILLINOIS

FIGURE E-2B

and proposed conditions. The critical flooding event with regard to the two proposed low levee projects is the 2-year event. The remaining flood events had no impact on the water surface since the low levees are considerably overtopped. Likewise, for events more frequent than the 2-year, there is no impact since the combination of the regulated pool at Melvin Price Lock and Dam and the low flows in the Illinois River produces stages below the natural high banks along this reach. With both the Swan Lake and Stump Lake levees in-place the maximum increase in the water surface profile is at the upstream end of the projects. It is about 0.1 feet with Grafton in a regulated pool condition, which is about 90% of the time. Table E-3 shows the effect of both Swan Lake and Stump Lake proposed levees on Upstream Water Surface Profiles.

TABLE E-3

Effect Of Both Swan Lake & Stump Lake Proposed Levees On Upstream Water Surface Profiles

		Increase in Depth Over Existing Conditions (feet) Return Period (years)						
River Mile	Location	2	5	10	25	50	100	500
13.5	Upstream Limits of Swan & Stump Lake Proposed Levees	.13	0	0	0	0	0	0
21.6	Hardin Gage	.07	0	0	0	0	0	0
31.7	Kampsville	.05	0	0	0	0	0	0
43.2	Pearl Gage	0	0	0	0	0	0	0
56.0	Florence Gage	0	0	0	0	0	0	0
70.8	Meredosia Gage	0	0	0	0	0	0	0

(1) Crown elevation. A range of crown elevations for the riverfront levee were analyzed to determine appropriate elevations to exclude most of the sediment, while minimizing construction cost. TABLE E-4 shows the average annual duration associated with various levee crown elevations. Due to an absence of sediment data, it was assumed that the percent reduction in sediment inflow to the complex would be similar to the percent time reduction of complex inundation. This assumption is admittedly qualitative, the actual reduction could be somewhat higher or lower. The 426 levee/dike will prevent sediment-carrying waters from entering the Swan/Fuller Lake complex about 79% of the time. Deposited material within the levee, after the project is constructed, is expected to be minimal, with possible exceptions during a major, long duration event such as the 1973 flood. Therefore, even though much of the sediment is transported during floods, the assumption that sediment reduction to the project area is proportional to the time duration is judged reasonable and valid.

TABLE E-4

Average Annual Duration vs Structure Elevation

Reference Point Near Downstream End (RM 7.7)		Reference Point Near Upstream End (RM 12.7)	
Crown Elev. (NGVD)	Sediment Reduction (%)	Crown Elev. (NGVD)	Sediment Reduction (%)
421	0	422	0
422	31	423	31
425	71	426	71
426	79	427	79
429	93	430	93

At the reference point at mile 7.7, the cost of levee construction above elevation 426 increased at a far greater rate than the incremental amount of sediment reduction. Consequently, minimum net levee crown elevations of 425.5 NGVD at the downstream end of the complex and 427.0 NGVD at the upstream end were selected. The net levee elevation of 427.0 at the upstream end was finally picked to increase the levee slope and guarantee overtopping of the levee to initiate at the lower end.

(2) Levee overtopping. Overtopping of these structures will be a fairly frequent occurrence. The levee crown elevation of 425.5 NGVD at the downstream end represents a stage that corresponds to an approximate recurrence interval of 2 to 3 years. An evaluation of the past 17 years of record (1973-1989) shows 9 years having events greater than 425.5 NGVD, an elevation which would cause the levee to overtop. Floods and overtopping would normally occur in the late winter-early spring of the year, due to upstream snowmelt and normal spring rains. When the low earthen levees are overtopped, some local damage may occur, but should be minimal. Any levee damage during most of these events would be repairable prior to the fall season, when higher interior water levels are required. To ensure minimal damage from overtopping, a 2,000 ft. length of levee near the downstream end will be protected by stone riprap.

(3) Exterior Lake Closure. The project will include the construction of a closure at the lower end of Swan Lake. This closure would be built along the Illinois River bankline between river miles 5.0 and 5.5 and would serve as an extension of the riverside levee by tieing the levee into high ground at Calhoun Point. This closure would be built to an elevation of 427.0 NGVD so that initial overtopping of the levee system would not occur on the closure but immediately upstream. The closure will be protected by riprap. B-stone will be used on the riverside to prevent damage by the Illinois River, since the closure is situated on the outside of a bend. C-stone will be used on the lakeside to prevent damage to the closure once the Illinois River inundates the entire Swan Lake during a flood.

(4) Drainage Structure. Since the proposed riverfront levee forms a closed system, new structures were required to drain excess runoff from the system by gravity during low river conditions. Both compartments in Swan Lake had approximately equal drainage areas, therefore, the same drainage structures were used for each. The drains were designed to pass in 5 days the runoff from a 24-hour, 2-year rainfall over the entire contributing drainage area. Each of the sites would include an uncovered 72 inch reinforced concrete box with sluice gate and a 20-foot wide open concrete channel containing 4-5 foot wide stoplog slots. Fishery biologists have indicated that fish would be more likely to enter Swan Lake for spawning through such an open structure, as compared to a closed culvert. Under existing conditions at

Fuller Lake, the Illinois Department of Conservation fills the area by either pumping or by removing a plug between the lake and the Illinois River to allow gravity flow. Draining of the lake was by pumping or gravity flow through an existing 36 inch pipe which drained into upper Swan Lake. The proposed plan would provide for 1-48 inch gravity drain with sluice gate connecting Fuller Lake to the Illinois River. When overtopping of the levee from high Illinois River levels was imminent, the gates in both Swan Lake compartments and in Fuller Lake could be opened to allow backflooding, reducing the chance of damage to the levee.

(5) <u>Pumping</u>. In order to have the capability to either flood or drain the system, a reversible pumping system was designed. The pumping system, shown on Plate 22, consists of one pump with a capacity of 20,000 gallons per minute (gpm) for each Swan Lake compartment. These pumps, built in conjunction with the 72 inch drains, will be capable of pumping in either direction. Each pump would be used to flood its associated compartment to attract waterfowl in the migration season with a low river level, and to drain the system in the growing season with a generally high (but not overtopping) river level. This filling or emptying could be accomplished in about 20 days with the selected pumping capacity. The Illinois Department of Conservation will use existing pumps for the Fuller Lake area.

(6) <u>Additional Land Acquisition</u>. Under existing conditions, headwater flows from the 31 square mile watershed, enter Swan Lake and immediately exit into the Illinois River at the lower end of the lake via the natural 2,000 foot wide opening. However, under the proposed plan, this lower opening will be closed by the exterior lake closure. Drainage structures included in the plan to facilitate management of the lake elevations are not capable of quickly removing runoff from high intensity local storms, which often occur independent of flooding events on the Illinois River. Situations would occur when elevations in the lake would quickly rise above the concurrent elevation in the Illinois River. Depending on the managed lake elevation before the storm began and the amount of runoff produced, the lake level could increase to an elevation which inundates land above, which neither the Corps, the Fish and Wildlife Service, nor the Illinois Department of Conservation own or have easements. Since the project life is 50 years, the 24-hour, 50-year storm event was chosen as the basis for determining the elevation before the storm began and the amount of runoff produced, the lake level could increase to an elevation which inundates land above, which neither the Corps, the Fish and Wildlife Service, nor the Illinois Department of Conservation own or have easements. Since the project life is 50 years, the 24-hour, 50-year storm event was chosen as the basis for determining the elevation to acquire land rights. The runoff from this event with a starting lake elevation of 421.0 NGVD, which was chosen as the starting elevation because it was considered the maximum future managed lake elevation, produces a 424.0 NGVD acquisition elevation with no gates opened and the full volume of runoff stored in lake. The assumption that no gates are open was chosen because the runoff from the hillside basins is very flashy and it is likely that if a major storm occurred at night, the bulk of the runoff would fill the lake prior to management personnel being able to open the gates the next morning. It should be noted, however, that in most instances, these same lands that might possibly incur induced flooding on occasion, will also benefit from the protection provided by the riverfront levee.

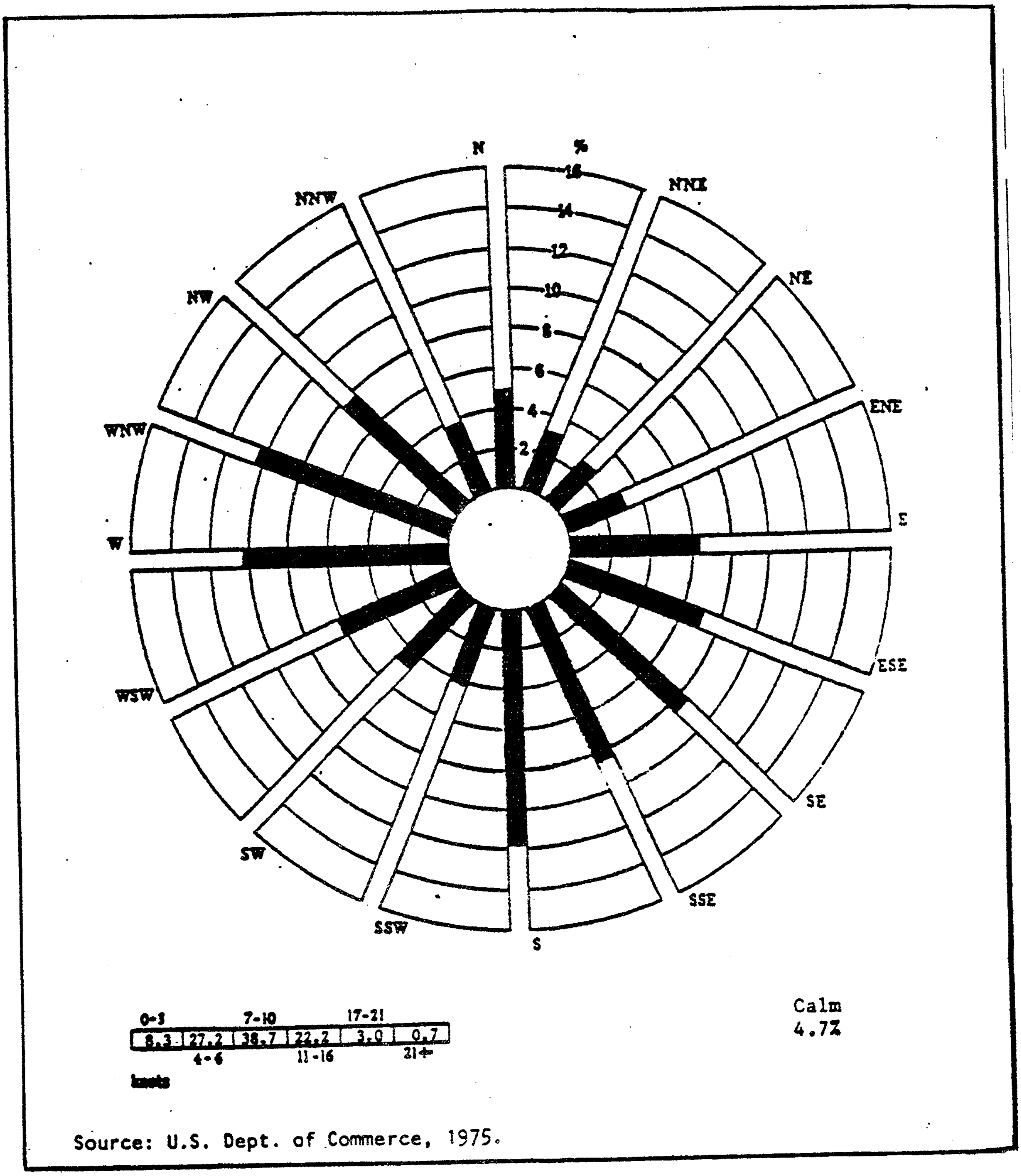
b. Interior Closures.

(1) <u>Crown Elevation</u>. In order to more efficiently manage the complex for waterfowl, a closure separating Swan Lake into two independently managed compartments will be built to a uniform elevation of 423 feet NGVD and protected with stone riprap. This elevation of 423 feet will allow for proper depth of flooding for waterfowl feeding. The existing closure structure between Fuller Lake and Swan Lake will be improved by removing vegetation, making minor riprap repairs, and insuring a minimum grade of 423.0 NGVD.

c. Island Wind Breaks. Using clam-shelled dredge material, two island groups would be created with Swan Lake. One group would lie in a plane perpendicular to the Illinois River at mile 6.0 in the lower compartment. The other would transect the lake at river mile 8.8 in the upper Swan Lake compartment. Both of these island groups would provide a wind break, as would the dividing closure forming the compartments. The prevailing winds, as indicated on FIGURE E-3, come from the south, producing a very long fetch under existing conditions. The waves produced by these winds keep the soft bottom sediments in suspension, which contributes to high turbidity. This high turbidity prevents light penetration into the water, which, in turn, prevents plant production needed to attract both waterfowl and fish.

d. Hillside Sediment Traps. Due to the high sediment delivery rate into Swan Lake from the hillside drainage basin, approximately 100,000 tons per year, three plans to reduce this sediment inflow was investigated. First, bottomland retention basins, in which part of the basins were located in the lake, were investigated. However, this was not acceptable to the local sponsor and was dropped from consideration. The second and third options consisted of hillside sediment retention, a Corps of Engineers built plan and a Soil Conservation Service (SCS) built plan. The recommended project plan was the SCS plan. This plan was chosen not only because it had a lower cost but because of the expertise and experience SCS has in sediment control. The SCS, through the Calhoun County Soil and Water Conservation District, would construct 95 water and sediment control basins, 40 terraces, and 55 ponds.

e. Swan Lake Water Management Plan. A proposed water management plan was devised for Swan Lake and a daily period of record simulation was run using the Illinois River stages and the rainfall-runoff for a typical year (1978), plus the proposed project features. A graph comparing the Illinois River elevations, one potential desired water management regime, and the actual lake elevations is shown in APPENDIX DPR-P, FIGURE P-2. The graph in APPENDIX DPR-P, FIGURE P-3, shows the results of another simulation plan in which the desired elevation is lowered to the lake bottom for an entire year to promote soil consolidation. TABLE E-5 is a rating curve for the Illinois River at Swan Lake, which can be used by the Fish and Wildlife Service to help in the management of the project. It is used in conjunction with forecasted river stages at Grafton and flows at Meredosia to predict the river elevation at the project site.



ANNUAL WIND ROSE FOR ST. LOUIS, MISSOURI (1970-1974).

FIGURE E-3

TABLE E - 5

RATING TABLE
ILLINOIS RIVER ELEVATIONS @ SWAN LAKE
ILLINOIS RIVER MILE 5.5

GRAFTON ELEV.	418.0	419.0	420.0	421.0	422.0	423.0	424.0	425.0
GRAFTON STAGE	14.2	15.2	16.2	17.2	18.2	19.2	20.2	21.2
MEREDOSIA Q PREVIOUS DAY (cfs)								
1000	418.0	419.0	420.0	421.0	422.0	423.0	424.0	425.0
2000	│	│	│	│	│	│	│	│
3000	│	│	│	│	│	│	│	│
4000	│	│	│	│	│	│	│	│
5000	│	│	│	│	│	│	│	│
6000	│	│	│	│	│	│	│	│
7000	418.0	│	│	│	│	│	│	│
8000	418.1	419.0	420.0	│	│	│	│	│
9000	418.1	419.1	420.1	421.0	│	│	│	│
10000	418.1	419.1	420.1	421.1	422.0	423.0	424.0	425.0
15000	418.2	419.2	420.1	421.1	422.1	423.1	424.1	425.1
20000	418.3	419.3	420.2	421.2	422.2	423.1	424.1	425.1
25000	418.5	419.4	420.4	421.3	422.3	423.2	424.2	425.1
30000	418.7	419.6	420.5	421.5	422.4	423.3	424.2	425.2
35000	418.9	419.8	420.7	421.6	422.5	423.4	424.3	425.3
40000	419.2	420.0	420.9	421.8	422.7	423.5	424.4	425.3
45000	419.4	420.3	421.2	422.0	422.8	423.6	424.5	425.4
50000	419.7	420.5	421.4	422.3	423.0	423.8	424.6	425.5
55000	420.0	420.8	421.7	422.4	423.2	423.9	424.8	425.6
60000	420.4	421.1	421.9	422.7	423.3	424.1	424.9	425.7
65000	420.7	421.4	422.2	422.9	423.5	424.3	425.0	425.8
70000	421.0	421.7	422.5	423.1	423.7	424.4	425.2	426.0
75000	421.4	422.0	422.8	423.4	424.0	424.6	425.3	426.1
80000	421.7	422.3	423.1	423.6	424.2	424.8	425.5	426.2
85000	422.1	422.6	423.4	423.8	424.4	425.0	425.6	426.4
90000	422.4	423.0	423.7	424.1	424.6	425.2	425.8	426.5
95000	422.8	423.3	423.9	424.3	424.8	425.4	426.0	426.6

ZERO GAGE ELEVATION AT GRAFTON, ILLINOIS = 403.8 FEET (NGVD)

FLOOD STAGE AT GRAFTON = 18 FEET

OVERTOPPING ELEVATION AT SWAN LAKE = 425.5 FEET (NGVD)

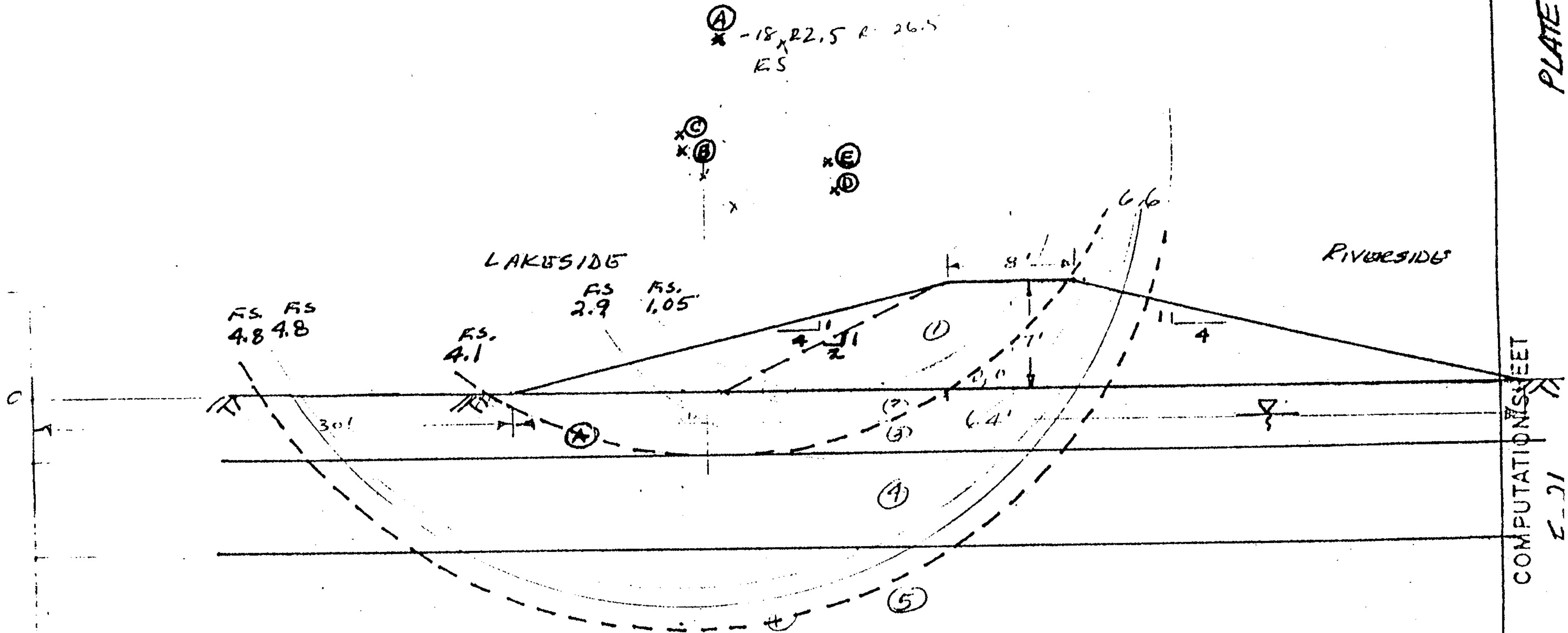
APPENDIX DPR-F

GEOTECHNICAL CONSIDERATIONS

FOREWORD

APPENDIX DPR-F presents the geotechnical effort leading to the proposed project.

SWAN LAKE - EMP



SUMMARY TABLE					
ARC - A	X = -18.5,	Y = 22.5	R = 26.50	F.S = 4.143	1 on 4 slope
B	-20.5	14.5	29.0	F.S. = 4.769	1 on 4 slope
C	-20.5	15.5	29.0	F.S = 4.775	1 on 4 slope
D	-11.0	13.0	17.0	F.S = 2.884	1 on 2 slope
*E	-11.5	15.0	18.0	F.S. = 1.05	1 on 2 slope

SOIL LEGEND

(1) Clay - c = 250 psf

(2), (3) clay - c = 800 psf

(4) clay - c = 600 psf

(5) sand - $\phi = 35°$

PLATE F-

COMPUTATION SHEET

LMV FORM 1 FEB 79 1078-R

SUBJECT

CHECKED BY DATE

Page ___ of ___

*Note: soil strengths were lowered to: (1) clay => C = 100 psf
(2) & (3) => C = 400 psf

```
A:SWANSTA.IN     Line:...
/ HEADING
/ SWAN LAKE EARTH LEVEE
/ STA. SVS-17
/ STAB. ANAL
/ PROFILE LINES
/ 1 1 EMB LINES
/ -32 0
/ -4 7
/ 4 7
/ 32 0
/
/ 2 2 SURFACE CLAY UPPER
/ -62 0
/ -32 0
/ 32 0
/ 62 0
/
/ 3 3 SURFACE CLAY LOWER
/ -62 -2
/ 62 -2
/
/ 4 4 FOUND. CLAY
/ -62 -4
/ 62 -4
A:SWANSTA.IN     Line:47     Col:02     Free:6433     Mode: EDIT          Com key:[F1]
/
/ 5 5 FOUND. SAND
/ -62 -50
/ 62 -50
/
/
/ HEA
/ SWAN LAKE
/ STA. SVS-17
/ STAB. ANAL
/ MATERIALS
/ 1 EMB 1
/ 110
/ CONVENTIONAL
/ 250 0
/ NO
/ 2 CLAY 1
/ 110
/ CONVENTIONAL
/ 800 0
/ NO
/ 3 CLAY 1B
/ 110
/ CONVENTIONAL
A:SWANSTA.IN     Line:71     Col:02     Free:6433     Mode: EDIT          Com key:[F1]
/ 800 0
/ PIEZOMETER LINE
/ 1 PIEZ LINE FOR GROUNDWATER
/ 4 FOUND. CLAY
/ 110
/ CONVENTIONAL
/ 600 0
/ PIEZOMETER LINE
/ 1 PIEZ LINE FOR GROUNDWATER
/ 5 FOUND. SAND
/ 120
/ CONVENTIONAL
/ 0 35
/ PIEZOMETER LINE
```

SLOPE STABILITY COMPUTER ANALYSES

FIGURE F-16

to a Horizontal Line

Center Coordinates X	Center Coordinates Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-34.00	-1.00	3.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-19.00	-1.00	3.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-4.00	-1.00	3.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-34.00	14.00	18.00	15.776	4.08	28
-19.00	14.00	18.00	4.430	8.45	6
-4.00	14.00	18.00	10.971	2.28	20
-34.00	29.00	33.00	10.361	5.43	17
-19.00	29.00	33.00	4.242	6.97	5
-4.00	29.00	33.00	13.991	1.55	26

Center Coordinates X	Center Coordinates Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-34.00	44.00	48.00	8.054	6.20	13
-19.00	44.00	48.00	4.890	5.17	7

Center Coordinates X	Center Coordinates Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-20.50	20.00	24.00	4.265	8.17	6
-19.00	20.00	24.00	4.169	7.96	5
-17.50	20.00	24.00	4.156	7.63	5
-20.50	21.50	25.50	4.246	8.00	6
-17.50	21.50	25.50	4.149	7.49	5
-20.50	23.00	27.00	4.240	7.82	6
-19.00	23.00	27.00	4.159	7.63	5
-17.50	23.00	27.00	4.149	7.37	5

Center Coordinates X	Center Coordinates Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-16.00	20.00	24.00	4.194	7.28	5
-16.00	21.50	25.50	4.197	7.14	5
-16.00	23.00	27.00	4.218	6.97	5

Center Coordinates X	Center Coordinates Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-18.00	21.00	25.00	4.146	7.65	5
-17.50	21.00	25.00	4.151	7.54	5

X	Y	Radius	Safety	(degrees)	Iterations
-18.50	23.00	27.00	4.148	7.55	5
-18.00	23.00	27.00	4.145	7.46	5

At the end of the current mode of search the most critical circle which was found has the following values -
X-center = -18.00 Y-center = 22.50 Radius = 26.50
Factor of Safety = 4.143 Side Force Inclination = 7.51

SEARCH WITH MODE = 3 STARTED

TABLE NO. 13
INFORMATION FOR CURRENT MODE OF SEARCH - All Circles Have the Same Radius - Radius = 26.500

SLOPE STABILITY COMPUTER ANALYSES

FIGURE F-17

of Inclination
Radius Safety (degrees) Iterations

.50 44.00 See Message on Next Line(s)

CIRCLE DOES NOT INTERSECT SLOPE

-20.50	.50	29.00	5.580	14.10	8

Message on the following line(s) applies to the above circle
DENOMINATOR IN EQUATIONS FOR FACTOR OF SAFETY WAS SMALL FOR 9 SLICES
FIRST AND LAST SLICES WHERE DENOMINATOR WAS LOW - 2 10

-21.00	15.00	29.00	4.775	2.78	7
-20.50	15.00	29.00	4.771	2.71	7
-20.00	15.00	29.00	4.774	2.64	7

At the end of the current mode of search the most critical circle which was found has the following values -
X-center = -20.50 Y-center = 14.50 Radius = 29.00
Factor of Safety = 4.769 Side Force Inclination = 2.54

SEARCH WITH MODE = 2 STARTED

TABLE NO. 12
INFORMATION FOR CURRENT MODE OF SEARCH - All Circles Are Tangent to a Horizontal Line at Y = -14.500

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-35.50	-.50	14.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-20.50	-.50	14.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-5.50	-.50	14.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-35.50	29.50	44.00	See Message on Next Line(s)		

CIRCLE DOES NOT INTERSECT SLOPE

-20.50	29.50	44.00	5.433	1.65	8
-5.50	29.50	44.00	14.363	.34	25

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations

SLOPE STABILITY COMPUTER ANALYSES

FIGURE F-18

10.50 24.00 4.918 2.59

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-22.00	10.50	24.00	5.073	2.69	8
-19.50	10.50	24.00	4.918	2.59	7
-17.00	10.50	24.00	4.947	2.45	7
-22.00	13.00	26.50	4.902	2.97	7
-17.00	13.00	26.50	4.898	2.49	7
-22.00	15.50	29.00	4.812	3.07	7
-19.50	15.50	29.00	4.786	2.74	7
-17.00	15.50	29.00	4.938	2.38	7

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-22.00	18.00	31.50	4.806	2.98	7
-19.50	18.00	31.50	4.838	2.60	7
-17.00	18.00	31.50	5.033	2.22	7

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-21.00	14.00	27.50	4.802	2.97	7
-19.50	14.00	27.50	4.784	2.80	7
-21.00	14.00	27.50	4.802	2.97	7
-19.50	14.00	27.50	4.784	2.80	7
-18.00	14.00	27.50	4.833	2.60	7
-21.00	15.50	29.00	4.780	2.95	7
-18.00	15.50	29.00	4.855	2.53	7
-21.00	17.00	30.50	4.785	2.89	7
-19.50	17.00	30.50	4.811	2.66	7
-18.00	17.00	30.50	4.897	2.44	7

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-22.50	14.00	27.50	4.892	3.07	7
-22.50	15.50	29.00	4.839	3.12	7
-22.50	17.00	30.50	4.819	3.09	7

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-21.50	15.00	28.50	4.800	3.02	7
-21.00	15.00	28.50	4.784	2.97	7
-20.50	15.00	28.50	4.776	2.90	7
-21.50	15.50	29.00	4.793	3.01	7
-20.50	15.50	29.00	4.775	2.88	7
-21.50	16.00	29.50	4.789	3.00	7
-20.00	16.00	29.50	4.781	2.79	7

At the end of the current mode of search the most critical circle which was found has the following values --
X-center = -20.50 Y-center = 15.50 Radius = 29.00
Factor of Safety = 4.775 Side Force Inclination = 2.88

EARCH WITH MODE = 3 STARTED

TABLE NO. 13
INFORMATION FOR CURRENT MODE OF SEARCH - All Circles Have the Same Radius - Radius = 29.000

SLOPE STABILITY COMPUTER ANALYSES

FIGURE F-19

X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-16.50	8.50	12.50	[illegible]	6.47	5
-14.00	8.50	12.50	3.252	5.84	5
-11.50	8.50	12.50	2.994	4.57	7
-16.50	11.00	15.00	3.648	8.57	5
-11.50	11.00	15.00	2.908	6.88	4
-16.50	13.50	17.50	3.464	8.62	4
-14.00	13.50	17.50	3.047	7.75	4
-11.50	13.50	17.50	2.891	7.48	4

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-9.00	11.00	15.00	2.977	7.10	4
-9.00	13.50	17.50	3.027	6.93	4
-14.00	16.00	20.00	3.056	7.61	4
-11.50	16.00	20.00	2.945	7.30	4
-9.00	16.00	20.00	3.160	6.36	4

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-13.00	12.00	16.00	2.968	7.41	4
-10.50	12.50	16.50	2.887	7.79	4
-10.50	13.00	17.00	2.891	7.41	4
-10.50	13.50	17.50	2.899	7.39	4

At the end of the current mode of search the most critical circle which was found has the following values -
X-center = -11.00 Y-center = 13.00 Radius = 17.00
Factor of Safety = 2.884 Side Force Inclination = 7.44

SEARCH WITH MODE = 3 STARTED

TABLE NO. 13
INFORMATION FOR CURRENT MODE OF SEARCH - All Circles Have the Same Radius - Radius = 17.000

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-26.00	-2.00	17.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
-11.00	-2.00	17.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		
4.00	-2.00	17.00	Center of circle is below lowest point of slope - CIRCLE REJECTED		

***** CAUTION ***** FACTOR OF SAFETY COULD NOT BE COMPUTED FOR SOME OF GRID POINTS AROUND THE MINIMUM
***** RESULTS MAY BE ERRONEOUS *****

TABLE NO. 15
***** FINAL CRITICAL CIRCLE INFORMATION *****
X Coordinate of Center - - - - - - - - -11.000
Y Coordinate of Center - - - - - - - - 13.000
Radius - - - - - - - - - - - - - - - - 17.000
Factor of Safety - - - - - - - - - - - 2.884
Side Force Inclination - - - - - - - - 7.44

Number of circles tried - - - - - - 78

SLOPE STABILITY COMPUTER ANALYSES

FIGURE F-20

-13.50	12.00	16.00	2.674	10.10	4
-8.50	12.00	16.00	2.751	8.72	4
-13.50	14.50	16.00	2.543	13.85	4
-11.00	14.50	16.00	2.408	12.67	4
-8.50	14.50	16.00	2.568	11.33	4

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-13.50	17.00	16.00	1.342	12.56	9
-11.00	17.00	16.00	1.238	8.86	9
-8.50	17.00	16.00	1.306	6.93	10

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-13.50	19.50	16.00	5.303	20.18	8
-11.00	19.50	16.00	2.527	12.40	4
-8.50	19.50	16.00	2.304	7.79	8

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-12.50	15.50	16.00	2.101	14.62	5

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-11.50	16.50	16.00	1.137	8.92	7
-11.00	16.50	16.00	1.138	8.42	9
-10.50	16.50	16.00	1.143	7.97	7
-11.50	17.00	16.00	1.242	9.45	12
-10.50	17.00	16.00	1.240	8.36	7
-11.50	17.50	16.00	1.375	10.05	7
-11.00	17.50	16.00	1.364	9.35	7
-10.50	17.50	16.00	1.361	8.76	10

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-12.00	16.00	16.00	1.054	8.93	11
-11.50	16.00	16.00	1.053	8.43	11
-11.00	16.00	16.00	1.057	7.99	10
-12.00	16.50	16.00	1.142	9.51	10
-12.00	17.00	16.00	1.253	10.13	10

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-11.50	15.00	15.00	1.052	8.42	7
-11.00	15.00	15.00	1.054	7.95	11

Center Coordinates X	Y	Radius	Factor of Safety	Side Force Inclination (degrees)	Iterations
-12.00	15.50	15.50	1.054	8.95	10
-11.50	15.50	15.50	1.052	8.43	10
-11.00	15.50	15.50	1.055	7.98	7

At the end of the current mode of search the most critical circle which was found has the following values -
X-center = -11.50 Y-center = 15.00 Radius = 15.00
Factor of Safety = 1.052 Side Force Inclination = 8.42

SLOPE STABILITY COMPUTER ANALYSES

FIGURE F-21

PROJECT SWAN LAKE — EMP | Page — of — | CFH | 7-2-90
CHECKED BY | DATE

SUBJECT ASSUMPTIONS FOR BARRIER ISLANDS

Construction Procedure

Soil displacement — Material dumped or placed on soft soils until weaker soils displaced to any unknown depth.

MANY cases 4 to 5 volumes of fill below grade required before 1 volumes is stable above grade.

Fig. #1

Ref Fig 32 - VPI GEOTECHNICAL ENGR. Duncen (SHEAR STRENGTH ESTIMATE)

SL-5 PI = 63 surface
25 4' depth
32 8' (bottom)

SL-13 PI = 48 surface
20 4'
28 8' bott.

Using PEORIA LAKE ENHANCEMENT

PI	psf
= 63	84
25	100
20	110

$9/15 = 7/x$

$9x = 105$

$\therefore x = 10\ 5/9$ say 11 ft min

OVERBURDEN WEIGHT

110 pcf x 3 + 4 x 47.5 = 520 psf

LMV FORM 1 FEB 79 107e—R COMPUTATION SHEET FIGURE F 22

APPENDIX DPR-G

CULTURAL RESOURCES DOCUMENTATION

APPENDIX DPR-G provides information on the overall cultural Resources survey strategy, a Draft Programmatic Agreement and a summary of coordination on that agreement, pertinent correspondence, and a survey cost estimate and assumptions.

APPENDIX DPR-G

CULTURAL RESOURCES DOCUMENTATION

Investigations directed by a professional archaeologist will be conducted to locate, evaluate and protect any significant sites in areas of ground disturbance prior to construction related earthmoving activities. In the event that significant archaeological sites are located, measures shall be developed to either excavate the sites or to alter the project design so as to avoid the archaeological sites as set forth in an agreement document discussed below.

The St. Louis District, in coordination with the Illinois State Historic Preservation officer, the Advisory Council on Historic Preservation and the U. S. Fish and Wildlife Service, is preparing a Programmatic Agreement to protect significant archaeological resources at projects of the Habitat Rehabilitation and Enhancement Program (HREP) of the Upper Mississippi-Environmental Management Program on St. Louis District lands including Swan Lake. Copies of the draft coordination letters to Susan Mogerman, Illinois State Historic Preservation Officer; Valerie DeCarlo, Advisory Council on Historic Preservation; and Chuck Gibbons, U. S. Fish and Wildlife Service are attached. In their review of the Final Definite Project Report dated August 6, 1992 (attached), the Illinois SHPO again stated that the PA would "adequately address all compliance issues and concerns...", however they would not agree to signing of the FONSI prior to signing of the PA. This Programmatic Agreement will follow the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-39) and the Illinois State Historic Preservation Office Guidelines for Archaeological Reconnaissance Surveys/Reports. The Programmatic Agreement will ensure that any significant site at Swan Lake will be located, evaluated and recovered. The District concludes that the effect of undertaking the project would not be adverse.

During the planning stage of this project the decision was made to conduct historic properties compliance on the Swan Lake project and its sister project, Stump Lake, during the construction phase. Two reasons led to this decision. First, the complexity of the projects might lead to changes during the Design Phases which would necessitate additional, unprogrammed fieldwork if the fieldwork already had been conducted. Secondly, the areas under consideration are too densely vegetated for effective shovel testing. Survey and any subsequent steps in such areas are more cost-effective if conducted after vegetation clearance associated with initial construction has occurred. Both the Illinois SHPO and the Council agreed to this approach during consultation on the draft PA in 1991. However, given the concerns raised by the WLRC review, for future EMP projects, where the above problems do not exist, survey work will be initiated during the earlier phases.

During the Design phase, a preliminary assessment of the potential of certain landforms to contain archaeological sites will be conducted by first examining historical documents indicating recent soil deposition and then utilizing subsurface geologic coring. Cores will be examined by a geomorphologist and an archaeologist to determine the presence of cultural material or the potential for such material to occur. Results will be used in conducting a landscape analysis to predict areas of high, medium, low and no probablility of site occurrence. This analysis will document areas of recent (less than 50 years old) soil deposition which will not require cultural resources investigation.

At the beginning of the construction phase, a plan to conduct a cultural resources reconnaissance survey will be developed and coordinated with the FWS and the Illinois SHPO. The lowland landscape analysis developed during the Design phase will be used to determine areas to be investigated by walkover survey and shovel testing. The walkover survey and shovel testing will be conducted where possible prior to construction. However, in the remaining areas of dense vegetation which prohibit survey initially, the survey will be conducted in conjunction with the initial land clearance.

Separate Detailed Government Estimates were prepared for the lowland and upland basin portions of the project. Both estimates were based on estimated project impacted acreage, assumptions about site density based on topography, how long it would take to survey the area and the costs of previous contracts (below). The estimated lowland portion cost is $44,071.00 and the estimated upland portion cost is $97,460.00 for an estimated total of $141,531.00 (including a 10% contingency). (Note: This estimate has been revised upward to reflect increases in contractor costs.)

Assumptions upon which these cost estimates are based are as follows:

1. Assumptions for cultural resources cost estimate for lowland segment of project:

a. Due to vegetation density, shovel testing to locate cultural resources will be necessary in most areas which will be disturbed by construction. Shovel testing rate will be approximately 20 shovel tests/person/day; shovel tests will be dug at 20 meter (54 foot) intervals.

b. Given that a portion of the levee is on recent (post-1903) sediments, assume that no more than 1/2 of the levee (22,350 ft.) will be constructed on pre-1903 soils which will require shovel testing. The proposed levee corridor will require a walk-over survey by archaeologists to determine whether any post-1903 cultural resources are present.

c. The total number of shovel tests for all areas to be disturbed by construction (including the levee on pre-1903 soils) is estimated to be 1,060 shovel tests.

d. Assume that 3 archaeological sites will be found by the survey. Assume that each site will require 2 people working 3 days to assess (total 18 field days) and that the sites will not require further testing or mitigation.

2. Assumptions for cultural resources cost estimates for upland segment of project:

a. Given that SCS plans to accomplish this over a 5 year period, assume that the cultural resources open-ended contract can be administered in 3 delivery orders.

b. Assume that, as indicated by SCS, the terraces (etc.) will be in plowed area which can be investigated by walk-over survey to locate cultural resources and shovel testing will not be required.

c. Assume following previous SCS practice, that proposed terrace etc. areas will be relocated if cultural resources are encountered to avoid impacting the resource. Assume that the resources so located will not require further evaluation since they are on private, not federal, property and will not be impacted by a federal project.

d. Assume that a team of 2 archaeologists can investigate 3 proposed terrace areas per day and 2 teams will investigate a total of 6 terrace areas per day.

e. Assume that a total of 190 terrace etc. areas will be investigated.

PROGRAMMATIC AGREEMENT

AMONG THE U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT, THE U.S. FISH AND WILDLIFE SERVICE, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND THE ILLINOIS STATE HISTORIC PRESERVATION AGENCY HABITAT REHABILITATION AND ENHANCEMENT PROGRAM (HREP) UPPER MISSISSIPPI RIVER SYSTEM - ENVIRONMENTAL MANAGEMENT PROGRAM (UMRS-EMP) ILLINOIS

WHEREAS, the U.S. Army Corps of Engineers, St. Louis District (Corps) has determined that the construction of the Habitat Rehabilitation and Enhancement Program (HREP) of the Upper Mississippi River - Environmental Management Program in St. Louis District lands in Illinois may have an effect upon properties potentially eligible for the National Register of Historic Places (NRHP) and has consulted with the Advisory Council on Historic Preservation (Council) and the Illinois State Historic Preservation Officer (SHPO) pursuant to Section 800.13 of the regulations (36 CFR Part 800) implementing 106 of the National Historic Preservation Act (16 U.S.C. Section 470f);

WHEREAS, the Fish and Wildlife Service (FWS) proposes to manage Corps lands at the HREP projects including any historic properties eligible or potentially eligible for the NRHP which are being preserved in place as a treatment to avoid adverse impacts from this project;

NOW, THEREFORE, the Corps, the FWS, the Illinois SHPO, and the Council agree that the project shall be implemented in accordance with the following stipulations to satisfy the Corps' Section 106 responsibilities for the project.

Stipulations

The Corps will ensure that the following measures are carried out:

I. ARCHAEOLOGICAL SURVEY

A) The Corps shall ensure that an archaeological reconnaissance survey (Phase I) will be performed in all project areas not previously surveyed. The Phase I survey shall be conducted in consultation with the Illinois SHPO and a report of the survey shall be submitted to the Illinois SHPO for review. An archaeological intensive survey (Phase II) will be performed at all historic properties within the project area to evaluate their National Register eligibility, except any sites that the Corps and the SHPO agree are ineligible on the basis of Phase I findings. Phase II testing methodologies shall be formulated in consultation with the Illinois SHPO. A report of the Phase II findings shall be submitted to the Illinois SHPO for review.

B) The Phase I and Phase II surveys will be conducted in a manner consistent with the Secretary of the Interior's <u>Standards and Guidelines for Identification</u> (48 FR 44720-23) and taking into account the National Park Service publication <u>The Archaeological Survey: Methods and Uses</u> (1978) and the Illinois State Historic Preservation Office Guidelines for Archaeological Reconnaissance Surveys/Reports. The Phase I and Phase II investigations will be implemented by the Corps and monitored by the Illinois SHPO.

C) In consultation with the Illinois SHPO, the Corps shall evaluate properties identified through the Phase II survey against the National Register criteria (36 CFR Part 60.4).

1. For those properties which the Corps and the Illinois SHPO agree are not eligible for inclusion in the National Register, no further archaeological investigations will be required, and the proposed project may proceed in those areas.

2. If the survey results in the identification of properties that the Corps and the Illinois SHPO agree are eligible for the National Register, such properties shall be treated in accordance with Part II below.

3. If the Corps and the Illinois SHPO do not agree on National Register eligibility, or if the Council or the National Park Service so request, the Corps shall request a formal determination of eligibility from the Keeper of the National Register, National Park Service, whose determination shall be final.

II. TREATMENT (PHASE III)

A) Those sites which the Corps and the Illinois SHPO have agreed are potentially eligible or eligible for the National Register and for which preservation is determined to be the appropriate mitigation action will be treated in the following manner:

1. The Corps shall insure that these sites will not be impacted during project construction.

2. The FWS, in consultation with the Corps and the Illinois SHPO, shall develop a management plan for the protection of these sites while they are managed by the FWS. This plan shall be approved annually by the Corps.

B) Those sites which the Corps and the Illinois SHPO agree are eligible for the National Register and for which data recovery rather than avoidance is necessary will be treated in the following manner;

1. The Corps shall ensure that a data recovery plan addressing substantive research questions is developed in consultation with the Illinois SHPO for the recovery of relevant archaeological data. The plan shall be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-37) and take into account the Council's publication, Treatment of Archaeological Properties. It shall specify, at a minimum, the following:

a. the property, properties, or portions of properties where data recovery is to be carried out;

b. the research questions to be addressed through the data recovery, with an explanation of their relevance and importance;

c. the methods to be used, with an explanation of their relevance to the research questions;

d. proposed methods of disseminating results of the work to the interested public; and

e. a proposed schedule for the submission of progress reports to the Illinois SHPO.

2. The data recovery plan shall be submitted by the Corps to the Illinois SHPO for thirty (30) days review. After comments are received from the SHPO, the Corps shall then ensure that the data recovery plan is implemented. The Illinois SHPO shall monitor this implementation.

3. The Corps shall ensure that the data recovery plan is carried out by or under the direct supervision of an archaeologist(s) who meets, at minimum, the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-9).

4. The Corps shall ensure that adequate laboratory time and space are available for analysis of artifacts recovered from the excavations, including osteological, cultural, and biological materials.

5. The Corps shall ensure that a program of site security from vandalism during data recovery is developed in consultation with the Illinois SHPO, and then implemented by the Corps.

III. ARCHAEOLOGICAL MONITORING

A) If any portions of the project areas are inaccessible prior to project implementation and if historic properties are likely to be present, archaeological monitoring during construction will be conducted.

B) The Corps shall ensure that monitoring will take place according to the following specifications:

1. All construction excavations will be monitored by or under the direct supervision of an archaeologist(s) who meets, at minimum, the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-9).

2. If deposits from prehistoric or historic occupations are encountered, the archaeologist will be provided sufficient time and access to evaluate, record and conduct data recovery of features and artifact concentrations.

3. Adequate laboratory time and space will be available as set forth in section II. B) 4. of this agreement.

4. A program of site security will be developed as set forth in secton II. B) 5. of this agreement.

IV. CURATION AND DISSEMINATION OF INFORMATION

A) In consultation with the Illinois SHPO, the Corps shall ensure that all materials and records resulting from the data recovery and/or construction monitoring conducted for the UMRS-EMP projects are curated at the Illinois State Museum and in accordance with 36 CFR Part 79.

B) The Corps shall ensure that copies of all final archaeological reports resulting from actions pursuant to this Agreement will be provided to the Illinois SHPO, the National Park Service and to the National Technical Information Service (NTIS). The agency official shall ensure that all such reports are responsive to contemporary standards, and to the Department of the Interior's Format Standards for Final Reports of Data Recovery Programs (42 FR 5377-79). Precise locational data may be provided only in a separate appendix if it appears that its release could jeopardize archaeological sites.

V. PROVISION FOR UNDETECTED ARCHAEOLOGICAL RESOURCES DISCOVERED DURING IMPLEMENTATION

In accordance with 36 CFR Section 800.11(a), if previously undetected archaeological resources are discovered during project activities, the Corps will immediately cease, or cause to stop, an activity having an effect on the resource and consult with the Illinois SHPO to determine if additional investigation is required.

If further archaeological investigations are required, any data recovery will be performed in accordance with Part II TREATMENT (PHASE III) and Part IV CURATION AND DISSEMINATION OF INFORMATION of this Agreement. If further investigation is not necessary, activities may resume with no further action required. Any disagreement between the Corps and the Illinois SHPO concerning the need for further investigations will be handled pursuant to Part VI. DISPUTE RESOLUTION of this Agreement.

VI. DISPUTE RESOLUTION

The Corps and the Illinois SHPO shall together attempt to resolve any disagreement arising from implementation of this Agreement. If the Corps determines that the disagreement cannot be resolved, the Corps shall request the further comments of the Council in accordance with 36 CFR Part 800.6(b). Any Council comment provided in response will be taken into account by the Corps in accordance with 36 CFR Part 800.6(c)(2), with reference only to the subject of the dispute. The Corps' responsibility to carry out all actions under this Agreement that are not the subjects of the dispute will remain unchanged.

Execution and implementation of this Programmatic Agreement evidences that the U.S. Army Corps of Engineers, St. Louis District, has satisfied its Section 106 responsibilities for all individual undertakings of the project.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

_______________________________ Date: __________
Executive Director

ILLINOIS STATE HISTORIC PRESERVATION OFFICER

_______________________________ Date: __________
State Historic Preservation Officer

U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT

_______________________________ Date: __________
Title:

UNITED STATES DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE

_______________________________ Date: __________
Title:

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

June 28, 1991

Environmental & Recreational Resources Branch
Planning Division

Ms. Susan Mogerman
Illinois State Historic Preservation Officer
Acting Director
Illinois Historic Preservation Program
Old State Capitol
Springfield, Illinois 62701

Dear Ms. Mogerman:

This letter is to advise the Illinois State Historic Preservation Officer that the U. S. Army Corps of Engineers is initiating a Programmatic Agreement to insure that no adverse effects will occur to historic properties in Illinois as a result of projects included in the Upper Mississippi River System-Environmental Management Program (UMRS-EMP). A draft Programmatic Agreement is attached for comment. This action is taken in accordance with the National Historic Preservation Act, Section 106 (as amended) and its implementing regulation 36CFR800.

The UMRS-EMP was authorized by the Water Resources Development Act of 1986, Public Law 99-662 and involves construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. The purpose of the UMRS-EMP is to rehabilitate and enhance fish and wildlife habitat by reducing sedimentation and by implementing a variety of habitat management practices. The Corps is responsible for constructing these habitat projects. The project sponsor (usually the U S. Fish and Wildlife Service on the Illinois Department of Conservation) will manage the completed projects. Nearly all projects will be on Federally owned lands.

The Programmatic Agreement specifies the processes by which all significant historic properties will be located, evaluated, and treated prior to construction, by which construction monitoring may be conducted and by which archaeological remains will be curated. The consulting parties in addition to the Corps will be the Advisory Council on Historic Preservation, the Illinois State Historic Preservation Officer, the U. S. Fish and Wildlife Service and project specific parties, if any.

The Corps requests that any comments which the Illinois State Historic Preservation Officer has concerning this draft document be forwarded by July 31, 1991. If you have any questions regarding this matter, please contact either Ms. Suzanne Harris at (314) 331-8467 or Mr. Terry Norris at (314) 331-8468.

Sincerely,

Owen D. Dutt
Acting Chief, Planning Division

Copy Furnished:

Ms. Paula Cross
Preservation Service Division
Illinois Historic Preservation Agency
Old State Capitol
Springfield, Illinois 62701

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

June 18, 1991

Environmental & Recreational Resources Branch
Planning Division

Mr. Chuck Gibbons, Chief
Special Services
U.S. Fish and Wildlife Service
Federal Building
Fort Snelling
Twin Cities, MN 55111

Dear Mr. Gibbons:

This letter is to advise the U.S. Fish and Wildlife Service that the U.S. Army Corps of Engineers is, St. Louis District (Corps) initiating a Programmatic Agreement to insure that no adverse effects will occur to historic properties on St. Louis District lands in Illinois as a result of projects included in the Habitat Rehabilitation and Enhancement Program (HREP) portion of the Upper Mississippi River System-Environmental Management Program. A draft Programmatic Agreement, which was developed in close coordination with the Illinois State Historic Preservation Officer's staff, is attached for comment. This action is taken in accordance with the National Historic Preservation Act, Section 106 (as amended) and its implementing regulation 36CFR800.

The Corps is initiating this Programmatic Agreement as the agency responsible for constructing these habitat projects. The Corps requests that the U.S. Fish and Wildlife Service be a signatory to the document since that agency will usually manage the completed projects. As part of the agreement (Part II, 2.) the Corps is requesting that the Fish and Wildlife Service will include in their annual HREP management plans a plan for the protection of any archaeological sites that remain undisturbed following the completion of investigations.

In addition, the Programmatic Agreement specifies the processes by which all significant historic properties will be located, evaluated, and treated prior to construction, by which construction monitoring may be conducted and by which archaeological remains will be curated. The consulting parties in addition to the Corps and FWS will be the Advisory Council on Historic Preservation, the Illinois State Historic Preservation Officer, and project specific parties, if any.

The Corps requests that any comments which the U.S. Fish and Wildlife Service has concerning this draft document be forwarded by July 31, 1991. If you have any questions regarding this matter, please contact either Ms. Suzanne Harris at (314) 331-8467 or Mr. Terry Norris at (314) 331-8468.

Sincerely,

Owen D. Dutt

Owen D. Dutt
Acting Chief, Planning Division

Copy Furnished:

Ms. Paula Cross
Preservation Services Division
Illinois Historic Preservation Agency
Old State Capitol
Springfield, Illinois 62701

DEPARTMENT OF THE ARMY

ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

June 28, 1991

Environmental & Recreational Resources Branch
Planning Division

Ms. Valerie DeCarlo
Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, Rm 803
Washington, D. C. 20004

Dear Ms. DeCarlo:

As we discussed during our telephone conversation on April 2, 1991, the U.S. Army Corps of Engineers, St. Louis District (Corps) is initiating a Programmatic Agreement to insure that no adverse effects will occur to historic properties on St. Louis District lands in Illinois as a result of projects included in the Habitat Rehabilitation and Enhancement Program (HREP) portion of the Upper Mississippi River System-Environmental Management Program (UMRS-EMP). A draft Programmatic Agreement, which was developed in close coordination with the Illinois State Historic Preservation Officer's staff (Ms. Paula Cross), is attached for comment. This action is taken in accordance with the National Historic Preservation Act, Section 106 (as amended) and its implementing regulation 36 CFR 800. A separate Programmatic Agreement is being prepared for UMRS-EMP projects in Missouri and the draft will be forwarded for comment at a later date.

The HREP was authorized by the Water Resources Development Act of 1986, Public Law 99-662 and involves construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. The purpose of the HREP is to rehabilitate and enhance fish and wildlife habitat by reducing sedimentation and by implementing a variety of habitat management practices. The Corps is responsible for constructing these habitat projects. The project sponsor (usually the U.S. Fish and Wildlife Service) will manage the completed projects. Nearly all projects will be on Federally owned lands.

The Programmatic Agreement specifies the processes by which all significant historic properties will be located, evaluated, and treated prior to construction, by which construction monitoring may be conducted and by which archaeological remains will be curated. The consulting parties in addition to the Corps will be the Advisory Council on Historic Preservation, the Illinois State Historic Preservation Officer, the U.S. Fish and Wildlife Service and project specific parties, if any.

The Corps requests that any comments which the Advisory Council on Historic Preservation has concerning this draft document be forwarded by July 31, 1991. If you have any questions regarding this matter, please contact either Ms. Suzanne Harris at (314) 331-8467 or Mr. Terry Norris at (314) 331-8468.

Sincerely,

Owen D. Dutt
Acting Chief, Planning Division

Copy Funished:

Ms. Paula Cross
Preservation Services Division
Illinois Historic Preservation Agency
Old State Capitol
Springfield, Illinois 62701

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:

FWS/ARW-SS

AUG 28 1991

Mr. Owen D. Dutt
Planning Division
Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Mr. Dutt:

Thank you for your letter to Mr. Chuck Gibbons transmitting a draft programmati agreement for our consideration. We support the proposed agreement covering historic preservation compliance among the several involved agencies for Environmental Management Program projects within the St. Louis District. Our comments are limited to the following points:

1. The programmatic agreement would cover only Corps of Engineers lands in Illinois. Perhaps this limitation is desirable; at this time no Environmental Management Program projects are planned on U.S. Fish and Wildlife Service land within the St. Louis District.

2. Review of draft reports is limited to the Illinois Historic Preservation Officer (I.A). We request opportunity to review draft reports of historic preservation studies that occur on refuges.

3. No provision has been made for the U.S. Fish and Wildlife Service to obtain copies of final reports (IV.B.). We request at least two copies of final reports of historic preservation studies that occur on refuges, one for the refuge and one for the Regional Office.

4. The Corps of Engineers and the Illinois Historic Preservation Officer are to determine if sites are eligible for the National Register of Historic Places (I.A, I.C). For sites found on refuges, we request the Regional Historic Preservation Officer as representative for the U.S. Fish and Wildlife Service to be involved in determinations of eligibility.

5. The U.S. Fish and Wildlife Service would be required to obtain annual approval from the Corps of Engineers for management plans of historical properties (II.A.2). This situation would presumably arise only if archeological sites were discovered as a result of Environmental Management Program projects and were mitigated through avoidance. Clarification is needed as to what constitutes a management plan under this programmatic agreement, the nature of the required annual reporting, and the relationship of this clause to refuge lands managed by the state, i.e., cooperative agreement lands.

ENCL 3

Mr. Owen D. Dutt

We look forward to continued cooperative efforts in developing this programmatic agreement for historic preservation as well as for habitat rehabilitation and enhancement projects under the Environmental Management Program.

Sincerely,

John R. Eadie

John R. Eadie
Assistant Regional Director
Refuges and Wildlife

Illinois Historic
Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

CALHOUN COUNTY
Swan Lake Rehabilitation and
Enhancement Project Final Definite
Project (DPR) with EA and FONSI

IHPA LOG #920723003C-C

August 6, 1992

Mr. Owen D. Dutt
Chief, Planning Division
Department of the Army
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Mr. Dutt:

Thank you for the submittal of the Swan Lake Habitat Rehabilitation and Enhancement Project Final Definite Project Report with Integrated Environmental Assessment and a signed Finding of No Significant Impact. Our comments are required pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR Part 800: "Protection of Historic Properties."

Our staff has reviewed the above referenced report. The programmatic agreement within the report is the result of consultation between the Corps of Engineers-St. Louis District and our office. We believe it will adequately address all compliance issues and concerns and that historic properties will be adequately protected. However, to accept the Finding of No Significant Impact, this agreement should be signed by all parties to ensure its implementation. Please forward a copy of this agreement to our office for signature.

If you have any questions, please contact Paula Cross, Senior Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701 at 217/785-4998.

Sincerely,

William L. Wheeler

William L. Wheeler
State Historic Preservation Officer

WLW:pgc

APPENDIX DPR-H

FISH AND WILDLIFE COORDINATION ACT DOCUMENTATION

FOREWORD

APPENDIX DPR-H provides the Fish and Wildlife Service's Fish and Wildlife Coordination Act Report (letter dated August 7, 1991) for the Swan Lake project. The Service is in general agreement with the project design and gives the project its full support, and has also made a determination that the project is compatible with the purposes for which the National refuge was established (letter dated February 12, 1991). The District will continue to involve the Service in all future phases of the project effort.

United States Department of the Interior
Fish and Wildlife Service
Rock Island Field Office (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

COM: 309/793-5800
FTS: 782-5800

TAKE PRIDE IN AMERICA

In Reply Refer to:

August 7, 1991

'91 AUG -9 A10:20

EXEC
ST. LO

Colonel James E. Corbin
District Engineer
U.S. Army Corps of Engineers
St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-8478

Dear Colonel Corbin:

This letter constitutes our Fish and Wildlife Coordination Act (FWCA) report for the Swan Lake Habitat Rehabilitation and Enhancement Project (HREP) in Pool 26, Calhoun County, Illinois. The report is intended to provide compliance with Subsection 2(b) of the FWCA, and Section 7 consultation requirements of the Endangered Species Act of 1973, as amended.

The Swan Lake HREP is a component of the Upper Mississippi River System Environmental Management Program (EMP) authorized in Section 1103 of the Water Resources Development Act of 1986. The goal of the EMP is to implement "...numerous enhancement efforts...to preserve, protect, and restore habitat that is deteriorating due to natural and man-induced activities."

The project is located on the Calhoun Refuge Division, Brussels District of the Mark Twain National Wildlife Refuge. Therefore, the National Wildlife Refuge System Administration Act requires that a compatibility study be approved and special use permit issued prior to construction. These documents are approved by our Regional Director, and will be forwarded to you under separate cover.

INTRODUCTION

The Swan Lake HREP study area is located adjacent to the west bank of the Illinois River between river miles 5 and 13, and encompasses approximately 4,580 acres of important migratory waterfowl and fish habitat in the Swan and Fuller Lake backwater complex. Approximately 2,500 acres of Swan Lake are managed by our agency, and the remaining 300 acres is managed by the Illinois Department of Conservation (IDOC) in conjunction with adjacent 200-acre Fuller Lake.

The project area contains ten percent of all backwater habitat on the Illinois River, and about 40 percent of Pool 26 backwaters. Sedimentation from Illinois River flood flows and the adjacent 30-square mile watershed are rapidly degrading water quality and preventing growth of submergent vegetation. Water depths in Swan Lake will be reduced from the existing two-foot average to about 0.7 feet by the year 2040. Turbidities caused by shallow depths, wind fetch, and unconsolidated bottom sediments will continue to reduce the potential habitat quality for aquatic organisms and waterfowl. By 2040 the existing 3,100 acres of lacustrine habitat will be reduced to about 2,240 acres as conversion to palustrine bottomland forest increases the existing 940 acres of forest to approximately 1,800 acres.

GOALS AND OBJECTIVES

The primary goal of the HREP is to restore aquatic macrophyte beds and the associated invertebrate communities for the benefit of migratory waterfowl. The secondary goal is to provide wintering habitat for fish, and the third objective is to provide fish spawning and rearing habitat. Some management conflicts can occur between each of these objectives, and careful monitoring of project outputs will be required to assure that both terrestrial and aquatic habitats are enhanced to the maximum extent practicable.

PROJECT FEATURES

Project features designed to reduce sedimentation rates in the Swan Lake complex by 60 percent would include:

- a 46,700-foot long low profile sediment deflection levee along the Illinois River, and

- construction of 276 sediment control structures and 30 ponds on private lands.

Additional features to enhance management of the complex would include a cross dike dividing Swan Lake into two units. The structure would be set perpendicular to prevailing winds to reduce wind fetch. Dredging in the lower pool will improve depths for wintering fish, and dredged material will be used to construct nesting islands for waterfowl. Water control structures will included in the cross dike, and reversible pumps will provide water level management capabilities.

METHODOLOGY

The project area and alternative futures were analyzed using the Wildlife Habitat Appraisal Guide (WHAG) system developed by the Missouri Department of Conservation and the U.S. Soil Conservation Service. An interagency team consisting of biologists from our respective agencies and the IDOC evaluated selected habitat sample sites in the study area using a matrix of variables to determine habitat suitability indices (HSIs) for representative wetland species. Aquatic habitats were evaluated using a similarly designed matrix that measures impacts to several groups of fish species. These existing values in target year 00 (TY00) formed the basis for projecting future habitat conditions for alternative futures in TY02 and TY50. These values were then used to determine improvements or losses attributable to average annual habitat units for key species or groups of species over the 50-year project life. The process is described in the Detailed Project Report's Appendix J- Habitat Quantification.

Management plan concepts and assumptions were developed for the area in order to establish the design parameters for project features, particularly the pumps and water control structures. However, it will be necessary to investigate management options in greater detail during preparation of the operations manual. Conflicts between fisheries access to the backwaters versus water level manipulations for waterfowl will have to be addressed.

DISCUSSION

Our preferred approach in HREP planning would be to use this portion of our report to describe an incremental analysis of alternative project features developed in concert with your staff. However, we were not provided with adequate data to conduct such an analysis until after appendix J was already drafted. We have reviewed the appendix and concur with your findings that the selected project features are justified from a biological perspective, and cost effective.

We have used the models referenced in the Swan Lake DPR appendix J to measure habitat values for dabbling and diving ducks on other HREP projects, and thus feel confident in their value as planning tools. The aquatic matrix has received less scrutiny in field applications, but the values it established for existing conditions and alternative futures seem reasonable. It is important to note, however, that none of the variables provide a multiplier to address the unique importance of the backwater system in the project area to the Illinois River fishery. These systems provide critical habitats for spawning, rearing and wintering. Therefore, waterfowl management plans for the lower pool should provide fish access to the maximum extent practicable.

We concur with the conclusion in appendix I (biological assessment) that the project will have no effect on federally listed threatened or endangered species. However, as pointed out in Mr. Michael Bornstein's written comments to your staff (dated December 21, 1991), dredging during cold weather to reduce water quality problems might disturb bald eagle roosting activity. The actual dates and locations for proposed cold weather dredging will need to be coordinated with the refuge staff and our Marion Suboffice during development of plans and specifications.

CONCLUSIONS AND RECOMMENDATIONS

We concur with the project features proposed in the draft Detailed Project Report. We would further propose that:

- a detailed project monitoring plan for both terrestrial and aquatic parameters be developed during construction to assure the maximum practicable enhancement of all three objectives; and,

- a coordinated interagency effort to development the operations manual be initiated during construction to assure that conflicts between waterfowl and fisheries can be minimized.

We look forward to working closer with your staff in the future on this important project.

Sincerely,

Charles C. Davis

Richard C. Nelson
for Field Supervisor

CC: Mark Twain NWR- Quincy
Mark Twain NWR- Brussels District
Mark Twain NWR- Wapello District (Bornstein)
Marion Suboffice (ES)
Fisheries Assistance- Marion
IL DOC- Springfield (Donels)
IL DOC (Atwood)

United States Department of the Interior
Fish and Wildlife Service
Mark Twain National Wildlife Refuge
Great River Plaza
311 N. 5th Street, Suite 100
Quincy, Illinois 62301

TAKE PRIDE IN AMERICA

In Reply Refer to:

February 12, 1991

Colonel James Corbin
District Engineer
St. Louis Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attn: Dave Gates

Dear Colonel Corbin:

The compatibility study for the Swan Lake Rehabilitation Project has been reviewed and signed by officials of the U.S. Fish and Wildlife Service and is attached for your use in preparing the next step(s) in the approval process.

If you have questions, please direct them to our EMP Coordinator, Michael Bornstein at Wapello, Iowa (319/523-6982), or if I may be of any assistance, please give us a call at Quincy.

It was good visiting with you last week at our Regional Conference; I heard several very positive comments about the work of the St. Louis District after your presentation.

Sincerely,

Robert H. Stratton, Jr.
Project Leader

MARK TWAIN NATIONAL WILDLIFE REFUGE
Established 1958

Compatibility Study
SWAN LAKE REHABILITATION

Establishment Authority:

The Calhoun Refuge was established in 1946 under authority of the Migratory Bird Conservation Act (16 U.S.C. 715 - 715r) and combined in 1958 under the Calhoun Division of the Brussels District of Mark Twain National Wildlife Refuge under authority of the Fish and Wildlife Coordination Act (48 Stat. 401).

Purpose for Which Established:

The lands acquired under the Migratory Bird Conservation Act were acquired for sanctuary and management of migratory birds. Lands acquired under the Fish and Wildlife Coordination Act were acquired for the conservation, maintenance, and management of wildlife, resources thereof, and habitat.

Description of Proposed Use:

The proposal is a Habitat Rehabilitation and Enhancement (HREP) project authorized by the Water Resource Development Act of 1986 (Public Law No. 99-262). The Army Corps of Engineers (COE), as part of the environmental management program derived from construction of a new dam and enlarged lock at Alton, Illinois, has proposed to construct an HREP project located adjacent to the west bank of the Illinois River between river miles 5 and 13. The project area includes 2,800 acre Swan Lake, 200 acre Fuller Lake, 950 acres of bottomland forest, and 550 acres of cropland surrounding these lakes. Fuller Lake and the uppermost 300 acres of Swan Lake are managed by the Illinois Department of Conservation, and the remaining 2,500 acres of Swan Lake are managed by the U.S. Fish and Wildlife Service as part of the Calhoun Division of the Brussels District of Mark Twain National Wildlife Refuge.

The project area is extensively used by migratory waterfowl. Historically, this wetland complex supported substantial populations of canvasbacks, as well as large numbers of dabbling ducks. In addition, the project area is critical to the fisheries of the Illinois River, providing approximately 10 percent of all backwater habitat on the Illinois River.

Sedimentation from floodwaters of the Illinois River and sediment input from the 30 square mile watershed adjacent to the west shore of the lake have resulted in direct losses of waterfowl and fish habitat, and additionally result in habitat deterioration through increased turbidity, poor anchorage for wetland plants, and reduced light penetration. This wetland complex is also subject to high wind fetch, resulting in further increases of turbidity. The project area is also affected by fluctuations in river stage, resulting in widely varying water levels. The Swan Lake HREP will reduce sediment deposition and wind fetch, and provide capabilities for long-term maintenance of this important wetland complex.

The project will entail construction of a 46,700 foot long low profile riverside sediment deflection levee/dike from river mile 5.5 to river mile 13.0 to reduce sediment deposition from the Illinois River.

The COE will also provide funds for the construction of 276 water and sediment control basins and 30 ponds within the segment of the local watershed directly impacting middle and lower Swan Lake. The sediment control basins and ponds will substantially reduce upland sediment deposition into Swan Lake.

The combined effects of the riverside sediment deflection levee and the sediment control basins should reduce the sediment deposition into Swan Lake by approximately 60 per cent.

The project will also involve construction of a lake closure opposite river mile 7.5. This closure will be set perpendicular to the orientation of prevailing winds, and assist in reducing fetch. The closure will subdivide the lake into two compartments and provide an increased ability to manage water levels.

This ability will be further enhanced by the placement of two water control structures, one at the downstream end of the lower lake closure, and a second unit in the middle lake closure. A bidirectional pump will be included in these structures, providing the capability to manage water levels by pumping from the river to the lake or from the lake to the river. The pump will be located in an offset chamber, providing unobstructed fish passage through the water control structures.

Two island groups will also be constructed from clamshell excavated material. These islands will further assist in reducing fetch, and will also provide habitat for waterfowl nesting. Each group of islands will be constructed in two staggered rows. One island group will be located in the lower lake compartment opposite river mile 5.9, and the second island group will be located in the middle lake compartment opposite river mile 9.2.

Two boat ramps will also be constructed along the west shore of the lake, one opposite river mile 5.9 and a second opposite river mile 9.2, to provide a means for boat access, since access will no longer be available from the Illinois River due to construction of the riverside levee closure. A small parking lot will also be constructed at each of the two boat ramp locations.

Anticipated Impacts on Refuge Purposes:

As a result of the project, waterfowl and fish habitat will be improved and increased, which should subsequently result in increased waterfowl and fish populations. This will be a direct benefit toward maintaining and accomplishing refuge purposes.

Justification:

The proposed project works toward the accomplishment of the stated objectives of the refuge.

Determination:

The proposed project is compatible with the purpose for which the refuge was established.

Determined by: ______________________
Project Leader

Date 12/17/90

Reviewed by: ______________________ 1.22.91
Wildlife Associate Manager Date

Concurred by: ______________________ 1-24-91
Regional Director Date

APPENDIX DPR-I

ENDANGERED SPECIES ACT DOCUMENTATION

APPENDIX DPR-I provides the July 16, 1990 letter from the USFWS listing Federally threatened and endangered species which may occur in the area of the proposed project, and the District's endangered species biological assessment. The USFWS's concurrence with this assessment is included in the discussion section of APPENDIX DPR-H.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

MARION SUBOFFICE (ES)
Rural Route 3, Box 328
Marion, Illinois 62959

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

July 16, 1990

Colonel James E. Corbin
U.S. Corps of Engineers
St. Louis District
210 Tucker Boulevard, North
St. Louis, MO 63101-1986

ATTN: Environmental Analysis (Nico)

Dear Colonel Corbin:

The following federally listed endangered species may be found in the area of the proposed Swan Lake Environmental Management Program project.

Classification	Common Name	Scientific Name	Habitat
Endangered	Bald eagle	*Haliaeetus leucocephalus*	Winters along major rivers andreservoirs
Endangered	Indiana bat	*Myotis sodalis*	Caves and riparian

Sincerely,

for Thomas M. Groutage
Assistant Field Supervisor

cc: IDOC (Lauzon)

RECEIVED S.D

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FEDERALLY ENDANGERED SPECIES: BIOLOGICAL ASSESSMENT.

a. Introduction. In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested that the U. S. Fish and Wildlife Service (USFWS) provide a listing of Federally threatened or endangered species, currently classified or proposed for classification, that may be found in the project area. The USFWS, in a letter dated July 16, 1990, provided the following list:

Common Name	Scientific Name	Classification	Habitat
Bald eagle	*Haliaeetus leucocephalus*	Endangered	Winters along major rivers and reservoirs
Indiana bat	*Myotis sodalis*	Endangered	Caves and riparian

b. Bald Eagle. The bald eagle (*Haliaeetus leucocephalus*) is a common winter inhabitant of the lower Illinois River and the river system in the vicinity of Swan Lake receives high eagle use providing foraging, resting, and night roosting habitat (Dunstan and Fawks 1981). Swan Lake is one of several areas in the lower Illinois River mentioned by Hindmarsh and McNamee 1980 cited in Dunstan and Fawks (1981: 20) that serves as a fishing and loafing site for the wintering eagles. The 8,000-acre Pere Marquette State Park, situated just across the river from Swan Lake along the east bank, has been identified as a primary night roosting location and also serves as a severe weather refuge to wintering eagles (Dunstan and Fawks 1981). Overall, the lower Illinois River region is considered relatively more complex than many wintering sites in Illinois because of the numerous marshes, glens, hollows, rivers, locks and dams, and cliffs (Dunstan and Fawks 1981).

Because the Illinois River is not as large as the Mississippi River, it is not as populated with eagles (Dunstand and Fawks 1981). However, the exact number of eagles inhabiting the lower Illinois River is not known. Dunstan and Fawks (1981), based on previous counts and their own observations, estimated that 80 to 150 eagles are likely to frequent the Pere Marquette area during the winter months. One day bald eagle counts from 1965-74 between Peoria and Grafton indicate from 39-196 birds.

The seasonal movement patterns of bald eagles have been relatively well studied. As winter arrives on the breeding ground of northern Alaska and Canada, deep snows and sub-freezing temperatures cause waterways to freeze over. Fish, the preferred food of the eagle, become less available to the birds. Eagles respond to this annual paucity of food by migrating south to milder climates to areas where food sources are more accessible, wintering as far north as open water and food permit.

Ice cover on the river is one factor that influences bald eagle distribution. During a relatively mild winter with little ice cover, such as the 1980-1981 season, eagles are generally scattered (e.g., Harper 1983). With increased ice cover on the river, eagles become more and more concentrated - foraging in and around the remaining open water areas.

Stalmaster and Newman (1978) reported that high human activity, such as that occurring frequently in the sight of eagles, cause the birds to use less suitable habitat. They report that feeding behavior was the most sensitive activity observed. Activities directly on the channel of the river, such as boating and fishing, were most disturbing to eagles if the activities did not regularly occur there. Harper (1983) reported disruptions of daily activities of eagles on the Mississippi River by hunters, fishermen in watercraft, and aircraft. If eagles are disturbed while on a feeding ground, they usually fly to nearby perch sites and do not resume feeding for long periods (Stalmaster, 1976).

c. Indiana Bat. In the central and southern portions of the eastern United States, Indiana bats (*Myotis sodalis*) hibernate during the winter in caves and mines (hibernacula) with cool and stable temperatures throughout the winter (Brady et al., 1983). Only seven hibernacula support about 85 percent of the entire known population (Brady et al., 1983). Two mines and 11 caves have been designated as critical winter habitat by the U.S. Fish and Wildlife Service. Although seven of these hibernacula occur in Missouri and Illinois, none of these are near the lower Illinois River. The most serious known cause of decline of the Indiana bat is human disturbance of hibernating bats (Clawson, 1987). Because there are no hibernacula in the project area, the proposed habitat rehabilitation work would not impact winter hibernating habitat of the Indiana bat.

In general, Indiana bats disperse from hibernacula in the spring and migrate to summer habitat in midwestern and eastern United States. They are entirely insectivorous. Clawson and Titus (1988) reviewed food habitat studies and determined that this bat preys upon insects from eight or more orders. These include (in order of preference): Lepidoptera (moths), Coleoptera (beetles), Diptera (flies and mosquitos), Trichoptera (caddis flies), Plecoptera (stone flies), Homoptera (aphids and scale insects), Neuroptera (lacewings), and Hymenoptera (bees, wasps, and ants). The bat's foraging strategy is apparently dependent upon prey availability - when preferred prey species are abundant, it will feed selectively, whereas the bat becomes opportunistic and feeds on a wider variety of prey items when the preferred ones are less abundant (Clawson and Titus, 1988).

In general, summer habitat requirements are not well known. Foraging habitat usually consists of the tree canopy of riparian and upland forest, but this bat may also feed along forest edges and over old fields and pastures (Clawson and Titus, 1988). During the warm months, female Indiana bats give birth to young. Brady et al. (1983) stated that maternity colonies are established mostly in riparian and flood plain areas of small to medium-sized streams. However, Gardner (1990) recently discovered a maternity roost on an island in the Mississippi River near Quincy, Illinois. Such colonies are formed in holes in trees, or more commonly under the loose bark of live or dead trees. Tree species known to be used for roosting in Illinois include silver maple, cottonwood, shingle oak, slippery elm, northern red oak, butternut hickory, sassafras, shagbark hickory, sugar maple, post oak, and white oak (Gardner, Hofmann, and Garner, 1988, 1989). Nor every tree with cavities or loose bark provides the microclimate of a suitable roost; probably only a small portion of such trees possess the properties required to shelter maternity colonies from weather extremes (hot temperatures, early freezes, extended periods of rain, etc.) (Gardner, 1990). Recent studies of summer habitat use indicate that wooded uplands may be used more extensively for rearing of young than has been previously known (Clark, Bowles, and Clark, 1987; Clawson, 1987; Gardner, Hofmann, and Garner, 1989).

Studies of banded Indiana bats indicate they may return to the same summer locality in successive years. However, an individual tree may serve as a roost for only a relatively short time, perhaps 6 to 8 years. Thus, the bats seem to have the behavioral flexibility to move their homesite every few years, probably to nearby trees that permit them to use the same general foraging area (Humphrey, Richter, and Cope, 1977).

Essentially all of Illinois and Missouri are within the known and suspected range of the Indiana bat (Brady et al., 1983; Clawson and Titus, 1988). The species apparently has not been found in Calhoun County, where the project site is located, but has been encountered in Madison, Macoupin, Morgan, Scott, and Pike Counties (Gardner, Hofmann, and Garner, 1989), which range from about 15 to 55 miles away. Calhoun County undoubtedly supports suitable summer habitat, and the apparent absence of this species is most likely due to a lack of fieldwork to locate it. Indiana bats were captured by Gardner and Gardner (1980) along McKee Creek on the flood plain of the

Illinois River in northern Pike County. This locality is about 50 miles north of the project site.

The proposed habitat rehabilitation work will involve the clearing of about 106 acres of flood plain forest to construct project features.

According to Gardner (1990), Indiana bats probably use the flood plain forests of the Illinois and Mississippi Rivers as summer habitat, including that found at Swan Lake. For this project, it is assumed that the species does use the flood plain forest of Swan Lake as foraging and maternity roost habitat. Impacts to maternity roosts can be avoided by scheduling tree clearing activities during the period of the year when bats are not present. According to the U. S. Fish and Wildlife Service, the time period when bats are assumed to be present is May 1 - August 31. Removal of 106 acres of flood plain forest to construct the riverside and interior levees may result in the loss of up to 106 acres of foraging habitat.

d. <u>Efforts to Eliminate Adverse Impacts on Species and Habitats</u>.

(1) <u>Bald Eagle</u>. Eagles are expected to occasionally use the Swan Lake area for feeding and resting during the winter. To avoid impacts to the eagles, the St. Louis District would place special conditions on the contracted work as follows:

(a) Most construction activities would likely take place outside of the winter months, thus avoiding potential conflicts with wintering bald eagles. In addition, consideration will be given during the preparation of Plans and Specifications to sequencing construction activities in a way that eliminates the potential for impacts to bald eagles. Any construction taking place during the winter months could decrease eagle use at Swan Lake; however, any such impacts would be short-term and not considered consequential. Specific restrictions relative to any sequencing will be included as part of the contract specifications. The contracting officer will ensure appropriate compliance.

(b) Large trees, especially eastern cottonwoods close to water, are the preferred perches used by eagles. Most tree clearing will be along the edge of the east shore of the lake. Vegetation in this zone consists primarily of willows and younger aged silver maples. As such, important eagle perching habitat will not be impacted.

(2) <u>Indiana Bat</u>. Although this species' summer habitat requirements are not well known, the riparian habitat and flood plain forest within the Swan Lake project site are assumed to provide foraging and roosting habitat. Special conditions on the contracted work will require that clearing activities be scheduled outside the period May 1 - August 31, when Indiana bats are known to inhabit summer habitat. If for any reason tree clearing activities have to be carried out during the period May 1 - August 31, a site visit will be conducted first by a team of biologists to determine if any roost trees are among those proposed to be removed. The team will consist of representatives from the Illinois Department of Conservation, U. S. Fish and Wildlife Service, and St. Louis District. The District will enter into formal consultation with the U. S. Fish and Wildlife Service if removal of a roost tree during the period May 1 - August 31 is proposed.

e. <u>Conclusions</u>. It is the St. Louis District's perspective that the habitat enhancement of Swan Lake, in conjunction with the described measures to avoid conflicts with the bald eagle and Indiana bat, would have no effect on Federally endangered species or their critical habitat. The USFWS will be given an opportunity to review the Draft Detailed Project Report and comment on this Biological Assessment.

c. Indiana Bat. In the central and southern portions of the eastern United States, Indiana bats (*Myotis sodalis*) hibernate during the winter in caves and mines (hibernacula) with cool and stable temperatures throughout the winter (Brady et al., 1983). Only seven hibernacula support about 85 percent of the entire known population (Brady et al., 1983). Two mines and 11 caves have been designated as critical winter habitat by the U.S. Fish and Wildlife Service. Although seven of these hibernacula occur in Missouri and Illinois, none of these are near the lower Illinois River. The most serious known cause of decline of the Indiana bat is human disturbance of hibernating bats (Clawson, 1987). Because there are no hibernacula in the project area, the proposed habitat rehabilitation work would not impact winter hibernating habitat of the Indiana bat.

In general, Indiana bats disperse from hibernacula in the spring and migrate to summer habitat in midwestern and eastern United States. They are entirely insectivorous. Clawson and Titus (1988) reviewed food habitat studies and determined that this bat preys upon insects from eight or more orders. These include (in order of preference): Lepidoptera (moths), Coleoptera (beetles), Diptera (flies and mosquitos), Trichoptera (caddis flies), Plecoptera (stone flies), Homoptera (aphids and scale insects), Neuroptera (lacewings), and Hymenoptera (bees, wasps, and ants). The bat's foraging strategy is apparently dependent upon prey availability - when preferred prey species are abundant, it will feed selectively, whereas the bat becomes opportunistic and feeds on a wider variety of prey items when the preferred ones are less abundant (Clawson and Titus, 1988).

In general, summer habitat requirements are not well known. Foraging habitat usually consists of the tree canopy of riparian and upland forest, but this bat may also feed along forest edges and over old fields and pastures (Clawson and Titus, 1988). During the warm months, female Indiana bats give birth to young. Brady et al. (1983) stated that maternity colonies are established mostly in riparian and flood plain areas of small to medium-sized streams. However, Gardner (1990) recently discovered a maternity roost on an island in the Mississippi River near Quincy, Illinois. Such colonies are formed in holes in trees, or more commonly under the loose bark of live or dead trees. Tree species known to be used for roosting in Illinois include silver maple, cottonwood, shingle oak, slippery elm, northern red oak, butternut hickory, sassafras, shagbark hickory, sugar maple, post oak, and white oak (Gardner, Hofmann, and Garner, 1988, 1989). Nor every tree with cavities or loose bark provides the microclimate of a suitable roost; probably only a small portion of such trees possess the properties required to shelter maternity colonies from weather extremes (hot temperatures, early freezes, extended periods of rain, etc.) (Gardner, 1990). Recent studies of summer habitat use indicate that wooded uplands may be used more extensively for rearing of young than has been previously known (Clark, Bowles, and Clark, 1987; Clawson, 1987; Gardner, Hofmann, and Garner, 1989).

Studies of banded Indiana bats indicate they may return to the same summer locality in successive years. However, an individual tree may serve as a roost for only a relatively short time, perhaps 6 to 8 years. Thus, the bats seem to have the behavioral flexibility to move their homesite every few years, probably to nearby trees that permit them to use the same general foraging area (Humphrey, Richter, and Cope, 1977).

Essentially all of Illinois and Missouri are within the known and suspected range of the Indiana bat (Brady et al., 1983; Clawson and Titus, 1988). The species apparently has not been found in Calhoun County, where the project site is located, but has been encountered in Madison, Macoupin, Morgan, Scott, and Pike Counties (Gardner, Hofmann, and Garner, 1989), which range from about 15 to 55 miles away. Calhoun County undoubtedly supports suitable summer habitat, and the apparent absence of this species is most likely due to a lack of fieldwork to locate it. Indiana bats were captured by Gardner and Gardner (1980) along McKee Creek on the flood plain of the

Musselman, T. E. 1949. Concentrations of bald eagles on the Mississippi River
at Hamilton, Illinois. Auk 66: 83.

Stalmaster, M. V. 1976. Winter ecology and effects of human activity on bald eagles in the Nooksack River Valley, Washington. M.S. Thesis. Western Washington State College, Bellingham. 100 pp.

Stalmaster, M. V., and J. R. Newman. 1978. Behavorial responses of wintering bald eagles to human activity. J. Widl. Management 43: 506-513.

APPENDIX DPR-J

PROJECT HABITAT QUANTIFICATION

APPENDIX DPR-J provides a quantification of habitat conditions for the project. The appendix consists of two major sections, Section I dealing with the project planning analysis, and Section II dealing with the project mitigation analysis for bottomland forest habitat.

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (SL-5)

SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

APPENDIX J

PROJECT HABITAT QUANTIFICATION

SECTION I. PROJECT PLANNING ANALYSIS

SUBSECTION I. INTRODUCTION

This appendix provides a quantification of habitat conditions for project planning. Such quantification is needed to evaluate project features where traditional benefit:cost evaluation procedures are not applicable. To date, the unit of measure that has gained the widest acceptance among technical and policy elements, both within and outside the Corps, is the habitat unit (HU). This unit has been applied to the evaluation of the Swan Lake HREP. A habitat unit is the product of an estimated acreage for a given habitat type times a habitat suitability index (HSI) value for that habitat type. HSI's result from the numeric ranking of site characteristics at sample sites for a habitat throughout a given project area. HU's can be annualized for specific target years to project changes in habitat values over time. The effects of various plans or plan features can then be compared by applying the HSI's to the acreages of habitats for each alternative considered.

For the Swan Lake HREP there is a need for both wildlife and fisheries based HU accounting methodologies. At the present time a number of such methodologies are available. These include the U. S. Fish and Wildlife Service's (USFWS) Habitat Evaluation Procedures or HEP, the U.S. Army Corps of Engineers' Habitat Evaluation System or HES, and U. S. Bureau of Reclamation's Habitat Management Evaluation Method (HMEM). Among the Federal and state agencies, the HEP procedure is the most familiar to all participants in the UMRS-EMP. The Missouri Department of Conservation (MDOC) and the U. S. Soil Conservation Service have developed an appraisal system, based on the USFWS's HEP. The system, referred to as the Missouri Habitat Appraisal Guide (WHAG) method, represents a regional fine tuning of HEP and is structured to more efficiently input field data. The WHAG is accepted by UMRS agencies as the method of choice for EMP wildlife habitat analysis, and for this reason it was applied to the Swan Lake project.

To date, HU methodologies for wildlife evaluation have received greater support and acceptance among biologists than have fisheries evaluation methods. The most promising fisheries evaluation developed thus far for use on the EMP is one developed by the Corps' Rock Island District and the Corps' Waterways Experiment Station (WES). The HSI models for the methodology, referred to here as the Aquatic Habitat Appraisal Guide (AHAG) method, follow the format of the Missouri WHAG. The AHAG is still evolving, and it has not yet been field verified; however, the procedure does represent the state-of-the-art. For that reason, the AHAG with some site-specific modifications made by WES, has been applied to the Swan Lake HREP. The specific details of the application of the WHAG and AHAG procedures to Swan Lake are described in the next two sections of this appendix.

For habitat quantification purposes, it is assumed that management at the upper Swan/Fuller Lake site will be very similar to that employed in the past. However, for the Swan Lake refuge, the precise manner in which the lake will be managed in the future with a project will be determined as a result of biological performance studies conducted during the early years of the project. Ultimately, the degree of emphasis placed on waterfowl and fish in one compartment may differ from that in the other. For example, the project could eventually provide more emphasis on resident fish and waterfowl in one compartment, and river fish and waterfowl in the other compartment. The project has been designed to provide management flexibility. Before a final operational plan has been determined, a number of alternative water management regimes will likely be explored. To simplify things, the WHAG and AHAG analyses have assumed an equal management emphasis for waterfowl (both dabblers and divers) and fish within the two refuge compartments.

SUBSECTION II. WILDLIFE HABITAT APPRAISAL GUIDE (WHAG) METHOD

1. BACKGROUND

The WHAG is a field evaluation procedure designed to measure the quality of a habitat for particular species of wildlife, and also accounts for land management practices. The method provides HSI values for areas classified into broad land-use types such as forested wetland and nonforested wetland. WHAG is based on the assumption that habitat can be numerically described by HSI's calculated from species-habitat models.

WHAG utilizes checklist-type appraisal guides for each habitat type. The guide breaks habitat into the most important characteristics which are rated on a 1-to-5 or 1-to-10 scale, depending on their importance. Field data values are entered into a computer program which rates habitat types based on life requisite requirements for a variety of species. The resulting index ranges from a low habitat suitability value of 0.1 to a high of 1.0.

Computer results are provided for estimated total HU's and HSI's. The results can be used to assess the value of various proposed habitat improvements on habitat quality. HU's are annualized for target years in order to evaluate changes in project features over time. In the Swan Lake project, sediment control, water control, and wave control are habitat improvement measures considered. Since habitat units can change over time, a number of target years were selected over the life of the project. These target years were year 0 (or existing conditions), year 2 (or early post-construction) and year 50 of the project life.

Habitat can potentially be improved by: (1) increasing the acreage of habitat types in short supply, (2) altering a habitat limiting factor, such as unpredictable water levels, (3) altering a management strategy, such as food crop composition, or (4) a combination of the above.

The major wildlife goal for the management of Swan Lake is to enhance wetland values for migratory waterfowl. Therefore, the appraisal guides for wetland habitats were selected, and consideration was given to both dabbling (the mallard being the species of emphasis) and diving ducks. The WHAG team included representation from the USFWS, IDOC and the Corps.

2. ASSUMPTIONS

During the WHAG analysis, certain assumptions were developed regarding existing conditions and future conditions. These assumptions are listed below.

a. Existing Conditions

(1) Water levels fluctuate greatly during the growing season and during waterfowl migrations, resulting in food production that is unreliable for or unavailable to waterfowl.

(2) Little quality habitat exists for waterfowl at the project site or within Pool 26 at large.

b. Future Conditions

(1) General. The following four general assumptions were applied to the analysis of all future changes in habitat during the 50-year project life.

(a) Target years of 0, 2, and 50 are sufficient to annualize HU's and to characterize habitat changes over the life of the project.

(b) Dabbling and diving ducks should be given equal consideration during project analysis.

(c) The mallard is a suitable species of emphasis for dabbling ducks, and adequately characterizes the life requisite requirements for that migratory waterfowl group for the purposes of the incremental analysis of this project.

(d) The Canada goose, muskrat, green-backed heron, wood duck, and beaver are suitable species for comparative evaluation of habitat value changes.

(2) Specific. Specific assumptions employed in evaluating alternative Plans A, B and C are given below.

(a) <u>Alternative Plan A, No Action Plan</u> (also represents future without project conditions).

<u>1</u> Severe water level fluctuations will continue to limit the lake's food value for waterfowl.

<u>2</u> Approximately 30-40 percent of the lake's nonforested wetlands will be lost over the next 50 years.

<u>3</u> The existing HSI values developed from the field data are a fair representation of the habitat quality of unprotected habitat in all target years, and for all future conditions with or without a project.

(b) <u>Alternative Plan B, Wetlands Excavation</u>.

<u>1</u> Severe water level fluctuations would continue to limit the lake's food value for waterfowl.

<u>2</u> Even though initially dredged out, all of the non-forested wetlands would again fill with sediment during the life of the project.

(c) Alternative Plan C, Wetlands Protection.

1 Most years water levels would be predictable and controlled (via levee, gated structures and pumps). This would greatly increase the reliability of plant production, and ensure that the food produced is available to waterfowl during migration.

2 Sedimentation would be reduced by 60 percent from its existing rate at middle and lower Swan Lake and about 85 percent at Upper Swan/Fuller Lake. Little loss of wetland depth or acreage would occur during the life of the project at Upper Swan/Fuller Lake, and about 5 inches of depth would be lost at middle and lower Swan Lake. However, the maximum water level at which the unit is managed could be elevated slightly to compensate for sedimentation that does occur.

3. RESULTS

Site Locations. The WHAG analysis locations were assigned by the WHAG team, as shown in Figure J-1. The number and location of these sites were judged by the team to be representative of the prevailing habitat conditions.

Appraisal Items/Ratings. TABLE J-1 provides a listing of the appraisal guide items and potential ratings utilized in the WHAG for wetlands evaluation. TABLE J-2 lists the particular appraisal item numbers used in evaluating the project's non-forested wetland habitats. This table also provides the team's assigned ratings for each appraisal item for each project condition. Due to the similarity of the existing condition and proposed future management of the Upper Swan and Fuller Lake site to that of the adjacent Stump Lake HREP, the averaged site ratings for Stump were judged to be representative of the Swan non-wetland site 2 as well. TABLE J-3 provides the HSI values resulting from the application of the WHAG software to the TABLE J-2 ratings. Forested wetland was initially evaluated using the WHAG but was subsequently deleted and reevaluated for mitigation purposes using the broader community-based HES methodology (See Section II of this Appendix).

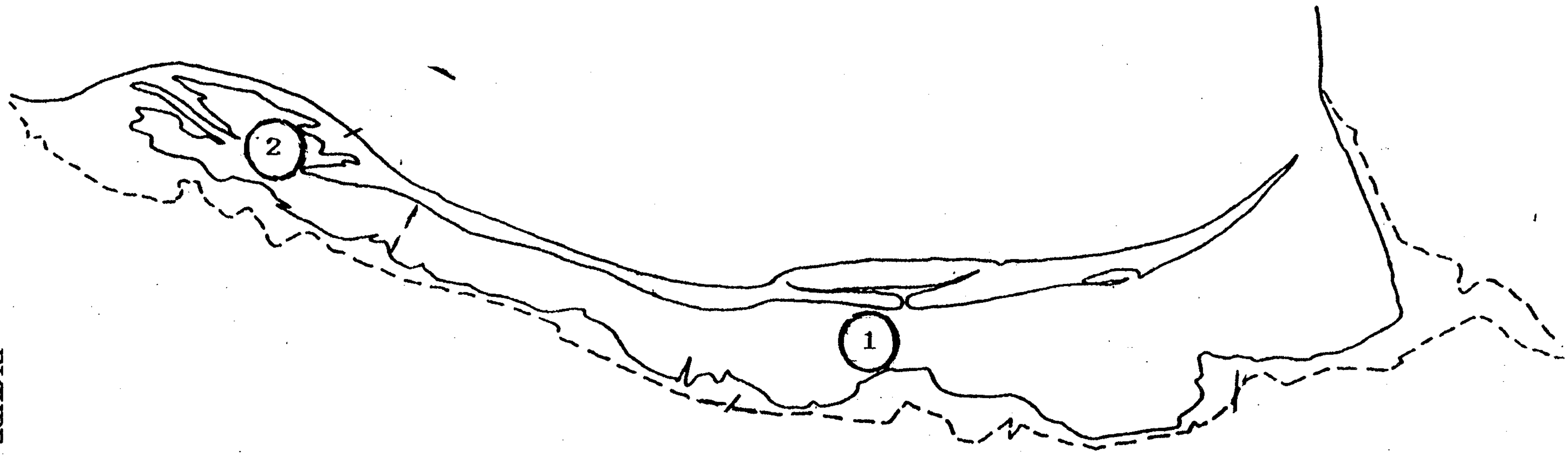
TABLE J-4 shows overall waterfowl HSI's used for subsequent habitat unit determination. TABLE J-5 provides a tabulated prediction for waterfowl of HSI and habitat acreage changes expected for the project area over the next 50 years for various alternative plan and plan features options. The rate of existing sedimentation (.50 inches/year) was determined from available literature describing this site. The determination of the future sedimentation rate with a project (.33 inches/year) took sedimentation rate half-life effects into consideration. Future sedimentation with a project took applicable hydraulic engineering estimates of percent reduction in sediment input into account.

TABLES J-6 and J-7 provide the HU value changes resulting from the application of the Corps' HES software to the TABLE J-5 values. The HU's are tabulated for waterfowl for each project alternative and individual habitat type.

4. DISCUSSION

The improvement of the Swan Lake Complex for migratory waterfowl is a primary purpose of the proposed project. Both dabbling ducks (represented by the mallard) and diving ducks were given consideration in the evaluation of Swan Lake proper (i.e., lower and middle Swan Lake). While the movement of dabblers through the project area during migration far exceeds that of divers, the USFWS would like to see new management emphasis given to divers. Divers were 10 times more abundant on the Illinois River in 1948 than they are today

WETLAND SAMPLE SITE LOCATIONS



(#) = NONFORESTED WETLAND SITE

FIGURE J-1

TABLE J-1

Wetland Species Characteristic Matrix

Wildlife Area: ____________________

Date: ____________________

Habitat Type: ____________________

CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
1. Percent Nonforest Wetlands in 2 Mile Wide Circle	N,B												
1. >75%				10	10	10	10				10		
2. 50 - 75%				8	8	8	8				8		
3. 25 - 50%				6	6	6	6				6		
4. 10 - 25%				4	4	4	4				4		
5. <10%				1	1	1	1				1		
2. Percent Nonforest Wetlands and Lakes or Reservoirs Water in 2 Mile Wide Circle	All												
1. >75%			10										
2. 50 - 75%			8										
3. 25 - 50%			6										
4. 10 - 25%			4										
5. <10%			LF										
3. Percent Bottomland Hardwoods and Nonforest Wetlands in 2 Mile Wide Circle	All												
1. >75%		10						10	10	10			
2. 50 - 75%		8						8	8	8			
3. 25 - 50%		6						6	6	6			
4. 10 - 25%		4						4	4	4			
5. <10%		LF						1	1	1			
4. Fall Winter Water Conditions	N,B,C												
1. Water present annually (predictable & water levels controlled		10	10										
2. Water present most years with occasional lapse & water levels controlled		7	7										
3. Water present 1 out of 3 years (opportunistic) & water levels controlled		4	4										
4. Water unpredictable; dry during fall and winter; or no control when present		LF	LF										
5. Fall-Winter Flood Conditions (food plant availability)	N,B	M	M										
1. Food plants unaffected		10	10										
2. Reduced 1 - 25% (Multiply index by .75)		8	8										
3. Reduced 25 - 50% (Multiply index by .50)		6	6										
4. Reduced 50 - 75% (Multiply index by .25)		4	4										
5. Reduced >75% (Multiply index by .25)		1	1										
6. Water Depth 1" - 18" Fall - Winter	N,B,C												
1. >90%		10	10										
2. 75 - 90%		8	8										
3. 50-75%		6	6										
4. 25 - 50%		4	4										
5. <25%		1	1										
7. Water Depth <4" May-June	N												
1. >90%					10						LF		
2. 75 - 90%					8						2		
3. 25 - 75%					6						4		
4. 1 - 25%					4						7		
5. ZERO or all >4" Deep					1						10		
8. Water Depth 4 - 18" By August	N												
1. >75%				1		10	1	10			10		
2. 50 - 75%				7		7	7	7			7		
3. 25 - 50%				10		4	10	4			4		
4. <25%				4		1	4	1			1		
9. Permanent Water Entire Year	N					M							
1. >90%						10							
2. 75 - 90% (Multiply index by .90)						8							
3. 50 - 75% (Multiply index by .75)						6							
4. 25 - 50% (Multiply index by .50)						4							
5. <25% (Multiply index by .25)						1							
10. Percent Emergent Vegetation Within 2 yds. of water	N												
1. >75% of emer. veg. within 2 yd. of water				10							10		
2. 50-75% of emer. veg. within 2 yd. of water				7							7		
3. 25-50% of emer. veg. within 2 yd. of water				4							4		
4. <25% of emer. veg. within 2 yd. of water				1							1		

TABLE J-1 (CONTINUED)

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
11.	**Woody Invasion**	N												
	1. <10%				10		5	6	1					
	2. 10 - 25%				8		4	8	6					
	3. 25 - 50%				6		3	10	8					
	4. 50 - 75%				4		2	4	10					
	5. >75%				1		1	1	4					
12.	**Emergent Vegetation Coverage**	N,B												
	1. >90%				6	LF			1					
	2. 75 - 90%				10	2			2					
	3. 50 - 75%				8	4			4					
	4. 25 - 50%				4	6			10					
	5. 10 - 25%				2	8			7					
	6. <10%				LF	10			1					
13.	**Cattail and Bulrush Coverage**	N												
	1. >75%						10	LF				8		
	2. 50 - 75%						8	2				10		
	3. 25 - 50%						6	4				6		
	4. 10 - 25%						4	7				4		
	5. <10%						1	10				LF		
14.	**Wetland Size**	N,B												
	1. >200 acres				10	10	10	10	10			10		
	2. 100 - 200 acres				10	8	8	8	10			10		
	3. 50 - 100 acres				8	6	6	6	10			8		
	4. 25 - 50 acres				6	4	4	4	10			6		
	5. 5 - 25 acres				4	1	2	2	5			4		
	6. <5 acres				LF	LF	1	1	LF			LF		
15.	**Wetland Edge**	N,B												
	1. >75% Bottomland H. - % adj. to water								10					
	2. 50-75% Nonforest w.-% woody or adj. to bottomland hardwoods								8					
	3. 25 - 50%								6					
	4. 10 - 25%								4					
	5. <10%								1					
16.	**Water Regime**	N												
	1. Gradual drying with >75% water remaining by Aug. 1				4	4	8	2	10			8		
	2. Gradual drying with 50 - 75% water remaining by Aug. 1				6	6	6	6	6			6		
	3. Gradual drying with 25 - 50% water remaining by Aug. 1				10	10	4	10	4			4		
	4. Gradual drying with <25% water remaining by Aug. 1				8	8	2	8	2			2		
	5. Stable water				2	4	10	4	10			10		
	6. Rapid drying; or no water after June 1				LF	LF	LF	LF	LF			LF		
17.	**Important Food Plant Coverage**	N,B	M	M										
	1. >75%		10	10										
	2. 50 - 75% (Multiply index by .75)		8	8										
	3. 25 - 50% (Multiply index by .50)		6	6										
	4. 10 - 25% (Multiply index by .25)		4	4										
	5. <10% (Multiply index by .25)		1	1										
18.	**Plant Diversity**	N,B												
	1. >7		5	5										
	2. 4 - 7		3	3										
	3. <4		1	1										
19.	**Persistent Emergent and Woody Vegetation Coverage**	N												
	1. 5 - 15%		5	5										
	2. 15 - 25%		4	4										
	3. 25 - 50%		2	2										
	4. <5% or >50%		1	1										

TABLE J-1 (CONTINUED)

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
20.	**Substrate - Surface Water Interspersion**	N												
	1. Substrate interspersed with shallow water					10								
	2. Shallow water occurring as one or few pools					1								
21.	**Percent Open Water**	N												
	1. <10%		5	5			10					6		
	2. 10 - 25%		3	3			8					10		
	3. 25 - 50%		1	1			6					8		
	4. 50 - 90%		1	1			4					4		
	5. >90%		1	1			1					1		
22.	**Winter Water Depth (Oct. - March)**	N												
	1. 15 - 24"						10							
	2. 10 - 15" or 24 - 30"						7							
	3. 6 - 10" or 30 - 36"						4							
	4. <6" or >36"						1							
23.	**Sedge Canopy Coverage**	N												
	1. <90%							8						
	2. 75 - 90%							10						
	3. 50 - 75%							6						
	4. 25 - 50%							4						
	5. 1 - 25%							2						
	6. Zero							LF						
24.	**Wetland Substrate**	N												
	1. Muddy					5								
	2. Sandy					3								
	3. Gravel					1								
25.	**Percent Soil Waterlogged Substrate May-June**	N												
	1. >90% of substrate waterlogged					10								
	2. 75 - 90% of substrate waterlogged					8								
	3. 50 - 75% of substrate waterlogged					6								
	4. 25 - 50% of substrate waterlogged					4								
	5. <25% of substrate waterlogged					1								
26.	**Percent Exposed Wetland Substrate and 1-4" Shallow Water Covered by Vegetation May-June**	N												
	1. <10%					10								
	2. 10 - 25%					8								
	3. 25 - 50%					6								
	4. 50 - 75%					4								
	5. 75 - 90%					2								
	6. >90%					LF								
27.	**Percent Channel with Aquatic Vegetation**	B												
	1. >10%									10	10			
	2. 5 - 10%									7	7			
	3. 1 - 5%									4	4			
	4. None									1	1			
28.	**Average Water Fluctuation in Channel**	B												
	1. Bank full <3 times per year										10			
	2. Bank full 3-5 times per year										7			
	3. Bank full 5-7 times per year										4			
	4. Bank full >7 times per year										1			
29.	**Cropfield Management**	C												
	1. No fall tillage		10	10										
	2. Winter Wheat		2	10										
	3. Chisel plowing		8	8										
	4. Chopped, baled, grazed		6	6										
	5. Fall disc		4	4										
	6. Fall moldboard		1	1										

TABLE J-1 (CONTINUED)

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
30.	Cropping Practice	C												
	1. >50 unharvested		10	10										
	2. 25-50% harvested		7	7										
	3. 10 - 25% unharvested		4	4										
	4. <10% unharvested		1	1										
31.	Crop Rotation	C												
	1. SG - RC - L			5										
	2. SG - RC; or idle some years			3										
	3. Continuous SG - RC			1										
32.	Field Size (% w/in 660' Woodland or Treeline)	C,G												
	1. <25%			10										
	2. 25 - 50%			6										
	3. 50 - 75%			3										
	4. >75%			1										
33.	Grassland Composition	G												
	1. Bluegrass, clover, alfalfa			10										
	2. Timothy, orchardgrass or mixed CSG			5										
	3. Fescue or WSG			1										
34.	Average Height Herbaceous Vegetation (Fall)	G												
	1. <6"			10										
	2. >6"			1										
35.	Woodland Tree Species	B												
	1. >50% trees as elm, walnut, cottonwood, sycamore, willow, maple, ash		1							8	10			
	2. 25 - 50% trees as elm, walnut, cottonwood, sycamore, willow, maple, ash		4							10	8			
	3. <25% trees as elm, walnut, cottonwood, sycamore, willow, maple, ash; or <25% pin oak		6							1	6			
	4. 25 - 50% pin oak		8							4	4			
	5. >50% pin oak		10							6	1			
36.	Permanent Water Within Woodland	B												
	1. >25%		1						10	10				10
	2. 10 - 25%		3						7	7				7
	3. 5 - 10%		5						4	4				4
	4. 1 - 5%		3						2	2				2
	5. Zero		2						1	1				1
37.	Forest Openings (<2 ac. in size)	B												
	1. 15 - 30% scattered		1						10	10	5			
	2. 15 - 30% one or few		3						7	7	4			
	3. 5 - 15%		5						4	4	3			
	4. <5% or >30%		1						1	1	1			
38.	Woodland Size Class	B												
	1. Sawtimber - open canopy		10						4	10	4		10	10
	2. Sawtimber - close canopy		8						1	8	1		10	10
	3. Pole with 25-50% sawtimber		6						10	6	6		7	7
	4. Regeneration with 25-50% sawtimber		4						8	4	8		2	2
	5. Regeneration		1						8	LF	10		LF	LF
	6. Pole		1						6	2	6		4	4
39.	Percent Canopy From Old Growth (>16" dbh)	B												
	1. >25%									10	1			
	2. 10 - 25%									8	4			
	3. 5 - 10%									6	6			
	4. 1 - 5%									4	8			
	5. Zero									1	10			

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
40.	**Woodland Overstory Canopy Height (feet)**	B												
	1. >80'												10	10
	2. 65-80'												7	7
	3. 40-65'												4	4
	4. <40'												1	1
41.	**Percent Subcanopy Closure**	B												
	1. >75%												10	1
	2. 50-75%												7	4
	3. 25-50%												4	10
	4. <25%												1	7
42.	**Woodland (Stand) Size**													
	1. <25%												10	10
	2. 25-50%												7	7
	3. 50-75%												4	4
	4. >75%												1	1
43.	**Percent Forest Canopy Adjacent to or Over Permanent Water**	B												M
	1. >25%													10
	2. 10-25%													7
	3. 5-10%													4
	4. <5%													1
44.	**Number of Snags >9"dbh per Acre**	B												
	1. >4									5				10
	2. 3-4									5				7
	3. 1-2									3				4
	4. <1									1				1
45.	**Number of Cavity Trees Per Acre**	B												
	1. >9									10				10
	2. 3 - 9									7				7
	3. 1 - 3									4				4
	4. None									LF				1
46.	**Stems per Square Yard of Shrub and Tree Reproduction >3 Feet Tall**													
	1. >3									1	10		10	1
	2. 1-3									3	7		6	4
	3. .5-1									5	4		4	10
	4. <.5									2	1		1	7
47.	**Percent Woodland Within 660' of Permanent Water**	B							M	M	M			
	1. >75%								10	10	10		10	10
	2. 50 - 75% (Multiply Index by .75)								6	6	6		7	7
	3. 25 - 50% (Multiply Index by .50)								4	4	4		4	4
	4. <25% (Multiply Index by .25)								1	1	1		1	1
48.	**Distance to Nonforest Wetland, Oxbow or Slough**	B,C,G												
	1. <250' water predictable		10	10					10	10	10			
	2. 250'-1/8 mi. water predictable		10	10					10	10	5			
	3. 1/8-1 mi. water predictable		10	10					1	1	1			
	4. <250' water predictable 1 of 3 years		5	5					5	5	3			
	5. 250'-1/8 mi. water predictable 1 of 3 yrs.		5	5					5	5	2			
	6. 1/8-1 mi. water predictable 1 of 3 yrs.		5	5					1	1	1			
	7. >1 mi.; or <1 mi. water unpredictable		1	1					1	1	1			
49.	**Distance to Bottomland Hardwoods**	C,N												
	1. <1/4 mi. water predictable		10						5					
	2. 1/4-1/2 mi. water predictable		10						3					
	3. 1/2-1 mi. water predictable		8						1					
	4. <1/4 mi. water predictable 1 of 3 yrs.		6						5					
	5. 1/4-1/2 mi. water predictable 1 of 3 yrs.		6						3					
	6. 1/2-1 mi. water predictable 1 of 3 yrs.		4						1					
	7. >1 mi.; or <1 mi. water unpredictable		1						1					

TABLE J-1 (CONTINUED)

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
50.	**Distance to Cropland**	N,B,G												
	1. <1/4 mi., unharvested or partially unharvested and water predictable		10	10										
	2. 1/4-1 mi. unharvested or partially unharvested and water predictable		8	8										
	3. 1/4-1 mi. unharvested or partially unharvested and water predictable		6	6										
	4. <1/4 mi., unharvested or partially unharvested and water predictable 1 of 3 years; or adjacent, unflooded with residues undisturbed		5	5										
	5. 1/4-1 mi. unharvested or partially unharvested and water predictable 1 of 3 years; or 1/4-1 mi. unflooded with residues and undisturbed		4	4										
	6. <1/4-1 mi. unharvested or partially unharvested and water predictable 1 of 3 yrs; or 1/2-1 mi. unflooded with residues undisturbed; or winter wheat		2	2										
	7. >1 mi. to any cropfield; or <1 mi. unflooded cropfield with residues disced or plowed		1	1										
51.	**Distance to Grassland**	N,C												
	1. <1/2 mi. with winter height <6" and field size >40 acres			10										
	2. 1/2-1 mi. with winter height <6" and field size >40 acres			7										
	3. <1 mi. with winter height <6" and field size <40 acres			4										
	4. >1 mi. to any grassland with winter height <6"; or grassland with winter height>6"			1										
52.	**Distance to Stream or River (permanent flow or pools)**	N,B												
	1. <1/4 mi.								10					
	2. 1/4 - 1/2 mi.								5					
	3. >1/2 mi.								1					
53.	**Distance to Major River, Lake or Reservoir >100 Acres**	N,C,G												
	1. <1 miles Missouri, Mississippi,			10										
	2. 1 - 5 miles Grand, St. Francis			7										
	3. 5 - 10 miles			4										
	4. >10 miles			1										
54.	**Distance to Major Canada Goose Winter Area**	N,C,G		M										
	1. <4 miles			10										
	2. 4 - 10 miles (Multiply Index by .75)			7										
	3. 10 - 25 miles (Multiply Index by .50)			4										
	4. >25 miles (Multiply Index by .25)			1										

TABLE J-1 (CONTINUED)

Wetland Species Characteristic Matrix

	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
Total													
Maximum Possible													
HTSI													
Multiplier													
Revised HTSI													
	N	85	105	70	85	85	70	85			80		
	B	105						100	110	95		60	100
	C	70	105										
	P		80										

Abbreviations

C = cropfield, G = grassland, N = nonforest wetland, B = bottomland hardwoods,
LF - limiting factor, score Habitat Type Suitability Index (HTSI) as .1 if characteristic scores .1.
M = multiplier. Multiply HTSI by the appropriate value to calculate revised HTSI. Use lowest value if 2 multiplier values apply.

Limiting Factors	Character Number
Mallard - If Percent in Bottomland Hardwood and Nonforest Wetland or Fall Winter Flood Conditions score 1, HTSI = .1.	3
Canada goose - If Percent in Nonforest Wetland or Fall Winter Flood Conditions score 1, HTSI = .1.	2,4
Lesser yellowlegs - If Wetland Size, Water Regime or Percent Wetland Substrate score 1, HTSI = .1.	14,16
Green-backed heron - If Wetland Size Water Regime HTSI = .1.	40,47
Wood duck - If Woodland Size Class or Number of Tree Cavities score 1, HTSI = .1.	14,12,16
Least bittern - If Wetland Size, Emergent Vegetation Coverage, or Water Regime score 1, HTSI = .1.	13,14,16
American Coot - If Cattail and Bulrush Coverage, Wetland Size or Water Regime score 1, HTSI = .1.	
King Rail - If Sedge Canopy Coverage Water Regime	
Northern Parula - If Woodland Size Class	40
Prothonotary Warbler - If Woodland Size Class	40

Multiplier	
Mallard - Important Food Plant Coverage (Nonforest wetland)	17
Canada goose - Distance to Major Canada Goose Winter Area	56
Important Food Plant Coverage (Nonforest wetland)	17
Muskrat - Percent Permanent Water Entire Year	9
Wood duck - Percent Woodland Within 660' of Permanent Water	49
Beaver - Percent Woodland Within 660' of Permanent Water	49
Green-backed Heron - Percent Woodland Within 660' of Permanent Water	49
Northern Parula - Percent Woodland Within 660' Water	49
Prothonotary Warbler - Percent Forest Canopy Adjacent to or Over Permanent Water	45

3/89

TABLE J-1 (CONTINUED)

WETLAND SPECIES MATRIX
SUPPLEMENTAL RATINGS 1/

Characteristic	Diving Ducks
55. Percent Area Covered With Submerged Vegetation Hab Type N	
1. >70%	10
2. 40-70%	6
3. 10-40%	3
4. <10%	1
56. Percent Cover of Emergent Vegetation Hab Type N	
1. 20-30%	10
2. 10-20% or 30-50%	5
3. <10% or >50%	1
57. Percent Area Covered With Mollusc Beds Hab Type N	
1. >25%	5
2. 10-25%	3
3. <10%	1
58. Percent Area In Water Depth 1.5 to 3 Ft Hab Type N	
1. >70%	10
2. 40-70%	5
3. 10-40%	3
4. <10%	1
59. Disturbance During Migratory Season Hab Type N	
1. Closed	10
2. No Wtrfl Hunting	6
3. Access Uncontrld	1
60. Water Level Fluctuation/Management Hab Type N	
1. Control 2 of 3 Yr	10
2. Control 1 of 2 Yr	5
3. Uncontrolled	1

1/ Supplemental ratings furnished by USFWS (Chuck Davis)

TABLE J-2

WILDLIFE HABITAT APPRAISAL GUIDE RATINGS

NON-FORESTED WETLAND
SITE 1

Appraisal	Ratings		
	Existing 1/	Future	
		Without	With
1	3	5	3
2	3	5	3
3	2	2	2
4	2	4	1
5	2	5	1
6	2	5	1
7	4	1	4
8	1	4	1
9	2	5	3
10	4	1	3
11	1	5	1
12	6	3	4
13	5	3	4
14	1	1	1
15	1	1	1
16	5	6	2
17	5	5	3
18	2	3	1
19	4	4	3
20	2	2	2
21	5	2	4
22	1	4	1
23	6	5	5
24	1	1	1
25	1	2	2
26	1	4	2
49	2	7	2
50	6	7	6
51	2	3	2
52	2	2	2
53	1	1	1
54	4	4	4
Supplemental Items (Diving Ducks)			
55	4	4	2
56	3	3	2
57	3	3	1
58	2	3	1
59	2	2	2
60	3	3	1

1/ Based on appraisal for field sample site 1 (i.e., Middle and Lower Swan Lake)

TABLE J-2 (Continued)

NON-FORESTED WETLAND
SITE 2

Appraisal	Ratings		
	Existing	Future	
		Without	With
1	3	4	3
2	2.7	4	2.7
3	2	2	2
4	1	2	1
5	2	2	1
6	2.7	2	2
7	1	3	1
8	2	1	2
9	4.7	5	4.7
10	1.7	1.7	1.7
11	2	3	1
12	1.7	3	1.7
13	4.3	3	4.3
14	1.7	3	1.7
15	1.3	1.3	1.3
16	4	4	4
17	1	1	1
18	3	3	2
19	1.3	3	1
20	2	2	2
21	5	3	5
22	1.3	3	1
23	5	5	5
24	1	1	1
25	1	2	1
26	1	2	1
49	1	1	1
50	1	1	1
51	2	2	2
52	1.7	1.7	1.7
53	1	1	1
54	4	4	4

TABLE J-3

WILDLIFE HABITAT SUITABILITY INDICES
NON-FORESTED WETLAND

Species	Habitat Suitability Index					
	Existing		Future			
			Without		With	
Site:	1	2	1	2	1	2
Mallard	.11	.61	.10	.57	.38	.88
Goose	.10	.13	.10	.12	.10	.19
Muskrat	.54	.13	.10	.12	.36	.13
Rail	.10	.66	.10	.50	.54	.63
Heron	.68	.65	.10	.73	.74	.59
Divers	.27	-	.24	-	.76	-

TABLE J-4

WATERFOWL HSI'S
FOR SWAN LAKE PROPER
MALLARD AND DIVERS

Group 1/	Existing	F/WO	F/W
Dabblers (Mallard)	.11	.10	.38
Divers	.27	.24	.76
* Average	.19	.17	.57

FOR FULLER LAKE
(VALUES TAKEN FROM STUMP LAKE)

Group 2/	Existing	F/WO	F/W
* Dabblers (Mallard)	.61	.57	.87

1/ Management of unit is directed at both dabblers and divers.
2/ Management of unit is directed at dabblers only.

* Values applied to project acreages to determine future.

TABLE J-5

WILDLIFE HABITAT ACREAGES
AND HIS VALUES

PLAN A (FUTURE WITHOUT)

Habitat Type	1990 ac	HSI	1992 ac	HSI	2040 ac	HSI
Cropland	538	(-)	538	(-)	538	(-)
Forested Wetland	942	(-)	977	(-)	1,803	(-)
Non-Forested Wetland						
Lower Swan	1,353	(.19)	1,338	(.19)	977	(.17)
Middle Swan	1,210	(.19)	1,194	(.19)	817	(.17)
Upper Swan/Fuller	540	(.61)	536	(.61)	448	(.57)
Other	0	(-)	0	(-)	0	(-)
TOTAL	4,583		4,583		4,583	

PLAN B (WETLANDS EXCAVATION)

Habitat Type	1990 ac	HSI	1992 ac	HSI	2040 ac	HSI
Cropland	538	(-)	538	(-)	538	(-)
Forested Wetland	942	(-)	677	(-)	1,503	(-)
Non-Forested Wetland						
Lower Swan	1,353	(.19)	1,438	(.19)	1,077	(.17)
Middle Swan	1,210	(.19)	1,294	(.19)	917	(.17)
Upper Swan/Fuller	540	(.61)	636	(.61)	548	(.57)
Other	0	(-)	0	(-)	0	(-)
TOTAL	4,583		4,583		4,583	

PLAN C (WETLANDS PROTECTION - DIKE/LEVEE) 424 NGVD)

Habitat Type	1990 ac	HSI	1992 ac	HSI	2040 ac	HSI
Cropland	538	(-)	538	(-)	538	(-)
Forested Wetland	942	(-)	932	(-)	1,470	(-)
Non-Forested Wetland						
Lower Swan	1,353	(.19)	1,338	(.33)	1,100	(.33)
Middle Swan	1,210	(.19)	1,194	(.33)	946	(.33)
Upper Swan/Fuller	540	(.61)	536	(.87)	448	(.87)
Other	0	(-)	74	(-)	74	(-)
TOTAL	4,583		4,583		4,583	

TABLE J-5 (Continued)

PLAN C (WETLANDS PROTECTION - DIKE/LEVEE 426 NGVD)

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,316 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.46)	1,136 (.46)
Middle Swan	1,210 (.19)	1,194 (.38)	983 (.38)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

PLAN C (WETLANDS PROTECTION - DIKE/LEVEE 428 NGVD)

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	768 (-)	1,144 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.41)	1,172 (.41)
Middle Swan	1,210 (.19)	1,194 (.41)	1,020 (.41)
Upper Swan/Fuller	540 (.61)	536 (.87)	500 (.87)
Other	0 (-)	209 (-)	209 (-)
TOTAL	4,583	4,583	4,583

PLAN C (WETLANDS PROTECTION - DIKE/LEVEE 426 NGVD
+ 30% HILLSIDE SED CONTROL)

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,186 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.40)	1,200 (.40)
Middle Swan	1,210 (.19)	1,194 (.40)	1,049 (.40)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

TABLE J-5 (Continued)

PLAN C (WETLANDS PROTECTION - DIKE/LEVEE 426 NGVD + 45% HILLSIDE SED CONTROL)

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,138 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.40)	1,223 (.40)
Middle Swan	1,210 (.19)	1,194 (.40)	1,074 (.40)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

PLAN C (WETLANDS PROTECTION - DIKE/LEVEE + 60% HILLSIDE SED CONTROL)

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,089 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.41)	1,247 (.41)
Middle Swan	1,210 (.19)	1,194 (.41)	1,099 (.41)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

TABLE J-5 (Continued)

PLAN C (WETLANDS PROTECTION DIKE/LEVEE 426 NGVD
+ 30% HILLSIDE SED CONTROL
+ INTERIOR CLOSURE

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,186 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.50)	1,200 (.50)
Middle Swan	1,210 (.19)	1,194 (.50)	1,049 (.50)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

PLAN C (WETLANDS PROTECTION DIKE/LEVEE 426 NGVD
+ 30% HILLSIDE SED CONTROL
+ INTERIOR CLOSURE
+ ISLANDS 4,000 FEET

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,186 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.52)	1,200 (.52)
Middle Swan	1,210 (.19)	1,194 (.52)	1,049 (.52)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

TABLE J-5 (CONTINUED)

PLAN C (WETLANDS PROTECTION DIKE/LEVEE 426 NGVD
+ 30% HILLSIDE SED CONTROL
+ INTERIOR CLOSURE
+ ISLANDS 8,000 FEET

Habitat Type	1990 ac HSI	1992 ac HSI	2040 ac HSI
Cropland	538 (-)	538 (-)	538 (-)
Forested Wetland	942 (-)	862 (-)	1,186 (-)
Non-Forested Wetland			
Lower Swan	1,353 (.19)	1,338 (.53)	1,200 (.53)
Middle Swan	1,210 (.19)	1,194 (.53)	1,049 (.53)
Upper Swan/Fuller	540 (.61)	536 (.87)	495 (.87)
Other	0 (-)	115 (-)	115 (-)
TOTAL	4,583	4,583	4,583

TABLE J-6

ANNUALIZED WATERFOWL HABITAT UNITS FOR PLAN C
INCREMENTAL COMPONENTS

	Non-Forested Wetland												
	Lower Swan			Middle Swan			Upper Swan/Fuller			Total			Potential Feature AAHU Contribution
Alternative	FW	FWO	NET	FW	FWO	NET	FW	FWO	NET	FW	FWO	NET	
Dike/Levee													
424 NGVD	400	212	188	351	185	167	442	293	149	1193	690	503	+503
* 426 NGVD	467	212	255	411	185	226	446	293	154	1324	690	634	+634
428 NGVD	510	212	298	450	185	265	449	293	156	1409	690	719	+719
Hillside Sediment Control (+D/L)													
* 30% Control	503	212	291	445	185	260	446	293	154	1394 (1429)	690	704 (739)	+ 70 (+105 1/)
45% Control	508	212	296	450	185	265	446	293	154	1404 (1444)	690	714 (754)	+ 80 (+120 1/)
60% Control	525	212	313	466	185	281	446	293	154	1437 (1494)	690	747 (804)	+113 (+170 1/)
New Interior Closure (+D/L + Hill. S.C.)													
*	628	212	416	555	185	370	446	293	154	1629	690	939	+235
Islands (+ D/L + Hill. S.C. + Int. C.)													
* 4,000 Feet	653	212	441	577	185	392	446	293	154	1676	690	986	+ 47
8,000 Feet	665	212	453	588	185	403	446	293	154	1699	690	1009	+ 70

1/ Adjusted to include waterfowl benefits generated by the upland water control units themselves, which would contribute at least half again as many waterfowl benefits (conversation with Chris Borden, SCS, 16 Nov 90).

TABLE J-7

ANNUALIZED WATERFOWL HABITAT UNITS - PLAN COMPARISONS

	Non-Forested Wetland											
	Lower Swan			Middle Swan			Upper Swan/Fuller			Total		
Alternative	FW	FWO	NET	FW	FWO	NET	FW	FWO	NET	FW	FWO	NET
Plan B	230	212	18	202	185	18	351	293	58	783	690	93
Plan C	653	212	441	577	185	392	446	293	154	1676 (1711)	690	986 (1021)

(#) = Includes waterfowl benefits attributable to upland sediment control structures per se.

(see APPENDIX DPR-K). The management emphasis at Upper Swan/Fuller Lake would continue to emphasize moist soil plant production for dabblers per the wishes of the Illinois Department of Conservation.

TABLE J-7 shows the general effects of each project plan for non-wetland habitat. From the analysis, Plan B showed an overall minor gain in habitat improvement (93 AAHU's) as compared to the very substantial waterfowl benefits of Plan C (1021 AAHU's).

TABLE J-6 indicates that the major contributor to this habitat gain is the dike/levee (providing both sediment and water control) followed by the interior closure, hillside sediment control and the islands. A fuller interpretation of the incremental AAHU changes reflected in TABLE J-6 is provided in the Alternatives section (Section 5) of the DPR.

SUBSECTION III. AQUATIC HABITAT APPRAISAL GUIDE (AHAG) METHOD

1. BACKGROUND

An Aquatic Habitat Appraisal Guide (AHAG) was developed by the U. S. Waterways Experiment Station for the St. Louis Corps District to evaluate changes in fishery habitat resulting from the Swan Lake project. As noted earlier, the AHAG is based on the concept of the Habitat Evaluation Procedure (USFWS 1980), and follows the format of the Missouri WHAG (Baskett et. al. 1980).

Subsection 2 below provides a description by WES of the overall AHAG methodology, including its assumptions, use of guilds, habitat quality ratings and usage. In subsection 3, WES provides the supporting documentation used in developing the AHAG method. Subsection 4 provides the results of the District's application of the AHAG to the Swan Lake HREP.

2. DESCRIPTION OF AHAG METHOD

There were two phases of AHAG development: prepare habitat guilds of fishes that have been collected in Pool 24, and rate the quality of the habitat for each guild according to habitat preference and life history stage. Each phase is discussed below, including assumptions made in the development of this guide.

a. <u>Assumptions</u>

Habitat-based assessment techniques make specific assumptions on species-habitat relationships (Terrell 1984; O'Neil 1985). Each assumption may be intuitively correct, but can only be verified from field studies. This guide was developed specifically for fishes of Pool 24 based on literature reviews (see Literature Cited section) and makes the following assumptions:

(1) The abundance and distribution of species respond in a predictable and measurable fashion to changes in habitat quality.

(2) Species within a guild have similar habitat requirements which can be described by the same set of habitat variables.

(3) At least one of the habitat variables used in the guide can potentially limit the distribution and abundance of the guild members.

It should be recognized that due to limited life history information on many species, influence of competition and predation on habitat selection, and variation in temporal distribution patterns of fishes, this guide may not necessarily represent a causal relationship. Although seasonal effects are partially accounted for by separating fishes into three life history stages (i.e., spawning, rearing, and adults), it is beyond the scope of this guide to incorporate all temporal environmental influences on fish distribution and abundance. As new information becomes available from field studies, components of the AHAG should be more rigorously defined.

b. Guild Development

A list of fish species that occur in pool 24 was compiled from Sternberg (1971) and Van Vooren (1983) and were separated into guilds (TABLE J-8). A guild is defined as a group of species that exploit the same environmental resources (e.g., habitats) in a similar way (Root 1967), therefore members of a guild should be affected similarly by the alteration of those resources (Roberts and O'Neil 1985).

Water velocity is a major habitat axis along which fish species segregate in riverine environments (Leonard and Orth 1988; Baker et al. 1989). Therefore, fish species that occur in Pool 24 were classified as either slackwater or swiftwater inhabitants. The classification was also based on the premise that tolerance to habitat alteration varies with size of the species, while some species utilize a wide range of conditions (generalists). These criteria result in the formation of five guilds: swiftwater-large fishes (Group 1), swiftwater-small fishes (Group 2), slackwater-large fishes (Group 3), slackwater-small fishes (Group 4), and generalists (Group 5). Although there are exceptions, most members of a guild share important morphological similarities (e.g., fusiform shape for swiftwater fishes and laterally compressed for slackwater fishes) and exhibited the same ontogenetic shifts in preferred habitat (e.g., shallow vegetated areas to open water).

Most species in Groups 1 and 2 are uncommon or occur only on a seasonal basis. These fishes prefer swiftwater habitats usually associated with coarse grain substrate. Their presence is indicative of good riverine habitat. Groups 3 and 4 are usually found in slackwater, although they occasionally enter swiftwater areas for feeding, dispersal, or spawning. Many of these species are economically important. Species in Group 5 are typically widespread and can tolerate a wide range of habitat conditions. Since they have no well-defined habitat preference, no guilds were developed for Group 5.

c. Habitat Quality Ratings

The AHAG uses Habitat Suitability Index (HSI) scores to relate the value of selected habitat variables to a defined guild. Physical and water quality variables used in the guides (TABLE J-9) have been identified as important in structuring fish communities in a variety of stream ecosystems (Baker et al. 1990; Barnickol and Starrett 1951; Becker 1983; Gorman and Karr 1978; Leonard and Orth 1988; Ross 1986; Smith 1979). Furthermore, they characterize physical changes associated with high sedimentation rates and altered water level regimes that have influenced habitat quality in the Upper Mississippi River. Each variable may limit the abundance and distribution of guild members, is directly affected by the engineering objectives of the project, is readily measured in the field, and can be predicted for future environmental conditions. Methods to measure most of these variables are described by Hamilton and Bergersen (1984).

For each guild, the range of habitat values were divided into classes and an HSI score was assigned to each class by life history stage (spawning, rearing, and adults). Each variable class is rated as excellent (1), good (.75), fair (.5), poor (.25), or unusable (0) habitat. The rating is based on information found in the Habitat Suitability Index Models published by the U.S. Fish and Wildlife Service and other data sources cited in the Reference Section. A final HSI score is obtained using either an arithmetic mean of all variable scores (compensatory relationships) or taking the lowest HSI score (limiting factor or threshold value). Habitat Units (HU) can be determined by multiplying HSI times area (e.g., acres) of interest. The AHAG data forms allow the user to enter all habitat measurements and calculate HSI values directly in the field.

d. Discussion

AHAG is a community-level evaluation technique that is useful as a general planning tool to rate habitat quality for guilds of species. It provides a qualitative assessment of the effects of habitat alteration on fishes and can be used without extensive field data collection. However, efforts should be made to evaluate the validity of AHAG. This should include sampling fish in both swiftwater and slackwater habitats to more rigorously define the guilds. Further classification of swiftwater and slackwater fishes into functional feeding (e.g., insectivores, piscivorous) or reproductive (e.g., nest builders versus egg dispersers) groups may increase the predictive capability of AHAG. Also, the relationships between habitat quality and fish abundance should be reviewed by biologists familiar with habitat requirements of the fish. Only through critical review of AHAG components combined with monitoring studies will the validity of AHAG be determined.

3. LITERATURE CITED AND REFERENCES

Baker, J. A., K. J. Killgore, and R. L. Kasul. 1989. Aquatic habitats and fish communities in the Lower Mississippi River. Critical Reviews in Aquatic Sciences (In Press).

Barnickol, P.G. and W.C. Starrett. 1951. Commercial and sport fishes of the Mississippi River between Caruthersville, Missouri and Dubuque, Iowa. Illinois Natural History Survey Bulletin 25.

Baskett, T.S. et al. 1980. A Handbook for Terrestrial Habitat Evaluation in Central Missouri. U. S. Dept. Int., Fish Wildl. Serv., Resource Publication 133, Washington, D. C.

Becker, G. C. 1983. Fishes of Wisconsin. The University of Wisconsin Press, Madison.

Brooks, M., and M. L. Warren. 1986. A Distributional Atlas of Kentucky Fishes. Kentucky Nature Preserves Commission, Scientific and Technical Series Number 4.

Canter, L. W. 1985. Environmental impacts of water resources projects. Lewis Publishers, Inc., Chelsea, Michigan.

Carlander, K. D. 1969. Handbook of Freshwater Fishery Biology-Volume One. The Iowa State University Press, Ames.

Carlander, K. D. 1977. Handbook of Freshwater Fishery Biology-Volume Two The Iowa State University Press, Ames.

Edwards, E. A. 1982. Habitat suitability index models: Bigmouth Buffalo. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.34. 23 pp.

Edwards, E. A., and K. Twomey. 1982. Habitat suitability index models: Smallmouth Buffalo. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.13. 23 pp.

Edwards, E. A., D. A. Krieger, M. Bacteller, and O. E. Maughan. 1982. Habitat suitability index models: Black Crappie. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.6. 25 pp.

Edwards, E. A., D. A. Krieger, G. Gebhart, and O. E. Maughan. 1982. Habitat suitability index models: White Crappie. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.7. 22 pp.

Edwards, E. A., G. Gebhart, and O. E. Maughan. 1982. Habitat suitability index models: Smallmouth bass. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.36. 47 pp.

Edwards, C. J., B. L. Griswold, R. A. Tubb, E. C. Weber, and L. C. Woods. 1984. Mitigating effects of artificial riffles and pools on a fauna of a channelized warmwater stream. North American Journal of Fisheries Management 4: 194-203.

Gore, J. A. 1985. Mechanisms of colonization and habitat enhancement for benthic macroinvertebrates in a restored river channels. Pages 81-102 In J. A. Gore, Editor, The Restoration of Rivers and Streams, Butterworth Publishers, Boston.

Gorman, O. T., and J. R. Karr. 1978. Haibtat structure and stream fish communities. Ecology 59:507-515.

Hamilton, K., and E. P. Bergensen. 1984. Methods to estimate aquatic habitat variables. Bureau of Reclamation, Denver.

Hamilton, K., and P. C. Nelson. 1984. Habitat suitability index models and instream flow suitability index curves. U. S. Dept. Int. Fish Wild. Ser. Biological Report 82 (10.89).

Hubert, W. A., S. H. Anderson, P. D. Southall, and J. H. Carnce. Habitat suitability index models and instream flow suitability curves: Paddlefish. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.80. 32pp.

Inskip, P. D. 1982. Habitat suitability index models: northern pike. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.17. 40 pp.

Krieger, D. A., J. W. Terrell, and P. C. Nelson. 1983. Habitat suitability index models: Yellow perch U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-83/10.55. 37 pp.

Lee, L. A., and J. W. Terrell. 1987. Habitat suitability index models: flathead catfish. U. S. Fish Wildl. Serv. Biol. Rep. 82(10.152). 39 pp.

Leonard, P. M., and D. J. Orth. 1988. Use of habitat guilds of fishes to determine instream flow requirements. North American Journal of Fisheries Management 8:399-409.

McMahon, T. E., and J. W. Terrell. 1982. Habitat suitability index models: Channel catfish. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.2. 29 pp.

McMahon, T. E., J. W. Terrell, and P. C. Nelson. 1984. Habitat suitability index models: Walleye. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.56. 43 pp.

McMahon, T. E., G. Gebhart, O. E. Maughan, and P. C. Nelson. 1984. Habitat suitability index models and instream flow suitability curves: warmouth. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.67. 21 pp.

Miller, A. C., K. J. Killgore, R. H. King, and T. J. Naimo. 1988. Biological and physical conditions at a newly placed gravel bar in the Tombigbee River. Miscellaneous Paper EL-88-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Neuhold, J. M. 1981. Strategy of stream ecosystem recovery. Pages 262-265 In G. W. Barrett and R. Rosenberg, editors, Stress Effects on Natural Ecosystems, John Wiley and Sons, New York.

O'Neil, L. J. 1985. Habitat evaluation methods notebook. Instruction Report EL-85-3, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Pflieger, W. L. 1975. The Fishes of Missouri. Missouri Dept. of Conservation.

Roberts, T. H., and L. J. O'Neil. 1985. Species selection for habitat assessments. Miscellaneous Paper EL-85-8, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Root, R. B. 1967. The niche exploitation pattern of the blue-gray gnatcatcher. Ecology 37:317-350.

Ross, S. T. 1986. Resource partitioning in fish assemblages: a review of field studies. Copeia 352.

Scott, W. B., and E. J. Crossman. 1979. Freshwater fishes of Canada. Bulletin 184, Fisheries Research Board of Canada, Ottawa 1973.

Smith, P. W. 1979. The Fishes of Illinois. University of Illinois Press, Urbana.

Stuber, R. J. 1982. Habitat suitability index models: Black Bullhead. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.14. 25 pp.

Stuber, R. J., G. Gebhart, and O. E. Maughan. 1982. Habitat suitability index models: Bluegill. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.8. 26 pp.

Stuber, R. J., G. Gebhart, and O. E. Maughan. 1982. Habitat suitability index models: Green sunfish. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.15. 28 pp.

Stuber, R. J., G. Gebhart, and O. E. Maughan. 1982. Habitat suitability index models: Largemouth bass. U. S. Dept. Int., Fish Wild. Ser. FWS/OBS-82/10.16. 32 pp.

Sternberg, R. B. 1971. Upper Mississippi River habitat classification survey, Minnesota Dept. of Natural Resources.

Terrell, J. W. 1984. Proceedings of a workshop on fish habitat suitability index models. Biological Report 85(6), U. S. Fish and Wildlife Service, Washington, D.C.

Trautman, M. B. 1981. The Fishes of Ohio. Ohio State University Press.

Twomey, K. A., K. L. Williamson, and P. C. Nelson. 1984. Habitat suitability index models and instream flow suitability curves: white sucker. U. S. Dept. Int., Fish wild. Ser. FWS/OBS-82/10.64. 56 pp.

USCE. 1989. Upper Mississippi River System-Environmental Management Program Definite Project Report: Pharrs Island Habitat Rehabilitation Project. USCE, St. Louis District, St. Louis, Missouri.

USFWS. 1980. Habitat Evaluation Procedures. ESM 102, U. S. Fish and Wildlife Service, Washington, D.C.

Van Vooren, A. 1983. Distribution and relative abundance of Upper Mississippi River Fishes. Upper Mississippi River Conservation Committee, Fish Technical Section.

Williamson, K. L., and P. C. Nelson. 1985. Habitat suitability index models and instream flow suitability curves: Gizzard shad. U. S. Fish Wildl. Serv. Biol. Rep. 82(10.112). 33 pp.

TABLE J-8

Fishes of the Illinois River and their respective size/habitat guild: 1=swiftwater, large fish, 2=swiftwater, small fish, 3=slackwater, large fish, 4=slackwater, small fish, and 5=generalist).

Family and Species	Group
Lepisosteidae	
Longnose gar (*L. osseus*)	5
Shortnose gar (*L. platostomus*)	5
Amiidae	
Bowfin (*Amia calva*)	3
Anguillidae	
American eel (*Anguilla rostrata*)	3
Clupeidae	
Skipjack herring (*Alosa chrysochloris*)	1
Gizzard shad (*Dorosoma cepedianum*)	5
Threadfin shad (*D. petenense*)	3
Hiodontidae	
Goldeye (*Hiodon alosoides*)	1
Mooneye (*H. tergisus*)	1
Esocidae	
Grass pickerel (*Esox americanus*)	3
Northern pike (*Esox lucius*)	3
Cyprinidae	
Common carp (*Cyprinus carpio*)	5
Goldfish (*Carrassius auratus*)	5
Golden shiner (*Notemigonus crysocleucas*)	4
Suckermouth minnow (*Phenacobius mirabilis*)	2
Central stoneroller (*Campostoma anomalum*)	2
Silver chub (*H. storeriana*)	2
Emerald shiner (*Notropis atherinoides*)	5
River shiner (*N. blennius*)	2
Striped shiner (*N. chrysocephalus*)	2
Bigmouth shiner (*N. dorsalis*)	2
Ribbon shiner (*N. fumeus*)	4
Blacknose shiner (*N. heterolepis*)	2
Spottail shiner (*N. hudsonius*)	4
Red shiner (*N. lutrensis*)	5
Silverband shiner (*N. shumardi*)	2
Spotfin shiner (*N. spilopterus*)	2
Redfin shiner (*N. umbratilis*)	2
Steelcolor shiner (*N. whipplei*)	2
Bullhead minnow (*Pimephales vigilax*)	5
Bluntnose minnow (*P. notatus*)	5
Fathead minnow (*P. promelas*)	5

TABLE J-8 (Continued)

Family and Species	Group
Catostomidae	
River carpsucker (*Carpiodes carpio*)	5
Quillback (*C. cyprinus*)	3 (1 for spawning)
Highfin carpsucker (*C. velifer*)	1
White sucker (*Catostomus commersoni*)	1
Smallmouth buffalo (*Ictiobus bubalus*)	3
Bigmouth buffalo (*I. cyprinellus*)	3
Black buffalo (*I. niger*)	3
S. H. redhorse (*Moxostoma macrolepidotum*)	1
Silver redhorse (*Moxostoma anisurum*)	1
River redhorse (*M. carinatum*)	1
Golden redhorse (*M. crythrurum*)	1
Black redhorse (*M. duquesnei*)	1
Ictaluridae	
Black bullhead (*I. melas*)	5
Yellow bullhead (*I. natalis*)	5
Brown bullhead (*I. nebulosus*)	3
Channel catfish (*I. punctatus*)	3
Flathead catfish (*Pylodictis olivaris*)	3
Cyprinodontidae	
Starhead minnow (*Fundulus notti*)	4
Blackstripe topminnow (*F. notatus*)	4
Poeciliidae	
Mosquitofish (*Gambusia affinis*)	5
Atherinidae	
Brook silverside (*Labidesthes sicculus*)	4
Percichthyidae	
White Bass (*Morone crysops*)	1
Yellow bass (*M. mississippiensis*)	3 (1 for swawning)
Centrarchidae	
Rock bass (*Ambloplites rupestris*)	4
Green sunfish (*Lepomis cyanellus*)	5
Pumpkinseed (*L. gibbosus*)	4
Warmouth (*L. gulosus*)	4
Orangespotted sunfish (*L. humilis*)	5
Bluegill (*L. macrochirus*)	5
Longear sunfish (*L. megalotis*)	4
Redear sunfish (*L. microlophus*)	4
Largemouth bass (*M. salmoides*)	3
Smallmouth bass (*Micropterus dolomieui*)	1
White crappie (*Pomoxis annularis*)	3
Black crappie (*P. nigromaculatus*)	3

TABLE J-8 (Continued)

Family and Species	Group
Percidae	
Logperch (*Percina caprodes*)	5
Blackside darter (*P. maculata*)	2
Sauger (*Stizostedion canadense*)	1
Walleye (*S. vitreum*)	1
Sciaenidae	
Freshwater drum (*Aplodinotus grunniens*)	5

~~DESCRIPTION OF GROUPS~~

Group 1
Swiftwater-Large Fishes

This group is represented by large, pelagic-oriented fish that prefer rather clear, fast-flowing water over a sand or gravel substrate. Most species are migratory, travel in schools, and often constitute an important commercial fishery. Spawning occurs over sand or gravel shoals in the spring. The fry of this group are usually pelagic and move into shallower water as they grow feeding on plankton and small invertebrates. The adults feed on large invertebrates or fishes.

Group 2
Swiftwater-Small Fishes

This group is comprised of small minnows and darters. Species in this group are important forage fishes and their presence generally indicates good riverine habitat. They often travel in schools and occupy similar habitat as described for species in Group 1, but generally occur in shallower water and do not migrate greater distances. Reproduction behavior is variable, but spawning usually occurs during the spring over sand or gravel in flowing water. Their diet consists of plankton and small invertebrates.

Group 3
Slackwater-Large Fishes

These fishes inhabit slackwater areas and generally avoids strong current. Because of their large size and relative high abundance, many of these species are important commercial and recreational fish. They often associate with vegetation, woody debris, or other forms of cover in deeper parts of pools, occasionally entering flowing water to feed. The majority of the species in this group are piscivorous as adults, except for the suckers and bullheads which feed on mollusks, insects, and plankton. Spawning occurs during the spring and early summer in shallow, non-flowing water over vegetation, logs, or prepared nests. One notable exception is the American eel which spawns around the Sargossa Sea.

TABLE J-8 (Continued)

DESCRIPTION OF GROUPS

Group 4
Slackwater-Small Fishes

This group of relatively small fish that are common in slackwater habitats. They are typically found in shallow, clear to moderately turbid water with little current. Most species associate with some form of submerged cover. Spawning occurs in spring and early summer in shallow water. Some small species of sunfish deposit eggs in prepared nests, while others spawn along a sandy or clay substrate without parental care. The young often school and become pelagic, but return to shallow areas with submerged timber or aquatic vegetation as they grow. The fry consume plankton and later small crustaceans and insects. Fish are also eaten, particularly by the adult sunfish.

Group 5
Generalists

This group of species are considered generalists because they tolerate a wide range of environmental conditions including high turbidity, low dissolved oxygen, and high water temperatures. They are often the first inhabitants of disturbed habitats and can survive in isolated pools, but generally prefer shallow, sluggish waters with vegetation. Most have an extended spawning season throughout the spring and summer over a variety of substrates. Sunfish and bullheads prepare nests and guard the eggs, while others broadcast their eggs with no parental care. Mosquitofish eggs are fertilized internally and females give birth to living young. The young of this group are usually confined to shallow, protected areas. The diet consists of plankton and invertebrates. Bullheads and sunfish will also consume small fishes.

TABLE J-9

AQUATIC HABITAT APPRAISAL GUIDES
FISHES OF THE ILLINOIS RIVER

Sample site:____________________ **Date:**__________

Season: Winter Spring Summer Fall

Comments:____________________

Scoring Criteria: Excellent=1 Good=.75 Fair=.5 Poor=.25 Unusable=0

Habitat Variable	**HSI Score by Species Group and Life Stage***											
	Group 1			Group 2			Group 3			Group 4		
	S	R	A	S	R	A	S	R	A	S	R	A
Average water temperature (C)												
1. >30	0	0	.25	0	0	.5	0	.25	.5	.25	.25	.75
2. 20-30	.5	.75	.75	.75	.75	.75	1	1	1	1	1	1
3. 15-20	1	1	1	1	1	1	.75	.5	.75	.75	.5	.75
4. 10-15	.75	.75	1	.75	.75	1	.5	.5	.75	.5	.5	.75
5. 4-10	.25	.25	.5	.25	.25	.5	0	.25	.5	0	.25	.5
6. 0-4	0	0	.25	0	0	.25	0	0	.25	0	0	.25
Average dissolved oxygen (mg/l)												
1. 0-1	0	0	0	0	0	0	0	0	0	0	0	0
2. 1-3	0	.25	.25	0	.25	.25	.25	.25	.25	.25	.25	.25
3. 3-5	.5	.5	.5	.5	.5	.75	.5	.5	.75	.5	.75	1
4. > 5	1	1	1	1	1	1	1	1	1	1	1	1
Average turbidty and secchi depth												
1. 0-10 NTU, >3 m	1	1	1	1	1	1	.75	.75	1	1	1	1
2. 10-50 NTU, 2-3 m	.75	.75	1	.75	.75	1	1	1	1	1	1	1
3. 50-100 NTU, 1-2 m	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.75
4. >100 NTU, <.5 m	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25	.5
Percent of area with water depth greater than 1 m												
1. 0-25	.5	.25	.5	.75	.75	.75	1	.5	.25	1	.75	.75
2. 25-50	.75	.75	1	1	1	1	.75	1	.75	1	1	1
3. 50-75	1	1	1	1	1	1	.75	1	1	.5	.75	1
4. >75	.5	.75	1	.75	.75	.75	.5	1	1	.25	.25	.75
Average water velocity (cm/sec)												
1. 0-20	.25	.25	.25	.25	.25	.25	1	1	1	1	1	1
2. 20-30	.5	.5	.5	.75	.75	.75	.5	.5	.75	.25	.5	.5
3. 30-40	1	1	1	1	1	1	.25	.5	.75	.25	.5	.5
4. 40-50	1	1	1	1	1	1	.25	.5	.75	.25	.5	.5
5. >50	1	1	1	1	1	1	0	.25	.5	0	.25	.25

Habitat Suitablity Index (HSI) score for S=Spawning, R=Rearing, and A=Adults

TABLE J-9 (Continued)

AQUATIC HABITAT APPRAISAL GUIDES
FISHES OF THE ILLINOIS RIVER

Habitat Variable	HSI Score by Species Group and Life Stage											
	Group 1			Group 2			Group 3			Group 4		
	S	R	A	S	R	A	S	R	A	S	R	A
Percent of surface area with cover (aquatic plants, logs, inundated timber and brush)												
1. 0-10	1	1	1	1	1	1	.25	.5	.5	.25	.25	.25
2. 10-25	1	1	1	1	1	1	.75	.75	1	.5	.5	.5
3. 25-50	.75	.75	.5	.75	.75	1	1	1	1	.75	.75	1
4. 50-75	.5	.5	.5	.5	.75	.5	.75	.75	.5	1	1	1
5. >75	.25	.25	.25	.25	.25	.25	.5	.25	.25	.75	.75	.5
Dominant substrate compostion												
1. Vegetation/detritus	.5	.75	.5	.75	1	.75	1	1	1	1	1	1
2. Clay and silt (<1.0 mm)	.25	.5	.5	.25	.5	.5	.5	.5	.75	.5	.5	.75
3. Sand (1-2 mm)	.75	1	1	1	1	1	.75	.75	.75	.75	.75	.75
4. Gravel 2-64 mm)	1	1	1	1	1	1	.75	.5	.75	.75	.5	.75
5. Rocks (>64 mm)	1	1	1	1	1	1	.5	.25	.5	.5	.5	.5
Calculations												
Total Score												
Average HSI Value (Total score/number of variables)												
Minimum HSI Value/1 (optional)												
Total Hectares												
Habitat Units (HSI x Total Hectares)												

SUBSECTION IV. AQUATIC HABITAT APPRAISAL GUIDE (AHAG) METHOD

1. GENERAL

The major fisheries goal of the project is to enhance aquatic habitat conditions for slackwater fish, particularly larger slackwater fish. Many of these species are important commercial fish (e.g., buffalo and catfish) and recreational fish (e.g., bullhead, catfish, bass and crappie). Thus AHAG guilds 3 was targeted for emphasis by the AHAG team. The AHAG team included representation from the USFWS, IDOC, WES, and the St. Louis District. Prior to the evaluation, the team reviewed hydrographic maps and existing biological data for the project area.

2. ASSUMPTIONS

During the AHAG analysis, certain assumptions were developed regarding existing conditions and projected future conditions. These assumptions are listed below.

a. Existing Conditions -

(1) Upper Swan Lake/Fuller Lake - This portion of the project area is not suitable as fisheries habitat. The area is nearly totally drained for a portion of the year for waterfowl food production.

(2) Middle and Lower Swan Lake - This vast aquatic area is currently connected to the Illinois River and thus serves as an important site for fish spawning, rearing and as wintering habitat. Conditions currently lowering the value of this habitat for large slackwater fish include high water temperature in the summer, cold water temperatures in the winter and early spring, lower dissolved oxygen levels in summer and the winter, high turbidity and shallow water depth.

b. Future Conditions -

(1) General. The following general assumptions were applied to the analysis of all future changes in habitat during the 50-year project life.

(a) Target years of 0, 2, and 50 are sufficient to annualize habitat units (HU's) and to characterize habitat changes over the life of the project.

(b) Slackwater fish guild 3 is a suitable guild for management emphasis and the life requirements of the slackwater fish group are adequately characterized for the purposes of the incremental analysis of this project.

(c) No comparative evaluation of project-related changes in habitat values was developed for other fish guilds. The swiftwater fishes were not considered because there is no current in Swan Lake for much of the year. The small slackwater fishes were not addressed because many of them are not commercially or recreationally significant.

(2) Specific. Specific assumptions employed in evaluating alternative Plans A, B and C are given below.

(a) <u>Alternative Plan A, No Action Plan</u>

<u>1</u> The Pool 26 section of the Illinois River will lose much of its remaining backwater fisheries habitat during the next century.

2 Shallow lake habitat within the project area (middle and lower Swan Lake) will become reduced in areal extent by 30 percent over the next 50 years, and these habitats will be decreased in depth by about half.

3 All of the habitat quality limiting factors described for the existing conditions will apply to the future without project condition.

(b) Alternative Plan B, Wetlands Excavation - Excavation of middle and lower Stump Lake (200 acres, 5 feet deep) would initially provide some deep water habitat for a short period of time. However, in the long-term the project under this alternative would be subject to the same sedimentation effects and outcome as that described for the no action plan.

(c) Alternative Plan C, Wetlands Protection - The AHAG analysis consisted of evaluating the effects of the various alternative project features and options on fisheries habitat.

1 The protection afforded by the riverside levee will increase water level stability within Swan Lake that will allow for the reestablishment of aquatic vegetation. This will provide additional cover, as well as feeding and spawning habitat. The structure will also prevent the influx of cold water to the lake from the river during the winter and spring period that is currently a source of physiological stress to the lake's wintering fish population.

2 The dike/levee structure, in combination with the hillside program, will result in an overall 60 percent reduction in the future rate of lake sedimentation.

3 The water level compensation capacity built into the interior closure structure (0.5 feet of compensation) will ensure that there is little future loss of water depth over the life of the project.

4 The project's water control structures (gates and pumps) potentially can be used to further deepen the lake (one addition foot) during the winter period to help ensure fish survival.

5 The clam shell operation for the construction of the dike/levee, interior closure and islands will result in deep water habitat potentially critical to the survival of overwintering fish.

6 The interior closure and islands will result in an approximate 75 percent reduction in wave action and a corresponding decrease in turbidity. This should enhance aquatic plant production.

7 Since the AHAG does not yet take into account the exchange of fish between the river and backwater, it is assumed that the access provided by the middle and lower lake control structures is sufficient for normal fish movement.

3. RESULTS

TABLE J-10 lists the team's appraisal item ratings for each habitat condition for both existing and future conditions. TABLE J-11 provides the HSI values for each fish life stage and season of the year for both existing and future conditions. TABLE J-12 provides a tabulated prediction of the habitat acreage changes expected for the project area over the next 50 years for various alternative plans and component plan measure options. A rough indication of the existing conversion rate of land-to-land habitat was determined based on values obtained from the available scientific literature. Extrapolation of the future sedimentation rate took into account half-life effects. Estimates of the sediment reduction effects for the with project condition were based on a judgmental assessment of the hydraulic engineering performance on the potential project measures. Historical river stage data was also used for making determinations of existing and future conditions regarding the likely frequency of dike/levee overtopping, and water level conditions for both the river and the lake.

TABLES J-13 and J-14 provide the HU value changes resulting from the application of the Corps' HES software to the TABLE J-12 HSI and acreage values. The HU's are tabulated for each alternative project plan and component measures.

4. DISCUSSION

The large slackwater fish guild was selected by the AHAG team for fisheries management emphasis. TABLE J-13 shows the incremental effects of the various study options on this fish group.

Plan B (TABLE J-14) shows relatively minor improvement gains for large slackwater fish. Under Plan C, the placement of a dike structure (which enhances aquatic plant production, reduces sediment input, reduces cold water input in winter and spring, and provides the potential for increased winter water depth) results in very substantial overall HU gains for slackwater fish. The hillside sediment control program, the interior closure, the islands and the dike/levee associated dredging, also contribute substantial HU benefits to this fish group. A more detailed analysis of the incremental effects of the component measures of Plan C are provided in the alternatives discussion of the DPR main report.

5. CONCLUSION

The Selected Plan (consisting of those project options marked with an asterisk in TABLE J-13) provides important benefits to large slackwater fish species.

TABLE J-10

AQUATIC HABITAT APPRAISAL GUIDE RATINGS
LARGE SLACKWATER FISHES

Appraisal Item	Ratings											
	Existing (Baseline)				Future							
					Without Project				Project (Max)			
	W	SP	S	F	W	SP	S	F	W	SP	S	F
Av. Water Temp	6	4	1	4	6	3	1	3	5	3	2	4
Av. D.O.	4	4	3	4	3	3	2	3	4	4	4	4
Av. Turbidity	3	4	3	3	3	4	3	3	2	2	2	2
% Water Depth	1	1	1	1	1	1	1	1	2	1	1	2
Av. Water Vel.	1	1	1	1	1	1	1	1	1	1	1	1
% Cover	1	1	1	1	1	1	2	2	1	2	3	3
Dominant Substr.	2	2	2	2	2	2	2	2	2	2	2	2

TABLE J-11

HSI VALUES FOR LARGE SLACKWATER FISHES
MIDDLE/LOWER SWAN LAKE

Life Stage	Existing					Future Without Project					Future With Project (Max. Configuration)				
	W	SP	SU	F	AV	W	SP	SU	F	AV	W	SP	SU	F	AV
Spawning	-	.64	-	-	.64	-	.61	-	-	.61	-	.86	-	-	.80
Rearing	.57	.61	.54	.64	.59	.50	.54	.54	.61	.55	.75	.75	.86	.86	.81
Adult	.61	.64	.61	.68	.64	.57	.61	.61	.71	.63	.79	.82	.86	.89	.84
Average	.59	.63	.58	.66	.62	.54	.59	.58	.66	.59	.77	.81	.86	.88	.83

TABLE J-12

AHAG ANALYSIS - LARGE SLACKWATER FISHES
ALL SEASONS/LIFE STAGES COMBINED

Project Condition: Future Without

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.59)	977	(.59)
Middle Swan	1210	(.62)	1194	(.59)	817	(.59)
Upper Swan/Fuller	540	(-)	536	(-)	448	(-)
Other	0	(-)	35	(-)	861	(-)
	3103		3103		3103	

Plan B

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1438	(.59)	1077	(.59)
Middle Swan	1210	(.62)	1294	(.59)	917	(.59)
Upper Swan/Fuller	540	(-)	636	(-)	548	(-)
Other	0	(-)	265	(-)	561	(-)
	3103		3103		3103	

Plan C - Dike/Levee, 424 NGVD

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.67)	1100	(.67)
Middle Swan	1210	(.62)	1194	(.67)	946	(.67)
Upper Swan/Fuller	540	(-)	536	(-)	448	(-)
Other	0	(-)	35	(-)	573	(-)
	3103		3103		3103	

TABLE J-12 (Continued)

Plan C - Dike/Levee, 426 NGVD

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.69)	1136	(.69)
Middle Swan	1210	(.62)	1194	(.69)	983	(.69)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	489	(-)
	3103		3103		3103	

Plan C - Dike/Levee, 428 NGVD

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.69)	1172	(.69)
Middle Swan	1210	(.62)	1194	(.69)	1020	(.69)
Upper Swan/Fuller	540	(-)	536	(-)	500	(-)
Other	0	(-)	35	(-)	411	(-)
	3103		3103		3103	

Plan C - 30% Hill S.C. (+ 426 D/L)

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.70)	1200	(.70)
Middle Swan	1210	(.62)	1194	(.70)	1049	(.70)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	359	(-)
	3103		3103		3103	

TABLE J-12 (Continued)

Plan C - 45% Hillslide S.C. (+ 426 D/L)

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.71)	1223	(.71)
Middle Swan	1210	(.62)	1194	(.71)	1074	(.71)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	311	(-)
	3103		3103		3103	

Plan C - 60% Hillside S.C. (+ 426 D/L)

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.71)	1247	(.71)
Middle Swan	1210	(.62)	1194	(.71)	1099	(.71)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	262	(-)
	3103		3103		3103	

Plan C - Interior Closure (+ 426 D/L + 30% Hillside S.C. + Int. CL.)

Habitat Type	1990 AC	1990 (HSI)	1992 AC	1992 (HSI)	2040 AC	2040 (HSI)
Lower Swan	1353	(.62)	1338	(.80)	1200	(.80)
Middle Swan	1210	(.62)	1194	(.80)	1049	(.80)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	359	(-)
	3103		3103		3103	

TABLE J-12 (Continued)

Plan C - 4,000 Ft Islands (+ 426 D/L + 30% Hillside S.C. + Int. CL.)

Habitat Type	1990		1992		2040	
	AC	(HSI)	AC	(HSI)	AC	(HSI)
Lower Swan	1353	(.62)	1338	(.80)	1200	(.80)
Middle Swan	1210	(.62)	1194	(.80)	1049	(.80)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	359	(-)
	3103		3103		3103	

Plan C - 8,000 Ft Islands (+ 426 D/L + 30% Hillside S.C. + Int. CL.)

Habitat Type	1990		1992		2040	
	AC	(HSI)	AC	(HSI)	AC	(HSI)
Lower Swan	1353	(.62)	1338	(.81)	1200	(.81)
Middle Swan	1210	(.62)	1194	(.81)	1049	(.81)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	359	(-)
	3103		3103		3103	

Plan C - Dredging (+ 426 D/L + 30% Hillside S.C. + Int. CL. + 4000' Island)

Habitat Type	1990		1992		2040	
	AC	(HSI)	AC	(HSI)	AC	(HSI)
Lower Swan	1353	(.62)	1338	(.82)	1200	(.82)
Middle Swan	1210	(.62)	1194	(.82)	1049	(.82)
Upper Swan/Fuller	540	(-)	536	(-)	495	(-)
Other	0	(-)	35	(-)	359	(-)
	3103		3103		3103	

TABLE J-13

ANNUALIZED LARGE SLACKWATER FISH HABITAT UNITS FOR PLAN C INCREMENTAL COMPONENTS

	Lower Swan			Middle Swan			Total			Potential
Alternative	FW	FWO	NET	FW	FWO	NET	FW	FWO	NET	AAHU Contribution
Dike/Levee										
424 NGVD	819	688	131	719	599	121	1538	1287	252	+252
* 426 NGVD	855	688	166	753	599	154	1608	1287	320	+320
428 NGVD	867	688	178	765	599	166	1632	1287	344	+344
Hillside Sediment Control (+ D/L)										
* 30% Control	888	688	200	785	599	187	1673	1287	386	+ 67
45% Control	909	688	220	805	599	206	1714	1287	426	+106
60% Control	917	688	229	813	599	215	1730	1287	444	+124
Interior Closure (+ D/L + Hill. S.C.)										
*	975	688	287	862	599	264	1837	1287	551	+164
Islands (+ D/L + Hill S.C. + Int. CL.)										
* 4,000 Feet	1013	688	325	895	599	297	1908	1287	622	+ 71
8,000 Feet	1025	688	337	906	599	308	1931	1287	645	+ 94
Dredging (+ D/L + Hill. S.C. + Int. CL. + Isl.)										
* Dredging	1038	688	350	917	599	319	1955	1287	669	+ 47

* Option included in Plan C.

TABLE J-14

ANNUALIZED LARGE SLACKWATER FISH HABITAT UNITS - PLAN COMPARISONS

	Lower Swan			Middle Swan			Total		
Alternative	FW	FWO	NET	FW	FWO	NET	FW	FWO	NET
Plan B	746	688	58	656	599	58	1402	1287	116
Plan C	1038	688	350	917	599	319	1955	1287	669

SECTION II. PROJECTED IMPACTS ON BOTTOMLAND HARDWOOD FOREST

SUBSECTION I. METHOD

According to the Water Resources Development Act (WRDA) of 1986, the Corps must assess the effects of proposed projects on bottomland hardwood forests. Adverse effects are to be mitigated "in-kind, to the extent possible." Representatives from the St. Louis District, U.S. Fish and Wildlife Service, and Illinois Department of Conservation participated as a team to evaluate impacts expected from the proposed Swan Lake project.

To quantify and evaluate these impacts, the team used the same approach as in the terrestrial (WHAG) and aquatic (FHAG) habitat quantification exercises. Habitat conditions were evaluated for existing, future without, and future with project conditions. Target years of 0, 2, and 50 were used to define existing (1992) and future (1994, 2043) conditions. For each project condition, habitat quality was quantified using an index, and habitat quantity was determined in acres. Lastly, habitat quality and quantity were multiplied to obtain a product called habitat units. The project's effect on bottomland hardwood forest was determined by subtracting habitat units computed for the future without condition from habitat units computed for the future condition with the preferred alternative.

The team used the Habitat Evaluation System (HES) method to assess impacts on quality of bottomland hardwood forests. The method was developed by the Corps over a decade ago to assess impacts of water resource development projects on terrestrial and aquatic natural resources in the Lower Mississippi River Valley. HES is a habitat-based method like the WHAG and AHAG methods described in the preceding pages in this appendix. Unlike WHAG, HES was developed as a community-based method. General habitat characteristics are assessed and used to indicate the ability of habitat to support fish and wildlife populations as a whole. In contrast, WHAG assesses habitat conditions for specific species. During the development of HES, the Corps was assisted by other institutions and agencies. HES has been professionally accepted within the Lower Mississippi River Valley region, and is the most comprehensive community-based technique available (Greeley-Polhemus Group, Inc. 1991).

To evaluate impacts on quality of bottomland hardwood forests, the team preferred the community-based approach of HES over the species-based approach of WHAG. The reason for this preference was two-fold. First, the team assumed that the community-based approach could "paint a more complete picture" concerning the ability of the ecological system to support fish and wildlife; the evaluation species used in a species-based approach would presumably provide a "fragmented" assessment. Second, the use of a community-based approach would avoid the need for species trade-offs when establishing mitigation goals using a species-based approach.

Habitat assessment methods for wetlands are still undergoing modifications for improvement. There currently is no "universally" accepted method that adequately addresses all aspects of wetland functions and values. The District is willing to explore alternative methods on future projects.

SUBSECTION II. PROCEDURE

The HES method uses seven key variables to assess overall habitat quality of bottomland hardwood forest. These key variables are: 1) tree species composition (on .20 acre plot), 2) number of mast trees (12 inches DBH or greater on .20 acre plot), 3) percent cover for overstory (2 to 12 feet above ground on .04 acre plot), 4) percent cover for groundcover (on .01 acre plot), 5) number of trees (with DBH of 18 inches or greater on .20 acre plot), 6) tract size, 7) number of snags (8 feet tall or higher on .20 acre plot).

Key variables were assessed and scored in the field using functional curves in the HES manual specific for bottomland hardwood forest. Scores ranged from 0.0 (lowest) to 1.0 (highest). The score for each variable was then weighted according to the manual to reflect the relative importance of that key variable to overall habitat quality. The weighted scores were summed for all key variables and divided by 100 to yield an aggregate score. The aggregate score was called the habitat quality index (HQI).

Key variables were assessed at six sites at Swan Lake to obtain six HQIs for bottomland hardwood forest. Three wooded sites were chosen along the Illinois River at locations coinciding with the footprint of the riverside dike/levee. Another three locations were selected away from the river in the interior of the project area (see FIGURE J-2). The HQIs for the three sample sites along the footprint of the levee were averaged, as were the HQIs for the three interior sites.

Once again, the Habitat Evaluation System software (not to be confused with the Habitat Evaluation System method used to assess habitat quality of bottomland hardwood forest) was used to compute habitat units. Habitat unit statistics for bottomland hardwood forest have also been annualized.

Currently, there are 942 acres of bottomland hardwood forest at the project site. Construction of the levee and other structures will require the clearing of 106 acres, which will leave 578 acres of forest in the interior area, and 258 acres in the riverside area. The impact area assessed by the HES method includes the interior forest (578 acres) and the riverside forest corresponding to the levee footprint (106 acres). The 258 acres of forest between the levee and river were not included in the assessment because this area will not be impacted by the project.

SUBSECTION III. RESULTS

The data representing habitat quality and quantity for the three project conditions are as follows.

Area	Existing	Future Without yr.2	Future Without yr.50	Future With yr.2	Future With yr.50
	habitat quality indices (HQI)				
Interior BLH	.50	.50	.52	.51	.76
Riverside BLH	.77	.77	.69	.0	.0
Levee footprint	.0	.0	.0	.0	.0
	acres				
Interior BLH	578	578	578	578	578
Riverside BLH	106	106	106	0	0
Levee footprint	0	0	0	106	106

The habitat unit output from the HES computer program is as follows.

Alternative	Land Use	Future With Project	Future W/O Project	Unit Changes
Plan C	Interior BLH	365.53	294.66	70.86
Plan C	Riverside BLH	0.82	77.46	-76.65
Plan C	Levee footprint	0.00	0.00	0.00
	Subtotal			- 5.79

The HES analysis shows that the clearing of forest from the 106 acres represents a loss of 77 AAHU. The analysis also shows that the riverside levee is expected to improve habitat quality by protecting the interior forest within the project area (578 acres) from frequent flooding. Mast tree species, especially oaks, in this interior area are currently unable to regenerate apparently because the existing flooding regime is too wet (Klein et al. 1975). The impact on this interior area consists of an increase of 71 AAHU, and is due in part to the expected regeneration of mast tree species.

According to the HES analysis, the overall impact of the preferred alternative on bottomland hardwood forest is negative, and consists of a decrease of 6 AAHU (-77 AAHU minus 71 AAHU).

Note that the HQI for target year 2 of the future with project condition (one year after construction) is 0.51, and for target year 50 it is 0.76. These values reflect the gradual growth of new tree seedlings to mature individuals.

SUBSECTION IV. POTENTIAL MEASURES TO MITIGATE ADVERSE EFFECTS

The assessment indicated that over the 50-year project life, there would be an overall negative net change of 6 AAHU to bottomland hardwood forest. To illustrate this, envision a scale balance. Habitat units placed on the right pan represent those that will be lost over the 50-year project life from clearing about 106 acres of forest to construct the riverside levee. The left pan holds habitat units to be gained in the future from forest protected from low-level flooding after construction of the riverside levee. After coming to rest, the balance leans to the right because the habitat units to be lost outweigh those to be gained. To balance the scale, 6 AAHU will need to be placed on the left pan.

a. Potential measures. The HES manual was used to identify which of the seven key variables are most amenable to manipulation to produce increases in habitat quality. The measures identified were number of mast trees, percent cover-understory, and percent cover-groundcover.

(1) Number mast trees. Figure 33 in the HES manual presents the habitat quality indices (HQIs) for number of mast trees (>=12" dbh) on a 1/5 acre plot. The interior sample sites (#1,2,3) scored HQIs of zero for this variable. Two mast trees per 1/5 acre, or 10 trees per acre, give a minimum HQI of 0.7. Therefore, an increase of 0.7 in the HQI for this variable produces a weighted HQI score of 11.2 (0.7 x 16).

(2) Percent cover-understory. Figure 34 in the HES manual gives HQIs for percent understory (2'-12') coverage on a 1/25 acre plot. Interior sites #1 and 3 scored very low on this variable, and #2 scored 0.44. Forty percent coverage by palatable species gives a HQI of 0.7. Therefore, an increase in HQI of 0.65 for this variable gives a weighted HQI score of 9.1 (0.65 x 14).

(3) Percent cover-groundcover. Figure 35 in the HES manual gives HQIs for percent groundcover (below 2') coverage on a 1/100 acre plot. All three interior sites scored very low for this variable. Forty percent coverage by palatable species yields a HQI of 0.55. Therefore, an increase in HQI of 0.50 for

this variable provides a weighted HQI score of 7.0 (0.50 x 14).

b. Expected HQI increase and required acreage. Acreage is determined by dividing the 8 AAHU by the proposed increase in habitat quality (habitat units divided by habitat quality equals acres). The greater the proposed increase in habitat quality, the fewer the acres. The expected increase in habitat quality from providing ten mast trees per acre, and 40 percent coverage for understory and groundcover components, is 0.27 [(11.2 + 9.1 + 7.0)/100]. The minimum area required for habitat improvements is 30 acres (8 AAHU/0.27 HQI).

Implementation of these three measures on 22 acres represents a mitigation ratio of 1 to 1 (one habitat unit gained for every habitat unit lost). The U.S. Environmental Protection Agency recommends mitigation ratios of 1.5 to 1 for forested wetlands. To achieve this mitigation ratio, 33 acres of forest would need habitat improvements.

SUBSECTION V. PROPOSED FORESTRY MANAGEMENT PROGRAM

The two project sponsors (USFWS and IDOC) are proposing to implement a bottomland forest management program for improving wildlife habitat. This program is a response to the opportunity afforded by implementation of the EMP project, which will create drier site conditions that are more conducive to mast tree plantings. The project sponsors consider the inclusion of this program as simply good management planning, and not as project mitigation per se. The program will not be reflected in the future-without condition because it will not be implemented without the project. Habitat benefits accruing from the program will be part of the future with condition. The scale of the program will at a minimum match a mitigation ratio of 1.5 to 1. The program may be of a much larger scale. The cost of the program will be incurred by the project sponsors - there will be no project costs associated with this program. With implementation of this plan, no mitigation will be required, and compliance with the requirements of Section 906(d) will be met.

a. Proposed measures.

(1) Mast tree plantings. The target density of mature trees is 10 per acre. Assuming a mortality rate of 50 percent, 20 seedlings per acre would be required.

(2) Enhancement of groundcover and understory coverage. The target coverage for both components is 40 percent. Girdling may be preferred to clearing. The density of girdled trees necessary to produce a coverage of 40 percent is to be decided by IDOC and USFWS.

b. Apportionment of acreage. The proposed riverside levee will protect areas managed by IDOC and USFWS. About 70 percent of the levee is located on Service land, and about 30 percent on IDOC land. According to this ratio, the required acreage on IDOC's area is 10 acres, and 23 acres on USFWS land. For example, 10 acres of mast tree plantings and 10 acres of increased understory and groundcover coverage will be required on IDOC land.

c. Location of implementation. These measures will be implemented on the west side of Swan Lake. The exact location will be decided by IDOC and USFWS in the future. Mast tree plantings as well as enhancement of groundcover and understory coverage may be implemented at the same site, or separate sites may be chosen.

d. Schedule. Details of the forestry management program will be developed jointly by IDOC, USFWS, and the District within 12 months after project approval.

e. Cost. The estimated total cost of implementing the proposed measures on 10 acres of IDOC land and 22 acres of USFWS land is [$15,000].

SUBSECTION VI. INDIRECT IMPACTS TO BOTTOMLAND HARDWOOD FORESTS

As required by Section 906 of the Water Resources Development Act of 1986, adverse impacts to bottomland hardwood forests are to be mitigated in-kind, to the extent possible. Adverse impacts include direct impacts, such as the loss of 106 acres to construct the proposed riverside levee and other structures (as discussed in the preceding sections). The Act does not specify that mitigation is required only for direct impacts. Indirect losses of bottomland hardwood forests that would result from implementation of the project are addressed below.

Without the project, it is expected that 861 of the 3,103 acres of existing open-water wetlands will become forested over the next 50 years through woody invasion of newly accreted areas. With the project, the rate of accretion will be reduced to preserve open-water wetlands, so that only 244 acres will become forested. The indirect loss is the difference between the future without and future with conditions, which is 617 acres of bottomland hardwoods.

Willow will be the first woody species to invade the newly accreted areas. Within about 10 - 20 years, willow will be replaced by silver maple and some cottonwood (with or without a project). For the 50-year life of the project, this composition of dominant species is not expected to change. Over a longer period of time, however, the silver maple - cottonwood association is expected to change. In areas protected by levees, a pin oak association is often observed, and it is expected that this shift will occur in the "interior" of the project site. In areas unprotected by levees, a silver maple - elm - ash association is usually found. The willow and silver maple - cottonwood associations are rated lower in habitat value by the HES methodology than the oak or maple - elm - ash associations.

Swan Lake itself represents about 40 percent of the total backwater habitat in Pool 26, and about 10 percent for the Illinois River. This backwater habitat serves an important function for waterfowl, fisheries, and wetland species in general, and retardation of the conversion process from aquatic to terrestrial habitat is a project priority. With the project, the integrity of backwater habitat will be improved, and the existing bottomland hardwood forests are expected to increase in habitat value. Without the project, Swan Lake will offer very little habitat value to waterfowl, fishes, and wetland species in general, and the surrounding bottomland hardwood forests will not be expected to increase in habitat value. Overall, the existing diversity of habitats will be maintained with the project rather than lost if Swan Lake were allowed to accrete at the present rate. Therefore, mitigation of indirect impacts to bottomland hardwood forests does not appear to be necessary.

SECTION III. PROJECTED IMPACTS ON NONFORESTED WETLANDS

Under the preferred alternative, there will be 8 acres of nonforested wetlands lost due to construction of project features. These nonforested wetlands consist of Swan Lake itself as well as herbaceous wetlands adjacent to the lake. Construction of the project will require 20 acres of shallow borrow areas. These borrow sites will be placed and configured to maximize their wetland value. The ratio of acres gained to acres lost is 20 to 8, or about 2.5 to 1. Because of this ratio, no compensatory mitigation has been proposed for the loss of nonforested wetlands.

HABITAT ELAVUATION SYSTEM (HES)

BOTTOMLAND HARDWOOD SAMPLE SITE LOCATIONS

INTERIOR SITES: 1-3
RIVERSIDE DIKE/LEVEE SITES: 4-6

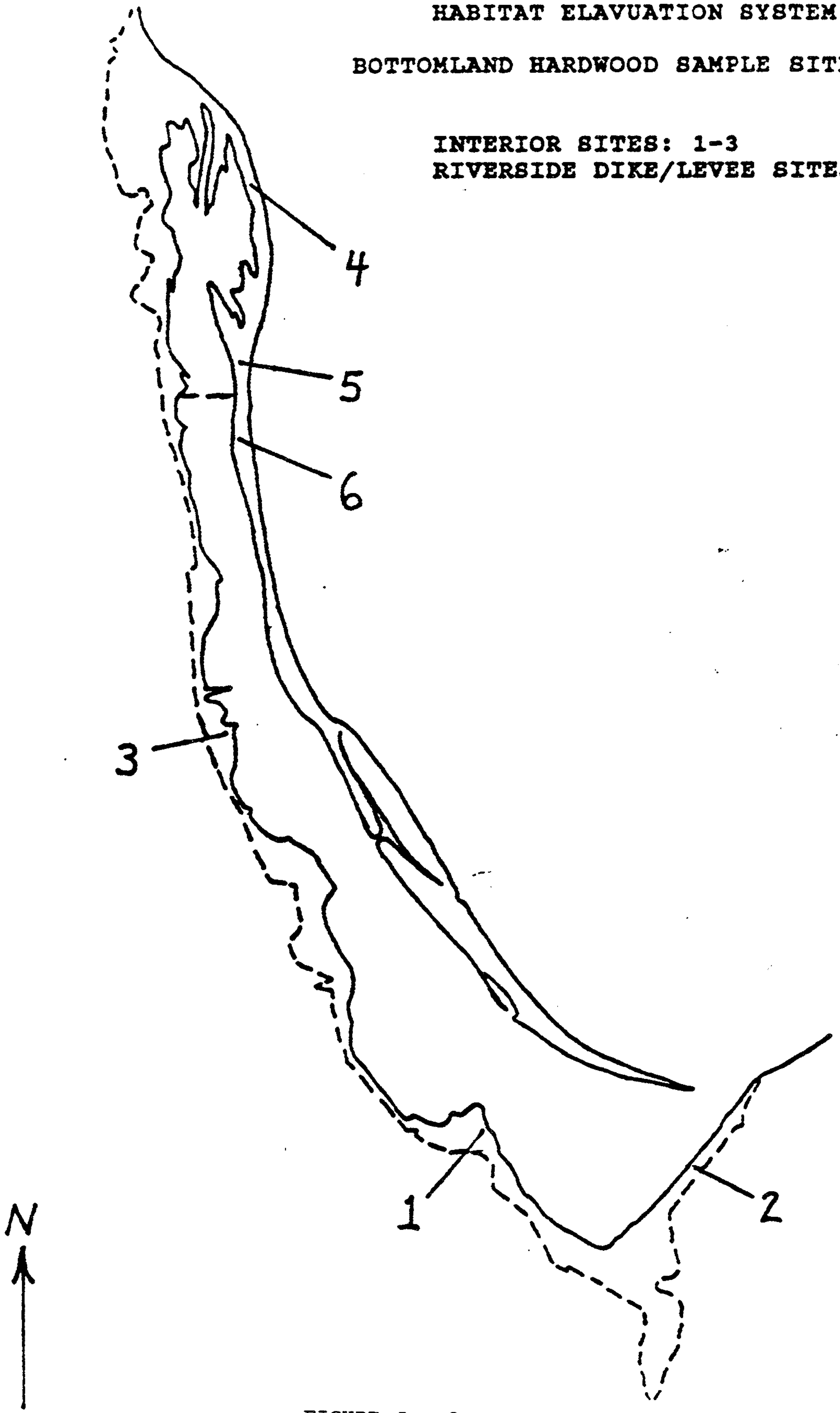


FIGURE J - 2

REFERENCES

Greeley-Polhemus Group, Inc. 1991. Economic and environmental considerations for incremental cost analysis in mitigation planning. IWR report 91-R-1, U.S. Army Corps of Engineers, Water Resources Support Center, Institiute for Water Resources, Fort Belvoir. 135 pp.

Klein, W.M., R.H. Daley, and J. Wedum. 1975. Environmental inventory and assessment of navigation pools 24, 25, and 26, upper Mississippi and lower Illinois rivers: a vegetational study. Contract report Y-75-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg. 140 pp.

APPENDIX DPR-K

BIOLOGICAL DATA

FOREWORD

APPENDIX DPR-K provides the following biological data for the Swan Lake project area, (1) Illinois Natural History Survey aerial waterfowl census data for the period 1967-1989; (2) ground survey for diving ducks for the period 1972-1989; (3) INHS peak population numbers data for various waterfowl species for the period 1948-1984; (4) 5-year biological and recreational output production history for period 1979-1983; (5) fish species collected - years 1984, 1986, 1987, 1988 and 1989; and (6) vegetative cover type information.

TABLE K-1

Average weekly count of waterfowl species aerially inventoried from 1967-1989 by Illinois Natural History Survey during fall migration (September 1 - December 15) on the Illinois River at **Swan Lake**, river miles 5 - 12, Calhoun County, Illinois. Counts rounded to nearest whole number. Number of weekly counts = n.

n	10	10	13	11	11	9	10	13	14	13	14
species	**1967**	**1968**	**1969**	**1970**	**1971**	**1972**	**1973**	**1975**	**1976**	**1977**	**1978**
mallard	5,962	5,567	10,973	5,008	22	17,821	6,272	17,012	18,096	18,001	16,445
black	36	87	48	37		511	144	448	203	268	207
pintail	21	1,410	1,176	27	6	1,334	118	445	235	956	1,622
blue-winged teal	46	16	57	11	27	71	196	231	393	669	521
green-winged teal	244	1,701	779	127	10	143	272	396	323	296	459
wigeon	5,712	6,316	2,973	549	54	318	398	385	859	816	3,104
gadwall	248	174	562	32		46	132	55	36	138	186
shoveler	2	4	9	5	<1	6		52	15	32	13
DABBLERS	**12,271**	**15,275**	**16,577**	**5,796**	**119**	**20,250**	**7,532**	**19,024**	**20,160**	**21,177**	**22,558**
scaup	1,026	3,592	438	405		1,361	140	179	105	444	524
ring-necked	790	1,400	2,042	136		197	36	67	42	236	350
canvasback	50	43	276	32		11	20	25	16	115	134
redhead	12	4	6	13		1		4		31	23
ruddy	212	940	829	266				32	11	26	30
goldeneye				2		17	12	11	105	79	179
bufflehead	2	2	6			8		7		6	51
DIVERS	**2,092**	**5,981**	**3,597**	**854**	**0**	**1,595**	**208**	**325**	**279**	**937**	**1,291**
common merganser			73	3		22	2	6	41	44	72
red-breasted merganser											3
hooded merganser	1		5					2	2	3	16
ALL DUCKS	**14,364**	**21,256**	**20,252**	**6,653**	**119**	**21,867**	**7,742**	**19,357**	**20,482**	**22,161**	**23,940**
Canada goose	348	10	77	100	10	13	76	290	267	408	1,576
blue & snow goose	3,850	4,286	1,169	454	<1	756	1,085	2,652	1,781	2,260	3,440
ALL GEESE	**4,198**	**4,296**	**1,246**	**554**	**10**	**769**	**1,161**	**2,942**	**2,048**	**2,718**	**5,016**
coot	9,810	9,280	2,512	1,836		439	1,044	756	925	3,190	8,648

TABLE K-1 (continued)

n	14	14	14	12	14	9	7	8	11	12	12
species	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**
mallard	13,964	9,366	7,848	5,958	7,828	7,922	9,714	9,750	20,727	23,062	25,617
black	204	100	151	139	106	107	98	145	327	336	464
pintail	1,498	922	277	242	436	630	3,628	2,538	2,682	1,690	2,980
blue-winged teal	405	191	136	188	323	353	1,088	944	418	426	236
green-winged teal	593	398	214	158	275	392	2,100	850	849	563	1,159
wigeon	2,660	1,351	898	452	520	1,221	4,725	3,309	3,454	1,681	2,654
gadwall	198	114	87	51	83	171	457	356	1,068	229	706
shoveler	40	15	20	25	34	20	277	120	372	114	834
DABBLERS	**19,562**	**12,455**	**9,628**	**7,214**	**9,606**	**10,818**	**22,089**	**18,012**	**29,898**	**28,102**	**34,651**
scaup	561	393	312	210	193	362	1,807	656	1,200	1,077	1,940
ring-necked	194	355	186	60	93	88	918	284	616	426	1,258
canvasback	98	75	91	72	55	135	454	189	320	281	896
redhead	16	26	16	16	21	26	96	42	150	79	148
ruddy	21	35	30	13	42	80	265	274	514	271	339
goldeneye	175	44	166	38	60	58	422	232	131	269	279
bufflehead	47	13	16	16	26	33	161	116	127	86	72
DIVERS	**1,113**	**941**	**818**	**425**	**490**	**832**	**4,124**	**1,793**	**3,060**	**2,490**	**4,932**
common merganser	51	13	56	12	19	22	115	76	45	76	76
red-breasted merganser	3				4		8	5			
hooded merganser	13	4	26	3	8	8	38	14	13	19	26
ALL DUCKS	**20,743**	**13,414**	**10,528**	**7,654**	**10,126**	**11,679**	**26,374**	**19,899**	**33,015**	**30,687**	**39,686**
Canada goose	664	470	607	478	265	500	1,264	488	1,154	1,200	2,821
blue & snow goose	2,176	2,531	1,106	1,462	344	828	589	594	1,070	776	1,110
ALL GEESE	**2,840**	**3,001**	**1,713**	**1,940**	**609**	**1,328**	**1,853**	**1,082**	**2,224**	**1,976**	**3,931**
coot	3,829	1,923	1,788	426	1,196	1,728	13,332	7,070	10,877	4,896	4,586

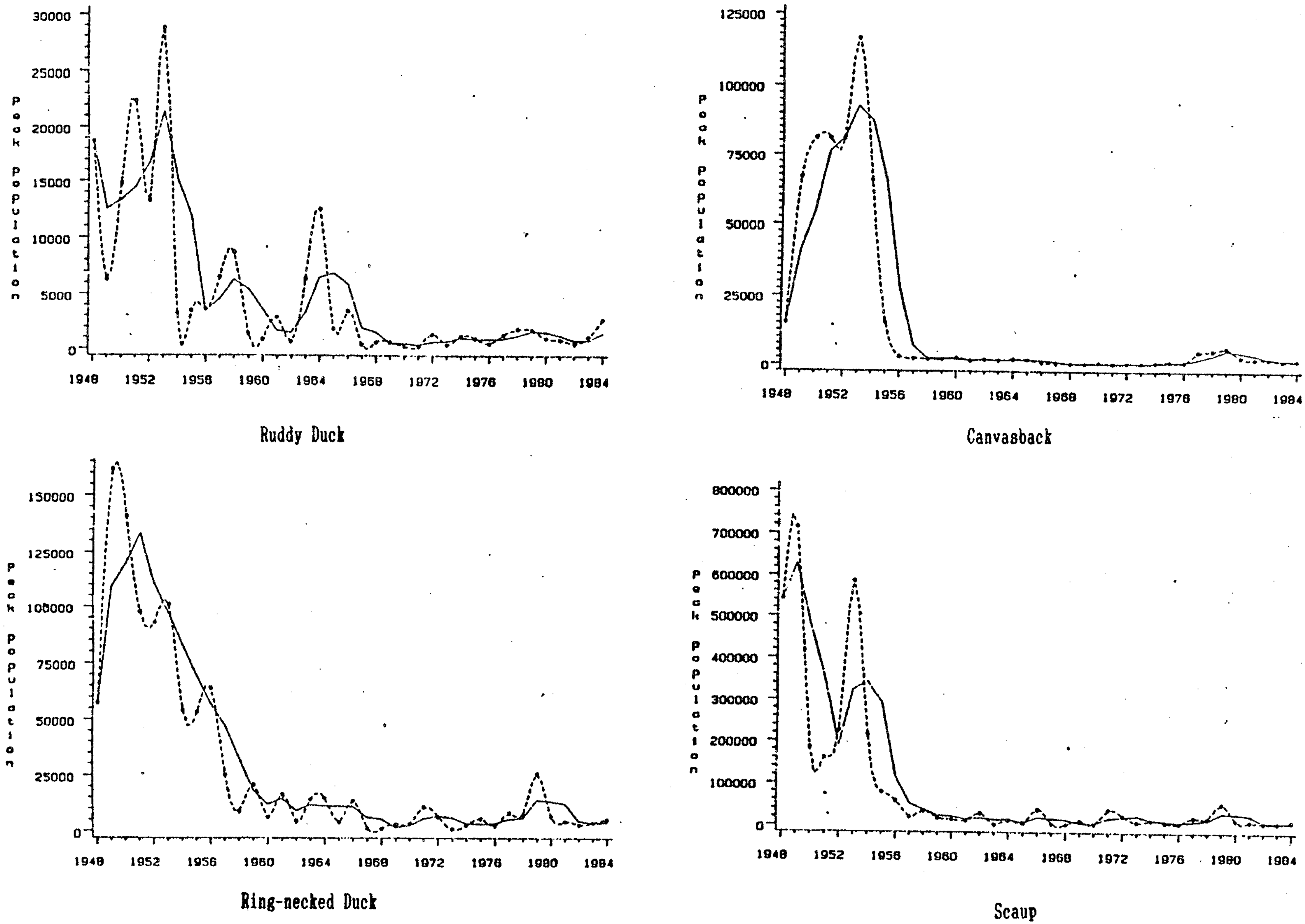
TABLE K-2

SWAN LAKE
DIVING DUCK GROUND SURVEY
1972-1989

Year	Common Merganser	Readhead	Canvasback	Lesser Scaup	Ring-Necked	Common Goldeneye	Buffle-head	Ruddy	Total
1989	1,836	1,120	6,875	14,635	8,600	4,580	900	11,270	49,816
1988	1,018	790	2,655	7,670	4,645	2,715	765	4,495	24,753
1987	1,048	1,250	2,985	8,805	5,045	2,335	1,072	3,355	25,895
1986	1,980	285	2,775	6,892	1,876	4,825	735	685	20,085
1985	2,090	430	2,815	9,415	3,670	4,445	911	1,145	24,921
1984	170	435	1,325	4,175	1,050	920	120	305	8,500
1983	830	940	2,550	11,095	4,205	1,485	470	860	22,435
1982	1,065	770	1,945	7,110	5,275	1,895	176	380	18,616
1981	735	1,055	4,090	9,990	6,490	1,745	125	350	24,580
1980	1,475	985	10,450	19,060	6,320	1,745	125	325	42,965
1979	1,075	630	3,030	18,415	7,170	2,890	390	470	34,070
1978	1,185	510	2,375	17,840	7,955	2,925	510	455	33,755
1977	1,420	695	2,230	6,287	3,865	2,195	295	385	17,372
1976	1,745	255	2,865	4,780	1,480	1,940	300	1,335	14,700
1975	1,765	210	1,330	3,675	1,875	785	340	1,475	11,455
1974	2,290	75	152	4,060	1,256	875	145	4,710	13,563
1973	1,187	15	65	11,087	1,085	605	105	3,760	17,909
1972	2,350	435	280	19,469	4,750	1,630	180	5,850	34,944

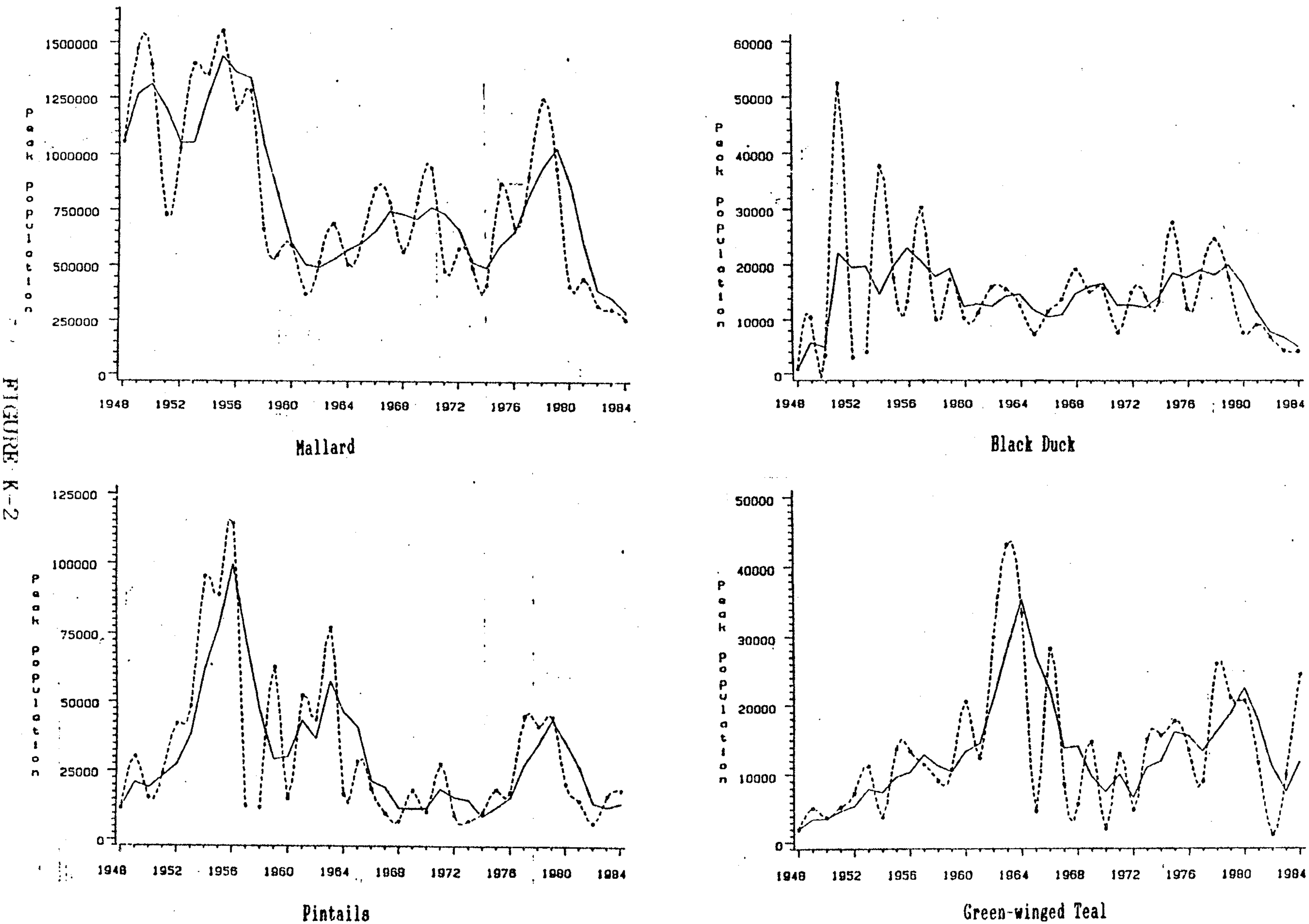
From: USFWS - Brussels District, Calhoun Division

FIGURE K-1



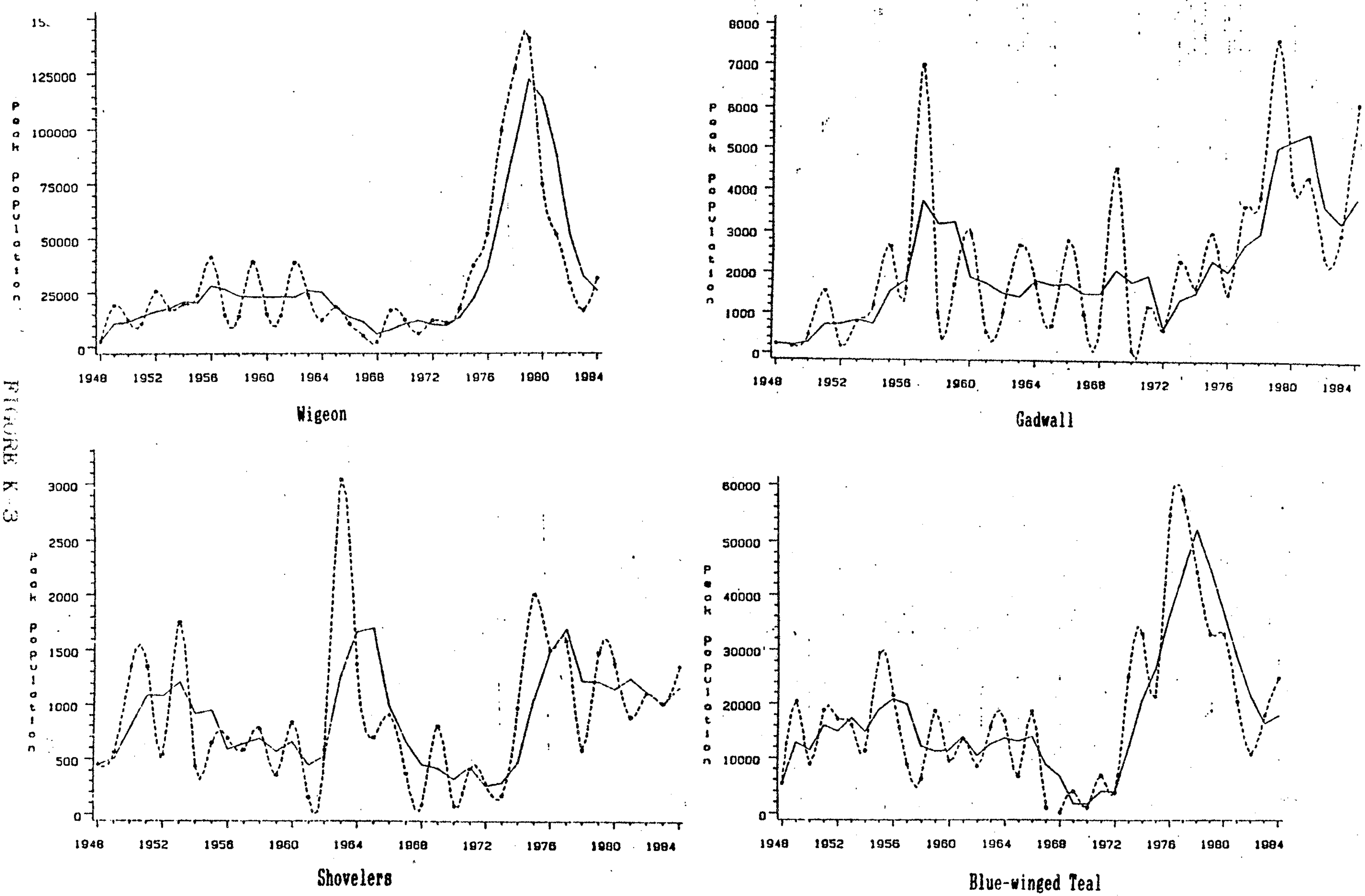
Peak population numbers and a 3-year moving average of peak numbers censused during fall in the Illinois River valley, 1948-1984. Solid line depicts the 3-year moving average (INHS, Federal Aid Project No. W-88-R-1-5, 1985).

FIGURE K-2



Peak population numbers and a 3-year moving average of peak numbers censused during fall in the Illinois River valley, 1948-1984. Solid line depicts the 3-year moving average (INHS, Federal Aid Project No. W-88-R-1-5, 1985).

FIGURE K-3



Peak population numbers and a 3-year moving average of peak numbers censused during fall in the Illinois River valley, 1948-1984. Solid line depicts the 3-year moving average (INHS, Federal Aid Project No. W-88-R-1-5, 1985).

TABLE K 3

Calhoun Division

Five-Year Output Production History (1979 - 1983)

Output	Unit	1979	1980	1981	1982	1983
Endangered/Threatened Species						
Bald Eagle	UD	1,500	2,500	3,000	1,000	1,500
Waterfowl Maintenance						
Geese	UD	782,000	1,036,000	926,000	896,000	346,000
Ducks	UD	2,450,000	2,916,000	1,629,000	1,109,000	1,930,000
Waterfowl Production						
Wood Duck	EA	300	500	600	800	600
Mallard	EA	150	70	60	400	200
Special Recognition Species						
Marsh & Water Birds	UD	6,000	14,000	24,000	13,000	18,000
Shorebirds, Gulls, Terns, Etc.	UD	29,000	21,000	9,000	21,000	16,000
Raptorial Birds	UD	4,000	6,000	3,000	5,000	4,000
Mourning Dove	UD	36,000	55,000	126,000	50,000	63,000
Wildlife Diversity	SP	231	231	231	231	231
Public Use						
Wildlife Observation	AH	600	1,000	600	300	600
Environmental Education	AH	0	0	0	20	200
Interpretive Exhibits	AH	50	0	30	80	0
Fishing	AH	3,000	7,000	5,000	4,000	4,000
Photography	AH	24	16	34	85	2
Other Consumptive Recreation	AH	0	200	0	200	0

Unit

EA = Each

UD = Use Days

SP = Species

AH = Activity Hours

TABLE K-4

Fish species collected in Swan Lake by the U.S. Fish and Wildlife Service during 1984, 1986, and 1987 using gillnets, trap nets and A.C. electrofishing (Swan Lake Fisheries Management Plan, in prep.).

Family and Species
Lepisosteidae - gars
Spotted gar (Lepisosteus oculatus)
Longnose gar (L. osseus)
Shortnose gar (L. platostomus)
Amiidae - bowfins
Bowfin (Amia calva)
Anguillidae - eels
American eel (Anguilla rostrata)
Clupeidae - herrings
Skipjack herring (Alosa chrysochloris)
Gizzard shad (Dorosoma cepedianum)
Hiodontidae - mooneyes
Goldeye (Hiodon alosoides)
Cyprinidae - minnows
Common carp (Cyprinus carpio)
Emerald shiner (Notropis atherinoides)
River shiner (N. blennius)
Red shiner (N. lutrensis)
Silverband shiner (N. shumardi)
Bluntnose minnow (Pimephales notatus)
Fathead minnow (P. promelas)
Catostomidae - suckers
River carpsucker (Carpiodes carpio)
Quillback (C. cyprinus)
White sucker (Catostomus commersoni)
Smallmouth buffalo (Ictiobus bubalus)
Bigmouth buffalo (I. cyprinellus)
Black buffalo (I. niger)
Shorthead redhorse (Moxosotoma macrolepidototum)
Ictaluridae - catfishes and bullheads
Black bullhead (Ictalurus melas)
Yellow bullhead (I. natalis)
Channel catfish (I. punctatus)
Poeciliidae - livebearers
Mosquitofish (Gambusia affinis)

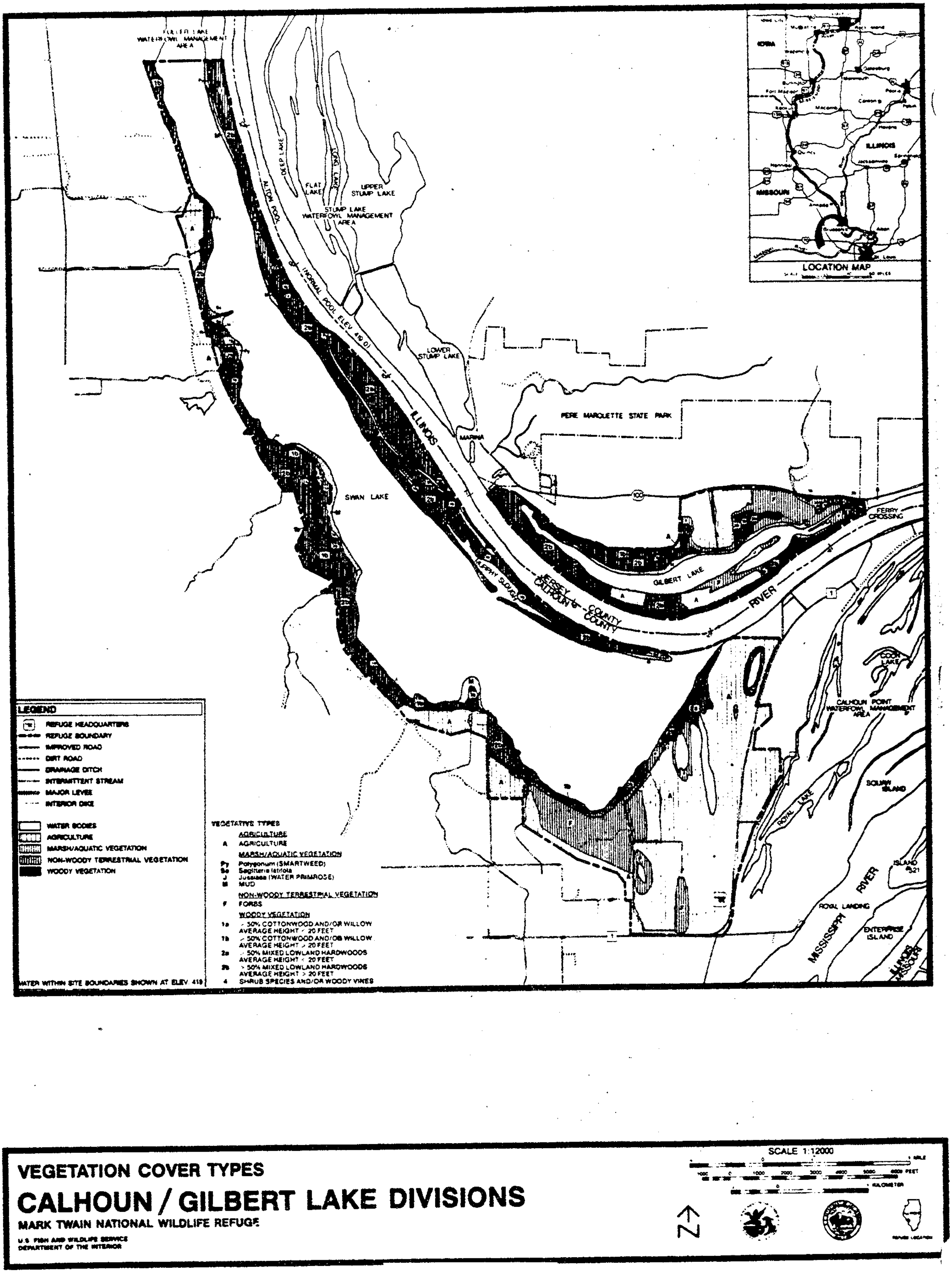
Family and Species
Percichthyidae - sea basses
White bass (Morone crysops)
Yellow bass (M. mississippiensis)
Hybrid striped bass (M. crysops x M. saxatilis)
Centrachidae - sunfishes
Green sunfish (Lepomis cyanellus)
Warmouth (L. gulosus)
Orangespotted sunfish (L. humilis)
Bluegill (L. macrochirus)
Largemouth bass (Micropterus salmoides)
White crappie (Pomoxis annularis)
Black crappie (P. nigromaculatus)
Percidae - perches and darters
Mud darter (Etheostoma aspirgene)
Sauger (Stizostedion canadense)
Sciaenidae - drums
Freshwater drum (Aplodinotus grunniens)

Additional fish species collected in Swan Lake during 1988 and 1989 using gillnets, trap nets, and A.C. electrofishing (Source: Winter habitat requirements and overwintering of riverine fishes, Project Completion Report, F-79-R, Fisheries Research Laboratory, Southern Illinois University, Carbondale, 1990).

Hiodontidae
- Mooneye (Hiodon tergisus)

Cyprinidae
- Golden shiner (Notemigonus crysocleucas)

Ictaluridae
- Brown bullhead (Ictalurus nebulosus)
- Flathead catfish (Pylodictis olivaris)



LOCATION MAP
IOWA
ILLINOIS
MISSOURI
FLAT LAKE
DEEP LAKE
LONG LAKE
UPPER STUMP LAKE
STUMP LAKE WATERFOWL MANAGEMENT AREA
ALTON POOL
(NORMAL POOL ELEV 419.0)
LOWER STUMP LAKE
PERE MARQUETTE STATE PARK
MARINA
ILLINOIS
SWAN LAKE
GILBERT LAKE
FERRY CROSSING
JERSEY COUNTY
CALHOUN COUNTY
RIVER
CALHOUN POINT WATERFOWL MANAGEMENT AREA
ROYAL LAKE
MISSISSIPPI RIVER
ROYAL LANDING
ENTERPRISE ISLAND
LEGEND
REFUGE HEADQUARTERS
REFUGE BOUNDARY
IMPROVED ROAD
DIRT ROAD
DRAINAGE DITCH
INTERMITTENT STREAM
MAJOR LEVEE
INTERIOR DIKE
WATER BODIES
AGRICULTURE
MARSH/AQUATIC VEGETATION
NON-WOODY TERRESTRIAL VEGETATION
WOODY VEGETATION
WATER WITHIN SITE BOUNDARIES SHOWN AT ELEV. 419
VEGETATIVE TYPES
AGRICULTURE
A AGRICULTURE
MARSH/AQUATIC VEGETATION
Py Polygonum (SMARTWEED)
Sa Sagittaria latifolia
J Jussiaea (WATER PRIMROSE)
M MUD
NON-WOODY TERRESTRIAL VEGETATION
F FORBS
WOODY VEGETATION
1a > 50% COTTONWOOD AND/OR WILLOW AVERAGE HEIGHT < 20 FEET
1b > 50% COTTONWOOD AND/OR WILLOW AVERAGE HEIGHT > 20 FEET
2a > 50% MIXED LOWLAND HARDWOODS AVERAGE HEIGHT < 20 FEET
2b > 50% MIXED LOWLAND HARDWOODS AVERAGE HEIGHT > 20 FEET
4 SHRUB SPECIES AND/OR WOODY VINES
VEGETATION COVER TYPES
CALHOUN / GILBERT LAKE DIVISIONS
MARK TWAIN NATIONAL WILDLIFE REFUGE
U.S. FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR
SCALE 1:12000
N

FIGURE K-4

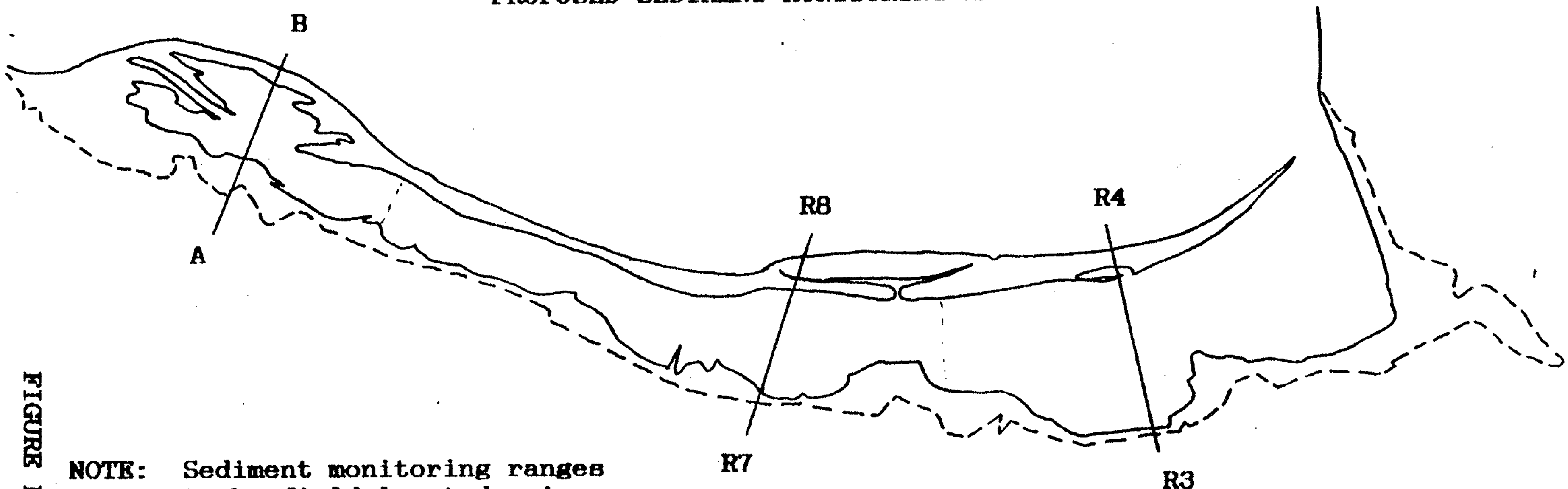
APPENDIX DPR-L

PERFORMANCE EVALUATION MONITORING - PHYSICAL, CHEMICAL SAMPLING LOCATIONS

FOREWORD

APPENDIX DPR-L provides the proposed ranges for post-project sedimentation monitoring, the proposed locations for limited water quality testing, and a listing of the water quality parameters to be assessed.

PROPOSED SEDIMENT MONITORING RANGES

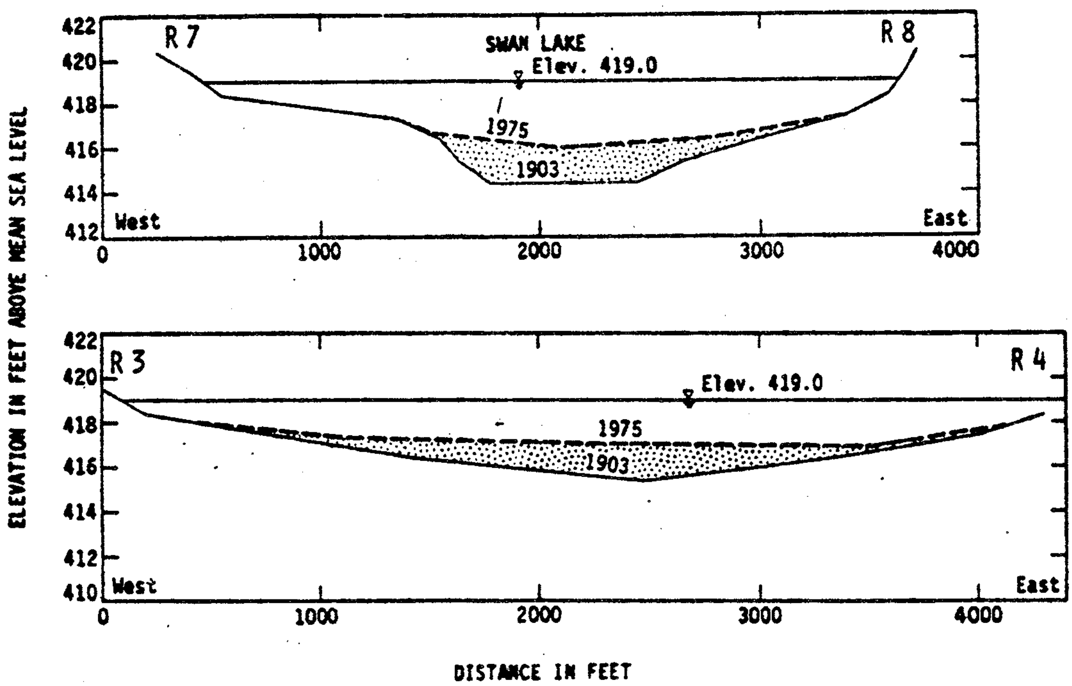


NOTE: Sediment monitoring ranges to be field located using state coordinates system during P&S phase of project. No more than 3 stations to be established.

R# = Designated 1975 sediment transects (Lee & Stall, 1976)

FIGURE L-1

HISTORICAL BOTTOM PROFILE
INFORMATION
FOR LAKE RANGES R3-R4 AND R7-R8



FROM: Lee & Stall, 1976

FIGURE L-2

WATER QUALITY
SAMPLING AND ANALYSIS

Sampling and analysis will be performed four (4) times a year based on seasonal conditions, i.e., spring, summer, fall, winter. This data will be collected yearly prior to construction and for five years after project completion. This data will be analyzed to evaluate the effectiveness ofthe project. This analyses will be incorporated into the Long Term Resource Monitoring program (LTRM). A description of the sampling locations follows (see attached map):

Site 1. This site is in the deeper water conveyance channel in the upper end of the lower compartment.

Site 2. This site is located in shallow water near the mouth of Metz Creek in the lower end of the middle compartment.

Site 3. This site is located in the deeper water conveyance channel in the upper end of the middle compartment.

Site 4. This site is located in the middle of the upper compartment (Fuller Lake).

Site 5. This site is located in the middle of the channel on the Illinois River at river mile 10.

A list of the parameters that will be monitored is attached.

WATER QUALITY STATIONS

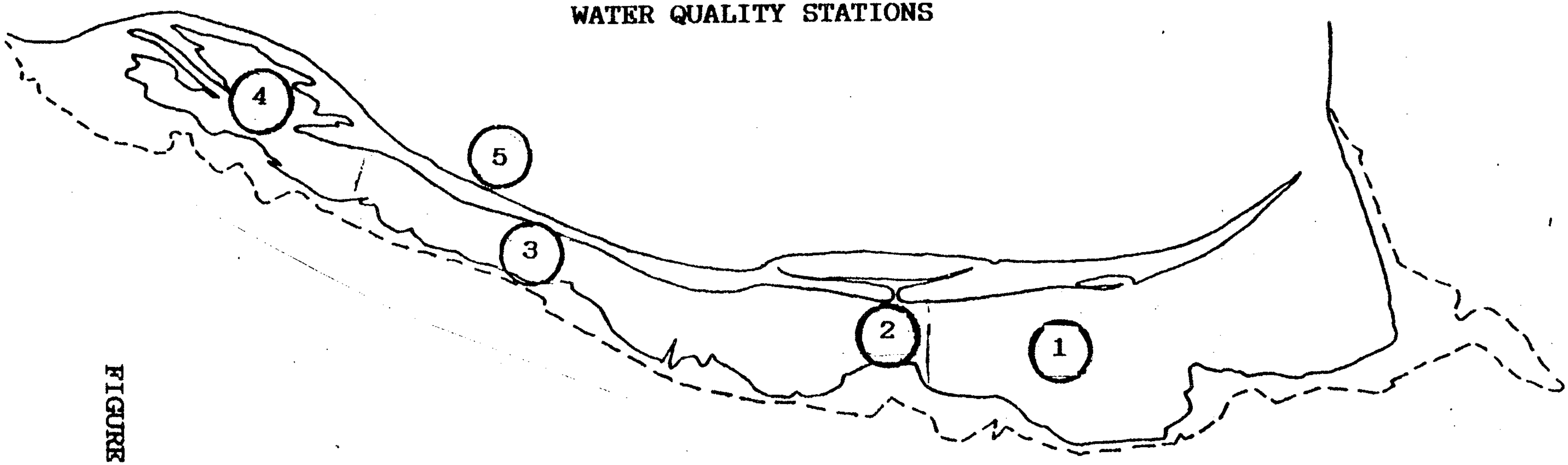


FIGURE L-3

TABLE L-1

STANDARD FIELD PARAMETERS FOR WATER QUALITY MONITORING

Parameter	Unit of Measure
Air temperature	oC
Water temperature	oC
Wind velocity	km/h
Wind direction	N,S,E,W, etc.
Cloud cover	%
Wave height	m
Water depth	m
Water velocity	m/sec
Secchi disk depth	m
Ice cover (seasonal)	%
Ice thickness (seasonal)	m
Snow cover (seasonal)	%
Snow depth (seasonal)	m
Dissolved oxygen	mg/l
pH	units
Alkalinity	mg/l as CaCO3
Specific conductance	micromhos/cm at 25oC

LTRM FIELD STATION
WATER QUALITY DATA

EXPLANATORY NOTES:

Water Velocity- "IE-2" is code for a velocity of 0.01 m/s.

No current directions are given for velocities of 0.02 m/s or less.

I005.7M- Is a site located near the mouth of Swan on the lower end. It´s vegetated, with sago pondweed and some coontail.

I005.8K- Is a site in Swan. It´s not vegetated.

Dissolved Oxygen- A code of "-9" is given for D.O. readings greater than 20.0 mg/l

From: Jenny Rundell
Cuivre Island Field Station

TABLE L-2

SWAN LAKE FIELD STATIONS DATA

Weekly Water Sampling (Data Only) For Datablock W148801

Report Date: 05/03/90 Page: 1

Date	Time (CST)	River Locat'n Code	Gauge Read (ft)	Wave Hght (cm)	Wind Dir	Wind Spd (m/s)	Watr Curr Dir	Water Depth (m)	Samp Dpth Code	Samp Dpth (m)	Sech Disk Tran (cm)	Turb (ntu)	Watr Vel (m/s)	Water Vel Meth Code	Spcf Cond (umho/cm)	Watr Temp (C)	Temp Meth Code	Dslv Oxyg (mg/l)	Dslv Oxyg Meth Code	Rprt Code	Crew Lead Init	Rcrd Nmbr
08/04/88	11:55	1005.7M	-0-	-0-	-0-	-0-	-0-	0.35	SF	0.2	29	41	0.00	EM	880	32.8	DM	8.3	EL	5	DB	37
08/10/88	8:15	1005.7M	-0-	-0-	-0-	-0-	-0-	0.31	SF	0.2	26	47	0.00	EM	790	28.8	DM	1.2	EL	3	DB	63
08/18/88	6:50	1005.7M	-0-	-0-	-0-	-0-	-0-	0.40	SF	0.2	-9	22	0.00	EM	725	29.0	DM	1.3	EL	5	DB	16
08/22/88	7:55	1005.7M	-0-	-0-	-0-	-0-	-0-	0.37	SF	0.2	20	-0-	1E-2	EM	720	28.3	DM	4.1	EL	5	DB	27
08/30/88	13:20	1005.7M	-0-	-0-	-0-	-0-	-0-	0.34	SF	0.2	-9	25	0.00	EM	625	23.0	DM	1.5	EL	5	DB	60
09/14/88	9:30	1005.7M	-0-	0	-0-	-0-	-0-	0.33	SF	0.2	12	-9	-0-	EM	605	24.0	DM	8.3	EL	5	DB	96
09/22/88	9:42	1005.7M	-0-	7	-0-	-0-	-0-	0.41	SF	0.2	15	86	-0-	EM	660	24.2	DM	7.9	EL	5	DB	123
10/11/88	12:55	1005.7M	-0-	4	-0-	-0-	-0-	0.27	SF	0.2	10	-9	1E-2	EM	545	15.9	DM	10.2	EL	5	DB	42
10/21/88	10:10	1005.7M	-0-	7	-0-	-0-	-0-	0.36	SF	0.2	10	130	0.04	EM	481	12.9	DM	8.2	EL	1	DB	88
11/02/88	10:40	1005.7M	-0-	6	-0-	-0-	-0-	0.25	SF	0.2	-9	23	1E-2	EM	480	11.1	DM	13.0	EL	3	DB	33
11/14/88	11:20	1005.7M	-0-	1	-0-	-0-	-0-	0.33	SF	0.2	-9	17	0.04	EM	485	9.4	DM	12.1	EL	5	DB	69
12/07/88	14:53	1005.7M	-0-	6	-0-	-0-	-0-	0.29	SF	0.2	14	86	0.02	EM	702	7.9	DM	10.8	EL	5	DB	40
01/20/89	10:30	1005.7M	-0-	16	-0-	-0-	-0-	0.44	SF	0.2	16	188	0.00	EM	914	1.9	DM	13.4	EL	3	DB	66
02/01/89	10:45	1005.7M	-0-	17	-0-	-0-	-0-	0.43	SF	0.2	33	35	0.03	EM	762	7.8	DM	14.2	EL	5	DB	12
03/17/89	12:50	1005.7M	-0-	7	-0-	-0-	-0-	0.57	SF	0.2	27	45	0.03	EM	1041	9.5	DM	13.4	EL	5	FA	42
03/21/89	14:25	1005.7M	-0-	7	-0-	-0-	-0-	0.54	SF	0.2	10	287	0.02	EM	574	7.3	DM	13.5	EL	5	FA	54
03/31/89	10:30	1005.7M	-0-	6	-0-	-0-	-0-	0.30	SF	0.2	6	627	0.00	EM	577	6.0	DM	11.8	EL	5	FA	97
04/06/89	11:45	1005.7M	-0-	4	-0-	-0-	-0-	0.36	SF	0.2	17	160	0.03	EM	640	9.3	DM	9.0	EL	5	FA	7
04/13/89	10:15	1005.7M	-0-	0	-0-	-0-	-0-	0.49	SF	0.2	19	69	1E-2	EM	663	11.8	DM	11.5	EL	5	FA	30
04/19/89	10:05	1005.7M	-0-	1	-0-	-0-	-0-	0.47	SF	0.2	19	52	1E-2	EM	597	15.0	DM	15.9	EL	5	DB	38
04/24/89	9:50	1005.7M	-0-	1	-0-	-0-	-0-	0.57	SF	0.2	23	48	0.02	EM	596	18.5	DM	15.6	EL	5	DB	62

Weekly Water Sampling (Data Only) For Datablock w148905

Report Date: 05/03/90 Page: 2

Date	Time (CST)	River Locat'n Code	Gauge Read (ft)	Wave Hght (cm)	Wind Dir	Wind Spd (m/s)	Watr Curr Dir	Water Depth (m)	Samp Dpth Code	Samp Dpth (m)	Sech Disk Tran (cm)	Turb (ntu)	Water Vel (m/s)	Vel Meth Code	Spcf Cond (umho/cm)	Watr Temp (C)	Watr Temp Meth Code	Dslv Oxyg (mg/l)	Dslv Oxyg Meth Code	Rprt Code	Crew Lead Init	Rcrd Nmbr
05/12/89	11:35	1005.7M	-0-		4	90	3.6	-0-	0.47	SF	0.2	28	38	0.00	EM	536	19 6	DM	-9.0	EL	5	FA	18
05/24/89	10:25	1005.7M	-0-		1	330	3.4	-0-	0.47	SF	0.2	18	82	0.00	EM	753	23.0	DM	12.2	EL	5	FA	55
06/01/89	8:46	1005.7M	-0-		0	150	5.3	-0-	0.43	SF	0.2	11	76	1E-2	EM	562	25.9	DM	5.6	EL	5	DB	9
06/07/89	13:55	1005.7M	-0-		0	15	4.8	15	0.37	SF	0.2	11	200	1E-2	EM	536	28.0	DM	14.2	EL	5	JJ	26
06/21/89	13:38	1005.7M	-0-		0	340	0.5	-0-	0.47	SF	0.2	28	27	0.00	EM	623	27.8	DM	13.5	EL	5	FA	81
07/07/89	9:47	1005.7M	-0-		0	120	1.2	-0-	0.37	SF	0.2	30	36	0.00	EM	717	28.0	DM	7.0	EL	5	JJ	25
07/11/89	10:20	1005.7M	-0-		0	110	1.	-0-	0.35	SF	0.2	-9	24	0.00	EM	735	30.5	DM	5.3	EL	5	FA	39
07/19/89	8:40	1005.7M	-0-		4	112	43.	-0-	0.50	SF	0.2	12	99	0.00	EM	654	23.3	DM	5.5	EL	5	JJ	76
07/25/89	16:17	1005.7M	-0-		0	340	2.5	-0-	0.41	SF	0.2	20	44	0.00	EM	996	30.3	DM	18.6	EL	5	FA	84
08/01/89	8:37	1005.7M	-0-		0	60	1.6	-0-	0.33	SF	0.2	14	83	0.00	EM	565	25.3	DM	4.1	EL	5	FA	19
08/11/89	13:20	1005.7M	-0-		0	340	1.4	-0-	0.39	SF	0.2	-0-	28	0.00	EM	669	24.6	DM	1.3	EL	5	FA	51
08/17/89	8:00	1005.7M	-0-		0	240	1.3	-0-	0.40	SF	0.2	26	40	0.00	EM	715	21.8	DM	1.6	EL	5	FA	78
08/25/89	10:45	1005.7M	-0-		0	260	3.	-0-	0.35	SF	0.2	19	41	0.00	EM	581	24.3	DM	4.6	EL	5	FA	110
08/31/89	13:50	1005.7M	-0-		1	0	4.	-0-	0.47	SF	0.2	18	59	0.00	EM	578	30.0	DM	16.2	EL	5	FA	135
09/07/89	8:03	1005.7M	-0-		0	0	0.6	-0-	0.39	SF	0.2	18	55	0.00	EM	639	25.3	DM	6.2	EL	5	FA	24
09/13/89	9:30	1005.7M	-0-		4	340	3.5	-0-	0.47	SF	0.2	17	86	0.00	EM	467	17.9	DM	5.6	EL	5	FA	44
09/18/89	11:10	1005.7M	-0-		1	-0-	-0-	200	0.52	SF	0.2	27	57	0.03	EM	444	23.2	DM	13.7	EL	5	FA	51
09/25/89	10:45	1005.7M	-0-		1	245	1.2	-0-	0.48	SF	0.2	28	41	1E-2	EM	603	17.7	DM	8.6	EL	5	FA	75
10/04/89	14:20	1005.7M	-0-		0	210	0.3	-0-	0.39	SF	0.2	17	88	0.00	EM	663	21.0	DM	10.4	EL	5	FA	23
10/13/89	15:30	1005.7M	-0-		3	240	1.9	-0-	0.35	SF	0.2	16	68	0.00	EM	539	24.3	DM	15.0	EL	5	FA	50
10/17/89	13:15	1005.7M	-0-		13	320	6.	-0-	0.43	SF	0.2	12	150	1E-2	EM	597	14.2	DM	11.0	EL	5	FA	70
10/23/89	11:05	1005.7M	-0-		0	50	0.7	-0-	0.36	SF	0.2	20	51	0.00	EM	639	15.4	DM	11.0	EL	5	FA	74

TABLE L-2 (CONTINUED)

Weekly Water Sampling (Data Only) For Datablock W148910

Report Date: 05/03/90 Page: 3

Date	Time (CST)	River Locat'n Code	Gauge Read (ft)	Wave Hght (cm)	Wind Dir	Wind Spd (m/s)	Watr Curr Dir	Water Depth (m)	Samp Dpth Code	Samp Dpth (m)	Sech Disk Tran (cm)	Turb (ntu)	Water Vel (m/s)	Vel Meth Code	Spcf Cond (umho/cm)	Watr Temp (C)	Temp Meth Code	Dslv Oxyg (mg/l)	Dslv Oxyg Meth Code	Rprt Code	Crew Lead Init	Rcrd Nmbr
10/30/89	12:00	1005.7M	-0-	4	200	3.1	20	0.34	SF	0.2	18	92	0.03	EM	616	17.6	DM	10.7	EL	5	FA	99
11/06/89	13:47	1005.7M	-0-	0	70	2.5	200	0.37	SF	0.2	15	65	0.03	EM	684	13.4	DM	11.3	EL	5	FA	10
11/16/89	14:36	1005.7M	-0-	13	285	9.3	-0-	0.31	SF	0.2	2	1700	0.00	EM	661	3.1	DM	11.5	EL	5	FA	41
11/21/89	14:21	1005.7M	-0-	1	35	2.5	-0-	0.38	SF	0.2	31	28	0.00	EM	788	9.8	DM	11.4	EL	5	FA	70
11/27/89	15:15	1005.7M	-0-	12	245	12.5	245	0.42	SF	0.2	2	1800	0.04	EM	730	13.0	DM	10.4	EL	5	FA	83
12/11/89	14:15	1005.7M	-0-	6	315	4.5	315	0.47	SF	0.2	32	29	0.03	EM	740	1.8	DM	14.6	EL	5	FA	19
12/20/89	14:50	1005.7M	-0-	0	120	2.1	-0-	0.41	SF	0.2	-9	9	0.00	EM	886	0.1	DM	11.4	EL	5	FA	38
12/29/89	10:30	1005.7M	-0-	0	60	0.8	-0-	0.45	SF	0.2	-9	15	0.00	EM	-0-	0.6	DM	12.8	EL	5	FA	44
01/03/90	13:50	1005.7M	-0-	0	150	1.1	-0-	0.46	SF	0.2	-0-	31	0.00	EM	895	1.9	DM	17.0	EL	5	FA	6
01/24/90	11:03	1005.7M	-0-	1	90	1.3	80	0.44	SF	0.2	24	49	0.04	EM	953	4.7	DM	12.5	EL	5	FA	62
01/29/90	13:19	1005.7M	-0-	0	235	2.5	-0-	0.40	SF	0.2	27	31	0.00	EM	935	6.9	DM	15.4	EL	5	FA	72
02/05/90	13:50	1005.7M	-0-	6	200	4.5	-0-	0.48	SF	0.2	29	46	0.00	EM	893	7.0	DM	13.2	EL	5	FC	9
02/21/90	14:39	1005.7M	-0-	3	115	2.3	40	0.49	SF	0.2	30	28	0.05	EM	782	6.3	DM	18.8	EL	5	FC	58
02/27/90	15:02	1005.7M	-0-	4	275	3.	-0-	0.62	SF	0.2	18	70	0.00	EM	832	7.0	DM	12.6	EL	5	FC	64
03/08/90	13:25	1005.7M	-0-	5	190	3.5	-0-	0.68	SF	0.2	23	61	0.02	EM	652	7.9	DM	13.6	EL	5	FC	20
03/16/90	14:52	1005.7M	-0-	27	240	-0-	-0-	1.38	SF	0.2	9	250	0.00	EM	615	14.5	DM	7.5	EL	5	FC	39
03/20/90	15:53	1005.7M	-0-	2	200	-0-	200	1.80	SF	0.2	22	46	0.07	EM	663	10.9	DM	12.3	EL	5	FC	46
03/27/90	14:20	1005.7M	-0-	1	30	2.8	-0-	1.23	SF	0.2	21	62	0.00	EM	570	11.9	DM	19.2	EL	5	FC	64
04/06/90	13:14	1005.7M	-0-	9	330	9.	-0-	0.71	SF	0.2	15	200	0.00	EM	650	9.5	DM	12.7	EL	5	FC	16
04/12/90	8:18	1005.7M	-0-	2	260	1.2	-0-	0.55	SF	0.2	15	180	0.00	EM	718	7.0	DM	10.8	EL	5	FC	33
04/17/90	13:20	1005.7M	-0-	8	10	4.4	-0-	0.58	SF	0.2	6	290	0.00	EM	663	11.1	DM	12.8	EL	5	FC	56

TABLE L-2 (CONTINUED)

Weekly Water Sampling (Data Only) For Datablock W149004

Report Date: 05/03/90 Page: 4

Date	Time (CST)	River Locat'n Code	Gauge Read (ft)	Wave Hght (cm)	Wind Dir	Wind Spd (m/s)	Watr Curr Dir	Water Depth (m)	Samp Dpth Code	Samp Dpth (m)	Sech Disk Tran (cm)	Turb (ntu)	Water Vel (m/s)	Vel Meth Code	Spcf Cond (umho /cm)	Watr Temp (C)	Dslv Oxyg Meth Code	Dslv Oxyg (mg /l)	Meth Code	Rprt Code	Crew Lead Init	Rcrd Nmbr
04/23/90	13:05	1005.7M	-0-	3	210	1.8	-0-	0.45	SF	0.2	20	100	1E-2	EM	532	24.0	DM	16.0	EL	5	FC	67
04/30/90	13:30	1005.7M	-0-	9	310	5.	-0-	0.55	SF	0.2	10	99	1E-2	EM	774	19.8	DM	7.8	EL	5	FC	7
08/04/88	12:25	1005.8K	-0-	-0-	-0-	-0-	-0-	0.38	SF	0.2	29	41	1E-2	EM	900	33.9	DM	8.4	EL	5	DB	38
08/10/88	8:35	1005.8K	-0-	-0-	-0-	-0-	-0-	0.34	SF	0.2	16	98	-0-	EM	730	28.8	DM	6.6	EL	3	DB	68
08/18/88	7:12	1005.8K	-0-	-0-	-0-	-0-	-0-	0.37	SF	0.2	17	53	0.02	EM	750	28.8	DM	3.6	EL	5	DB	12
08/22/88	8:10	1005.8K	-0-	-0-	-0-	-0-	-0-	0.39	SF	0.2	24	59	1E-2	EM	720	28.1	DM	4.6	EL	5	DB	38
08/30/88	13:35	1005.8K	-0-	-0-	-0-	-0-	-0-	0.36	SF	0.2	12	98	0.04	EM	600	25.3	DM	19.0	EL	3	DB	59
09/14/88	10:00	1005.8K	-0-	0	-0-	-0-	-0-	0.34	SF	0.2	13	-9	-0-	EM	590	24.6	DM	15.2	EL	5	DB	99
09/22/88	9:22	1005.8K	-0-	8	-0-	-0-	-0-	0.40	SF	0.2	9	-9	-0-	EM	640	23.2	DM	7.9	EL	5	DB	122
10/11/88	12:35	1005.8K	-0-	11	-0-	-0-	-0-	0.32	SF	0.2	8	-9	0.02	EM	495	15.6	DM	10.0	EL	5	DB	41
10/21/88	9:50	1005.8K	-0-	7	-0-	-0-	-0-	0.42	SF	0.2	15	75	0.00	EM	475	12.5	DM	8.3	EL	5	DB	87
11/02/88	10:20	1005.8K	-0-	7	-0-	-0-	-0-	0.28	SF	0.2	-9	20	0.03	EM	460	10.9	DM	13.0	EL	3	DB	32
11/14/88	11:00	1005.8K	-0-	0	-0-	-0-	-0-	0.39	SF	0.2	-9	18	1E-2	EM	469	9.5	DM	12.8	EL	5	DB	68
12/07/88	14:20	1005.8K	-0-	3	-0-	-0-	-0-	0.36	SF	0.2	19	103	1E-2	EM	712	7.8	DM	10.8	EL	5	DB	39
01/20/89	10:10	1005.8K	-0-	13	-0-	-0-	-0-	0.37	SF	0.2	10	520	0.05	EM	584	3.0	DM	12.8	EL	1	DB	65
02/01/89	10:25	1005.8K	-0-	20	-0-	-0-	-0-	0.46	SF	0.2	22	78	0.05	EM	662	8.3	DM	13.5	EL	5	DB	11
02/15/89	10:55	1005.8K	-0-	0	-0-	-0-	-0-	0.39	SF	0.2	-9	13	0.00	EM	530	2.2	DM	-9.0	EL	5	FA	24
03/17/89	12:40	1005.8K	-0-	9	-0-	-0-	-0-	-0-	SF	0.2	31	33	0.03	EM	1042	9.2	DM	13.6	EL	5	FA	41
03/21/89	14:55	1005.8K	-0-	8	-0-	-0-	-0-	0.59	SF	0.2	8	280	0.00	EM	645	6.9	DM	12.9	EL	5	FA	55
03/31/89	10:45	1005.8K	-0-	6	-0-	-0-	-0-	0.39	SF	0.2	6	627	0.02	EM	591	6.5	DM	11.3	EL	5	FA	98
04/06/89	12:00	1005.8K	-0-	2	-0-	-0-	-0-	0.34	SF	0.2	10	160	0.03	EM	630	9.2	DM	9.1	EL	5	FA	8
04/13/89	10:00	1005.8K	-0-	0	-0-	-0-	-0-	0.50	SF	0.2	15	71	0.00	EM	675	12.5	DM	11.6	EL	5	FA	29

TABLE L-2 (CONTINUED)

Weekly Water Sampling (Data Only) For Datablock W148904

Report Date: 05/03/90 Page: 5

Date	Time (CST)	River Locat'n Code	Gauge Read (ft)	Wave Hght (cm)	Wind Dir	Wind Spd (m/s)	Watr Curr Dir	Water Depth (m)	Samp Dpth Code	Samp Dpth (m)	Sech Disk Tran (cm)	Turb (ntu)	Water Vel (m/s)	Watr Vel Meth Code	Spcf Cond (umho/cm)	Watr Temp (C)	Watr Temp Meth Code	Dslv Oxyg (mg/l)	Dslv Oxyg Meth Code	Rprt Code	Crew Lead Init	Rcrd Nmbr
04/19/89	10:20	I005.8K	-0-	1	-0-	-0-	-0-	0.48	SF	0.2	19	47	0.00	EM	557	15.0	DM	15.8	EL	5	DB	39
04/24/89	10:05	I005.8K	-0-	-0-	-0-	-0-	-0-	0.62	SF	0.2	22	37	1E-2	EM	560	19.7	DM	16.2	EL	5	DB	63
05/12/89	11:15	I005.8K	-0-	4	90	3.6	90	0.51	SF	0.2	26	46	0.03	EM	538	19.6	DM	-9.0	EL	5	FA	17
05/24/89	10:15	I005.8K	-0-	4	330	3.3	330	0.48	SF	0.2	19	66	0.02	EM	760	22.7	DM	10.7	EL	5	FA	54
06/01/89	9:04	I005.8K	-0-	10	150	4.5	-0-	0.47	SF	0.2	17	71	0.00	EM	570	26.1	DM	6.5	EL	5	DB	10
06/07/89	14:00	I005.8K	-0-	4	15	4.8	15	0.42	SF	0.2	17	56	0.04	EM	512	28.4	DM	15.3	EL	5	JJ	27
06/21/89	13:55	I005.8K	-0-	2	305	0.6	280	0.48	SF	0.2	-0-	61	0.08	EM	690	30.0	DM	16.2	EL	5	FA	82
07/07/89	9:24	I005.8K	-0-	0	120	1.2	-0-	0.40	SF	0.2	31	31	0.00	EM	642	28.0	DM	4.9	EL	5	JJ	24
07/11/89	10:00	I005.8K	-0-	4	110	1.3	-0-	0.42	SF	0.2	24	41	0.00	EM	714	31.1	DM	8.0	EL	5	FA	38
07/19/89	8:15	I005.8K	-0-	10	112	51.	90	0.40	SF	0.2	15	98	0.02	EM	605	22.8	DM	9.5	EL	5	JJ	75
07/25/89	15:57	I005.8K	-0-	1	340	3.	-0-	0.44	SF	0.2	18	67	0.00	EM	925	29.2	DM	14.2	EL	5	FA	83
08/01/89	8:22	I005.8K	-0-	0	60	2.8	-0-	0.33	SF	0.2	12	89	0.00	EM	556	24.9	DM	11.9	EL	5	FA	18
08/11/89	13:05	I005.8K	-0-	0	340	1.	-0-	0.40	SF	0.2	17	75	1E-2	EM	556	26.7	DM	-9.0	EL	5	FA	50
08/17/89	7:45	I005.8K	-0-	0	240	1.1	-0-	0.42	SF	0.2	23	46	0.00	EM	678	21.2	DM	8.0	EL	5	FA	77
08/25/89	10:30	I005.8K	-0-	0	260	2.4	-0-	0.40	SF	0.2	12	74	0.00	EM	577	24.5	DM	9.2	EL	5	FA	109
08/31/89	13:40	I005.8K	-0-	3	0	3.3	-0-	0.40	SF	0.2	15	97	0.00	EM	586	30.2	DM	15.0	EL	5	FA	134
09/07/89	7:48	I005.8K	-0-	0	0	0.6	0	0.41	SF	0.2	17	74	0.02	EM	627	25.6	DM	8.2	EL	5	FA	23
09/13/89	9:50	I005.8K	-0-	3	340	3.5	-0-	0.48	SF	0.2	18	63	0.00	EM	578	17.2	DM	6.5	EL	5	FA	45
09/18/89	11:30	I005.8K	-0-	1	-0-	-0-	200	0.52	SF	0.2	14	86	0.03	EM	448	22.5	DM	13.5	EL	5	FA	52
09/25/89	11:00	I005.8K	-0-	1	245	1.	-0-	0.51	SF	0.2	27	42	1E-2	EM	603	17.8	DM	8.5	EL	5	FA	76
10/04/89	14:35	I005.8K	-0-	0	210	0.3	-0-	0.41	SF	0.2	23	44	0.00	EM	650	19.4	DM	11.6	EL	5	FA	24

TABLE L-2 (CONTINUED)

Weekly Water Sampling (Data Only) For Datablock W148910

Report Date: 05/03/90 Page: 6

Date	Time (CST)	River Locat'n Code	Gauge Read (ft)	Wave Hght (cm)	Wind Dir	Wind Spd (m/s)	Watr Curr Dir	Water Depth (m)	Samp Dpth Code	Samp Dpth (m)	Sech Disk Tran (cm)	Turb (ntu)	Water Vel (m/s)	Watr Vel Meth Code	Spcf Cond (umho /cm)	Watr Temp (C)	Temp Meth Code	Dslv Oxyg (mg /l)	Dslv Oxyg Meth Code	Rprt Code	Crew Lead Init	Rcrd Nmbr
10/13/89	15:20	1005.8K	-0-	3	240	1.8	-0-	0.44	SF	0.2	15	72	0.00	EM	535	24.4	DM	-9.0	EL	5	FA	49
10/17/89	13:21	1005.8K	-0-	12	320	6.2	-0-	0.43	SF	0.2	8	190	0.00	EM	658	13.5	DM	10.2	EL	5	FA	71
10/23/89	11:20	1005.8K	-0-	0	50	0.5	-0-	0.42	SF	0.2	30	44	0.00	EM	676	15.8	DM	9.0	EL	5	FA	75
10/30/89	12:10	1005.8K	-0-	3	200	3.5	-0-	0.35	SF	0.2	18	73	0.02	EM	633	17.7	DM	11.4	EL	5	FA	100
12/11/89	14:30	1005.8K	-0-	6	315	4.9	-0-	0.46	SF	0.2	25	42	0.00	EM	739	2.0	DM	14.4	EL	5	FA	20
12/20/89	14:20	1005.8K	-0-	0	120	2.3	-0-	0.44	SF	0.2	-9	9	0.00	EM	909	1.1	DM	13.6	EL	5	FA	37
12/29/89	10:10	1005.8K	-0-	0	60	0.6	-0-	0.46	SF	0.2	-9	16	0.00	EM	-0-	0.5	DM	13.2	EL	5	FA	43
01/03/90	13:30	1005.8K	-0-	0	150	2.1	-0-	0.44	SF	0.2	-0-	23	0.00	EM	667	2.0	DM	13.1	EL	5	FA	5
01/24/90	11:20	1005.8K	-0-	1	90	1.	-0-	0.48	SF	0.2	43	45	0.00	EM	942	4.2	DM	12.5	EL	5	FA	63
01/29/90	13:45	1005.8K	-0-	0	235	2.	-0-	0.38	SF	0.2	23	43	0.00	EM	875	6.6	DM	16.9	EL	5	FA	73
02/05/90	14:00	1005.8K	-0-	6	200	5.	200	0.47	SF	0.2	19	69	0.03	EM	896	7.5	DM	19.3	EL	5	FC	10
02/21/90	14:53	1005.8K	-0-	2	115	2.4	-0-	0.44	SF	0.2	24	30	0.00	EM	763	7.5	DM	19.4	EL	5	FC	59
02/27/90	15:15	1005.8K	-0-	5	275	3.5	-0-	0.60	SF	0.2	23	55	0.00	EM	831	7.2	DM	13.4	EL	5	FC	65
03/08/90	13:36	1005.8K	-0-	5	190	3.5	-0-	0.62	SF	0.2	21	74	1E-2	EM	636	7.8	DM	15.7	EL	5	FC	21
03/16/90	15:01	1005.8K	-0-	27	240	-0-	-0-	1.45	SF	0.2	7	230	0.00	EM	615	14.5	DM	7.6	EL	5	FC	40
03/20/90	16:02	1005.8K	-0-	1	200	-0-	210	1.80	SF	0.2	22	42	0.05	EM	660	10.5	DM	13.4	EL	5	FC	47
03/27/90	14:40	1005.8K	-0-	1	30	2.1	-0-	1.21	SF	0.2	25	54	0.00	EM	576	10.0	DM	18.3	EL	5	FC	65
04/06/90	13:28	1005.8K	-0-	15	330	9.5	-0-	0.72	SF	0.2	12	290	0.00	EM	539	10.0	DM	13.2	EL	5	FC	17
04/12/90	8:30	1005.8K	-0-	2	260	1.4	-0-	0.56	SF	0.2	14	150	0.00	EM	551	7.1	DM	11.8	EL	5	FC	34
04/17/90	13:40	1005.8K	-0-	8	10	5.	-0-	0.58	SF	0.2	6	470	0.00	EM	531	12.9	DM	11.4	EL	5	FC	57
04/23/90	13:20	1005.8K	-0-	3	210	1.8	-0-	0.40	SF	0.2	17	55	1E-2	EM	514	24.4	DM	19.1	EL	5	FC	68
04/30/90	13:40	1005.8K	-0-	12	310	4.8	-0-	0.55	SF	0.2	10	250	1E-2	EM	531	18.0	DM	11.1	EL	5	FC	8

APPENDIX DPR-M

WETLAND EVALUATION TECHNIQUE

FOREWARD

APPENDIX DPR-M provides baseline information from the application of the Wetland Evaluation Technique (WET) developed by the Waterways Experiment Station. A post-project analysis using WET will be performed at the same intervals as the re-evaluation of the WHAG and AHAG analyses.

FORM A: SITE DOCUMENTATION (Page 1 of 2)

Part 1 - Background Information

Evaluation Site: SWAN LAKE Date: AUG 1990

QUADS: BRUSSELS, IL - SECTS 4-6, 8-10, 16, 25
Site Location (Section, Range, and Township): NUTWOOD, IL - SECTS - 7, 12, 13, 18, 19, 24
CALHOUN CO., ILLINOIS; ILLINOIS RIVER MILES

Has the evaluator taken a training course in WET Version 2.0? YES

Agencies/Experts Contacted: DAN SMITH WES; RON YARBOROUGH, SIUE,

Circle the assessment levels to be completed? SS-1 SS-2 E/O-1&2 E/O-3 HS

Is the wetland tidal or nontidal? If the wetland is nontidal, indicate the month(s) that represent wet, dry, and average conditions, or if only average annual condition will be used, give rationale. Also, indicate if the previous 12 months of precipitation has been above, below, or near normal.
NONTIDAL; WET: APRIL, MAY, JUNE, JULY; DRY: OCT, DEC, JAN, FEB; AVG: MAR, AUG, SEP, NOV; PREVIOUS 12 MONTHS

Is this evaluation an estimate of past conditions or a prediction of future conditions? (If answer is yes, explain nature and source of predictive data.)
NO - EXISTING CONDITIONS

Will alternative ratings be used to evaluate any of the functions or values (if yes, explain)? YES - WHAG (WILDLIFE HABITAT EVALUATION GUIDELINES) AND AHAG (AQUATIC HABITAT ASSESSMENT GUIDELINES)

Part 2 - Identification and Delineation of Evaluation Areas

Sketch a map on the following page, or attach a suitable map (photocopy of topgraphic map) that shows the following information:

-- Boundaries of the AA, IA, and IZ, and the location of service areas.
-- Watershed boundaries of AA, and service areas. (Too large to delineate all)
-- Extent of surface water in the AA during the wet and dry seasons. (no real difference on this map scale)
-- Open water (channels and pools) within and adjacent to the AA.
-- Normal direction of channel or tidal flow (parallel to channel)
-- Normal direction of wind-driven waves or current. (S to W, sometimes NW)
-- Impact area(s).
-- Scale of distance and north compass direction.

Explain the procedures used to identify or delineate the AA, IA, IZ, service areas, and the watersheds of these areas if they differed from the guidelines outlined in Section 2.7. AA = IA; otherwise did not differ.

-- Continued --

FORM A: SITE DOCUMENTATION (Page 2 of 2)

Part 2 (Cont.)

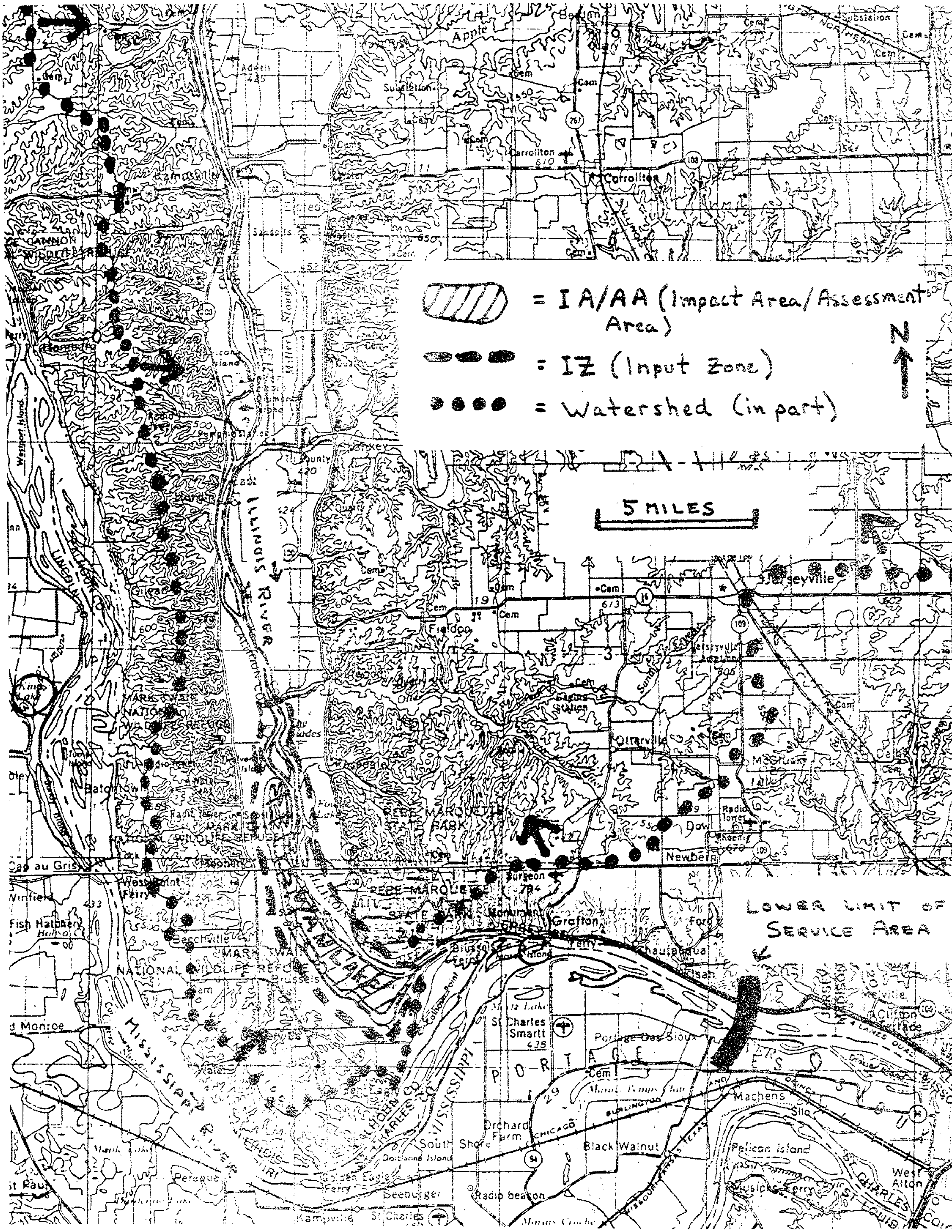
Estimate the extent of the following areas:

Assessment Area = 3,000 acres
Impact Area = 3,000 acres (only if applicable)
Watershed of AA = 2,062,500 acres/ 3,300 miles^2 (acres x 0.0016 = miles) LOWER ILLINOIS R. TO LAGRANGE L+D
Wetlands in AA = ~2,900 acres
Wetlands in the watershed of closest service area = ______ acres
Wetlands and deepwater in the watershed of closest service area = ______ acres

How were locality and region defined for this evaluation? ______
LOCALITY = POOL 26 OF MISSISSIPPI RIVER
REGION = ILLINOIS RIVER FLOODPLAIN

Sketch of Evaluation Areas (or attach map):

SEE ATTACHED MAP


= IA/AA (Impact Area/Assessment Area)
= IZ (Input Zone)
= Watershed (in part)
N
5 MILES
ILLINOIS RIVER
MISSISSIPPI RIVER
LOWER LIMIT OF SERVICE AREA
Carrollton
Jerseyville
Fieldon
Otterville
Newbern
Grafton
Brussels
Cap au Gris
Winfield
Batchtown
Hardin
Pere Marquette State Park
Portage des Sioux
Machens
Black Walnut
Pelican Island
West Alton
Orchard Farm
South Shore
Golden Eagle
Seeburger
Radio beacon

****

Summary of Evaluation Results for "swan"

****

	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	M	U	*
Ground Water Discharge	H	L	*
Floodflow Alteration	H	H	M
Sediment Stabilization	M	H	*
Sediment/Toxicant Retention	H	H	H
Nutrient Removal/Transformation	M	H	H
Production Export	*	M	*
Wildlife Diversity/Abundance	H	*	*
Wildlife D/A Breeding	*	M	*
Wildlife D/A Migration	*	L	*
Wildlife D/A Wintering	*	H	*
Aquatic Diversity/Abundance	H	L	*
Uniqueness/Heritage	H	*	*
Recreation	H	*	*

Note: "H" = High, "M" = Moderate, "L" = Low, "U" = Uncertain, and "*"'s identify conditions where functions and values are not evaluated.

WET Answer Dataset for "swan"

s1 - y
s2 - y
s3 - n
s4 - n
s5 - n
s6 - y
s7 - n
s8 - n
s9 - y
s10 - y
s11 - n
s12 - n
s13 - n
s14 - n
s15 - y
s16 - n
s17 - n
s18 - n
s19 - n
s20 - y
s21 - y
s22 - y
s23 - n
s24 - n
s25 - y
s26 - n
s27 - y
s28 - n
s29 - n
s30 - y
s31 - y
1.1 - n
1.2 - n
1.3 - n
2.1.1 - n
2.1.2 - y
2.1.3 - y
2.2.1 - n
2.2.2 - y
3.1 - y
3.2 - n
3.3 - n
4.1 - y
4.2A - n
4.2B - n
4.2C - n
4.2D - y
5.1.1 - y
5.1.2 - n
5.2 - n
blank - u
6.1 - y
6.2 - y
7 - i
8.1 - y
8.2 - n
8.3 - y
8.4 - n
9.1 - n
9.2 - y
9.3 - n
10A - y
10B - n
10C - n
10D - n
10E - n
10F - n
11(x) - n
11(w) - n
11(d) - n
12A(x) - y
12A(w) - y
12A(d) - y
12Aa(x) - n
12Aa(w) - n
12Aa(d) - n
12Ab(x) - n
12Ab(w) - n
12Ab(d) - n
12Ac(x) - n
12Ac(w) - n
12Ac(d) - n
12Ad(x) - n
12Ad(w) - n
12Ad(d) - n
12Ae(x) - y
12Ae(w) - y
12Ae(d) - y
12B(x) - n
12B(w) - n
12B(d) - n
12Ba(x) - n
12Ba(w) - n
12Ba(d) - n
12Bb(x) - n
12Bb(w) - n
12Bb(d) - n
12Bc(x) - n
12Bc(w) - n
12Bc(d) - n
12Bd(x) - n
12Bd(w) - n
12Bd(d) - n
12Be(x) - n
12Be(w) - n
12Be(d) - n
12C(x) - n
12C(w) - n
12C(d) - n
12Ca(x) - n
12Ca(w) - n
12Ca(d) - n
12Cb(x) - n
12Cb(w) - n
12Cb(d) - n
12Cc(x) - n
12Cc(w) - n
12Cc(d) - n
12Cd(x) - n
12Cd(w) - n
12Cd(d) - n
12D(x) - n
12D(w) - n
12D(d) - n
12Da(x) - n
12Da(w) - n
12Da(d) - n
12Db(x) - n
12Db(w) - n
12Db(d) - n
12E(x) - n
12E(w) - n
12E(d) - n
13A(x) - y
13A(w) - y
13A(d) - y
13Aa(x) - n
13Aa(w) - n
13Aa(d) - n
13Ab(x) - n
13Ab(w) - n
13Ab(d) - n
13Ac(x) - n
13Ac(w) - n
13Ac(d) - n
13Ad(x) - n
13Ad(w) - n
13Ad(d) - n
13Ae(x) - y
13Ae(w) - y
13Ae(d) - y
13B(x) - y
13B(w) - y
13B(d) - y
13Ba(x) - n
13Ba(w) - n
13Ba(d) - n
13Bb(x) - n
13Bb(w) - n
13Bb(d) - n
13Bc(x) - n
13Bc(w) - n
13Bc(d) - n
13Bd(x) - n
13Bd(w) - n
13Bd(d) - n
13Be(x) - y
13Be(w) - y
13Be(d) - y
13C(x) - y
13C(w) - y
13C(d) - y
13Ca(x) - y
13Ca(w) - y
13Ca(d) - y
13Cb(x) - y
13Cb(w) - y
13Cb(d) - y
13Cc(x) - y
13Cc(w) - y
13Cc(d) - y
13Cd(x) - n
13Cd(w) - n
13Cd(d) - n
13D(x) - y
13D(w) - n
13D(d) - y
13Da(x) - y
13Da(w) - y
13Da(d) - y
13Db(x) - y
13Db(w) - n
13Db(d) - y
13E(x) - n
13E(w) - n
13E(d) - n
14.1(x) - y
14.1(w) - y
14.1(d) - y
14.2(x) - n
14.2(w) - n
14.2(d) - n
15.1A - y
15.1B - n
15.1C - n
15.2 - n
16A(x) - y
16A(w) - y

WET Answer Dataset for "swan"

16A(d) - y
16B(x) - n
16B(w) - n
16B(d) - n
16C(x) - n
16C(w) - n
16C(d) - n
17 - n
18 - n
19.1A - i
19.1B - y
19.2 - y
19.3 - y
20.1 - i
20.2 - i
21A - n
21B - n
21C - y
21D - n
21E - n
22.1.1 - y
22.1.2 - i
22.2 - y
22.3 - n
23 - n
24.1 - y
24.2 - y
24.3 - n
24.4 - n
24.5 - n
25.1 - y
25.2A - n
25.2B - y
25.3 - y
26.1 - y
26.2 - n
26.3 - y
27.1 - n
27.2 - i
27.3 - i
28 - n
29.1 - y
29.2 - y
30(x) - n
30(w) - n
30(d) - n
31.1(x) - n
31.1(w) - n
31.1(d) - n
31.2(x) - n
31.2(w) - n
31.2(d) - n
31.3(x) - n
31.3(w) - n
31.3(d) - n
31.4(x) - i
31.4(w) - i
31.4(d) - i
31.5(x) - y
31.5(w) - y
31.5(d) - y
31.6A(x) - n
31.6A(w) - n
31.6A(d) - n
31.6B(x) - y
31.6B(w) - y
31.6B(d) - y
31.6C(x) - n
31.6C(w) - n
31.6C(d) - n
31.6D(x) - n
31.6D(w) - n
31.6D(d) - n
31.6E(x) - n
31.6E(w) - n
31.6E(d) - n
32A - y
32B - n
32C - n
32D - n
32E - n
32F - n
32G - n
32H - n
32I - n
32J - n
32K - n
33A - y
33B - n
33C - n
33D - n
33E - n
33F - n
33G - n
33H - n
33I - n
33J - n
33K - n
34.1 - n
34.2 - n
34.3.1 - y
34.3.2 - n
35.1 - n
35.2 - i
36.1.1(x) - n
36.1.1(w) - n
36.1.1(d) - n
36.1.2(x) - y
36.1.2(w) - y
36.1.2(d) - y
36.2.1(x) - y
36.2.1(w) - y
36.2.1(d) - y
36.2.2(x) - n
36.2.2(w) - n
36.2.2(d) - n
36.2.3(x) - n
36.2.3(w) - n
36.2.3(d) - n
37 - y
38.1 - n
38.2 - n
38.3 - y
38.4 - n
38.5 - n
38.6 - n
38.7 - y
38.8 - i
39 - y
40.1 - n
40.2 - y
41.1 - y
41.2 - n
42.1.1(x) - y
42.1.1(w) - y
42.1.1(d) - y
42.1.2(x) - n
42.1.2(w) - n
42.1.2(d) - n
42.1.3(x) - n
42.1.3(w) - n
42.1.3(d) - n
42.2.1(x) - y
42.2.1(w) - y
42.2.1(d) - y
42.2.2(x) - y
42.2.2(w) - y
42.2.2(d) - y
42.2.3(x) - n
42.2.3(w) - n
42.2.3(d) - n
43A(x) - n
43A(w) - n
43A(d) - n
43B(x) - n
43B(w) - n
43B(d) - n
43C(x) - n
43C(w) - n
43C(d) - n
43D(x) - n
43D(w) - n
43D(d) - n
43E(x) - y
43E(w) - y
43E(d) - y
43F(x) - n
43F(w) - n
43F(d) - n
43G(x) - n
43G(w) - n
43G(d) - n
43H(x) - n
43H(w) - n
43H(d) - n
43I(x) - n
43I(w) - n
43I(d) - n
44A(x) - y
44A(w) - y
44A(d) - y
44B(x) - y
44B(w) - y
44B(d) - y
44C(x) - y
44C(w) - y
44C(d) - y
44D(x) - y
44D(w) - y
44D(d) - y
44E(x) - y
44E(w) - y
44E(d) - y
44F(x) - y
44F(w) - y
44F(d) - y
44G(x) - y
44G(w) - y
44G(d) - n
44H(x) - n
44H(w) - n
44H(d) - n
44I(x) - n
44I(w) - n
44I(d) - n
45A - y
45B - n
45C - n

WET Answer Dataset for "swan"

45D - n	48B(w) - n	49.2(x) - y	55.3 - u
45E - n	48B(d) - n	49.2(w) - y	55.4 - u
45F - n	48C(x) - n	49.2(d) - y	56.1 - u
45G - n	48C(w) - n	49.3(x) - y	56.2 - u
46A(x) - y	48C(d) - n	49.3(w) - y	57.1 - u
46A(w) - n	48D(x) - n	49.3(d) - y	57.2 - u
46A(d) - y	48D(w) - n	50(x) - y	58 - u
46B(x) - n	48D(d) - n	50(w) - y	59.1 - u
46B(w) - y	48E(x) - n	50(d) - y	59.2 - u
46B(d) - n	48E(w) - n	51.1 - u	60 - u
46C(x) - n	48E(d) - n	51.2 - u	61 - u
46C(w) - n	48F(x) - n	52.1 - u	62 - u
46C(d) - n	48F(w) - n	52.2 - u	63.1 - u
47A - y	48F(d) - n	53.1 - u	63.2 - u
47B - n	49.1.1(x) - y	53.2 - u	64 - u
47C - n	49.1.1(w) - y	54(x) - u	CR - u
48A(x) - y	49.1.1(d) - y	54(w) - u	1 - u
48A(w) - y	49.1.2(x) - n	54(d) - u	2 - u
48A(d) - y	49.1.2(w) - n	55.1 - u	3 - u
48B(x) - n	49.1.2(d) - n	55.2 - u	4 - u

FORM C: SUPPLEMENTARY OBSERVATIONS

Evaluation Site: SWAN LAKE

Indicate the species, species groups, and activities that are actually observed, reliably reported, or known to occur at the AA on a regular basis.

FISH SPECIES GROUPS*	OBSERVED/REPORTED
1. Warmwater Group	Y or N
2. Coldwater Group	Y or N
3. Northern Lake Group	Y or N
4. Coldwater Riverine Group	Y or N

FISH SPECIES	OBSERVED/REPORTED
______________	Y or N
______________	Y or N
______________	Y or N

WATERFOWL SPECIES GROUPS**	OBSERVED/REPORTED		
	NESTING	MIGRATING	WINTERING
1. Prairie Dabblers	Y or N	Y or N	Y or N
2. Black Duck	Y or N	Y or N	Y or N
3. Wood Duck	Y or N	Y or N	Y or N
4. Common and Red-Breasted Mergansers	Y or N	Y or N	Y or N
5. Hooded Merganser	Y or N	Y or N	Y or N
6. Canvasback, Redhead, Ruddy Duck	Y or N	Y or N	Y or N
7. Ring-necked Duck	Y or N	Y or N	Y or N
8. Greater and Lesser Scaup	Y or N	Y or N	Y or N
9. Common Goldeneye	Y or N	Y or N	Y or N
10. Bufflehead	Y or N	Y or N	Y or N
11. Whistling Ducks	Y or N	Y or N	Y or N
12. Inland Geese	Y or N	Y or N	Y or N
13. Tundra Swan	Y or N	Y or N	Y or N
14. Brant	Y or N	Y or N	Y or N

BIRD SPECIES	OBSERVED/REPORTED
______________	Y or N
______________	Y or N
______________	Y or N

RECREATIONAL ACTIVITIES

Hiking	Sailing	Snowmobiling	Research
Birdwatching	Power Boating	Skiing	Educational Fieldtrips
Photography	Canoeing	Snowshoeing	Horseback Riding
Swimming	Kayaking	Ice Skating	

CONSUMPTIVE ACTIVITIES

Agriculture	Fur Harvesting	Commercial/Sport Fishing	Peat Harvesting
Hunting	Timber Harvest	Natural Food Gathering	Water Supply

* Fish species groups are explained on page 138
** Waterfowl species groups are explained on page 1647

APPENDIX DPR-N

FARMLAND PROTECTION POLICY ACT DOCUMENTATION

FOREWARD

APPENDIX DPR-N provides a letter from the St. Louis District to the Calhoun County Field Office of the Soil Conservation Service at Harden, Illinois regarding potential farmland conversion impacts induced by the project.

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

Plan Formulation Branch
Planning Division

Mr. Christopher Borden
District Conservationist
U.S. Soil Conservation Service
Hardin, Illinois 62047

Dear Mr. Borden:

As you are aware, the St. Louis Corps District is currently involved in a habitat rehabilitation project at Swan Lake, Calhoun County, Illinois. In accordance with the Farmland Protection Policy Act, we are hereby forwarding Form AD-1006 with Parts I and II completed. A table has also been included to give a fuller explanation of the acreages involved. We have also provided maps (developed from U.S.G.S. maps) showing the areas to be converted directly and indirectly by the alternative plans.

If you require further information, please contact Mr. Dave Gates, of our Planning Division.

Sincerely,

David E Leake

David Leake
Chief, Plan Formulation
Branch

Enclosure

REVISED 12/91

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 31 DECEMBER 1990
Name Of Project SWAN LAKE HABITAT REHABILITATION	Federal Agency Involved U.S. ARMY CORPS OF ENGINEERS
Proposed Land Use FISH + WILDLIFE MANAGEMENT	County And State CALHOUN COUNTY ILLINOIS
PART II *(To be completed by SCS)*	Date Request Received By SCS

Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply — do not complete additional parts of this form). Yes ☐ No ☐		Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By SCS	

	Maximum Points	Alternative Site Rating: PLAN ~~Site A~~	PLAN ~~Site B~~	PLAN ~~Site C~~	~~Site D~~
PART III *(To be completed by Federal Agency)*					
A. Total Acres To Be Converted Directly		0	0	~~35~~ 40	
B. Total Acres To Be Converted Indirectly (TOTAL CONVERSION)		0	0	20	
C. Total Acres In Site (FARMLAND)		600	600	600	
PART IV *(To be completed by SCS)* **Land Evaluation Information**					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value					
PART V *(To be completed by SCS)* **Land Evaluation Criterion** Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*					
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection

FARMLAND CONVERSION

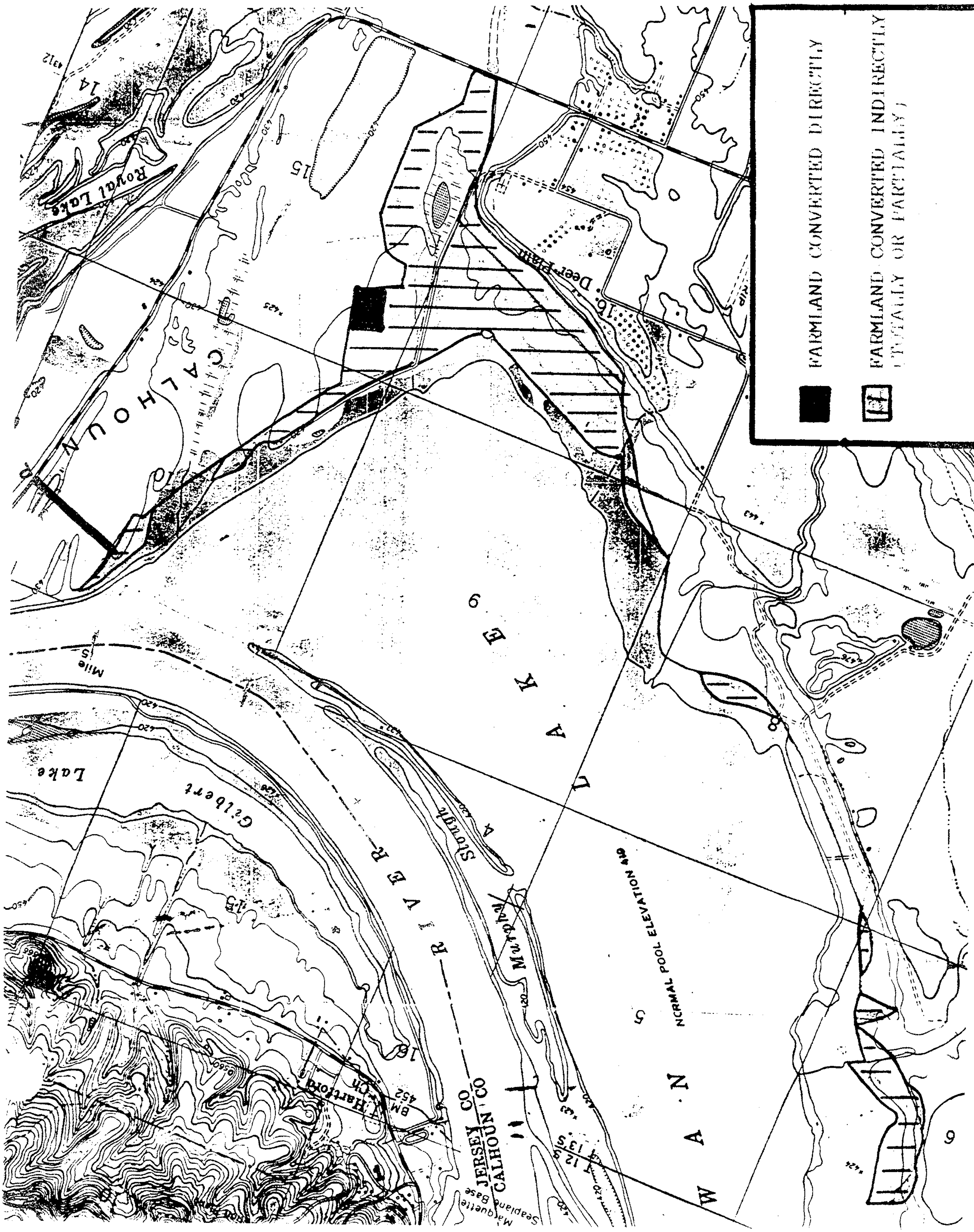
SWAN LAKE PROJECT HABITAT REHABILITATION & ENHANCEMENT PROJECT

ACREAGE STATUS	ALTERNATIVE PLANS (ACRES IMPACTED) 1/		
	PLAN A	PLAN B	PLAN C (SELECTED PLAN)
1. ACRES TO BE CONVERTED DIRECTLY			
A. BORROW/PONDING AREAS	0	0	20
B. FOR CONSTRUCTION (LEVEE/DIKE)	0	0	14
C. O&M (ROADS, PARKING LOTS)	0	0	1
D. TREE PLANTING AREAS	0	0	5
TOTAL ACRES TO BE CONVERTED DIRECTLY	0	0	40
2. ACRES TO BE CONVERTED INDIRECTLY 2/			
A. TOTAL CONVERSION (I.E. ACRES BELOW 422 NGVD)	0	0	20 (10)
B. PARTIAL CONVERSION (I.E. ACRES ABOVE 422 NGVD, BUT BELOW 424 NGVD)	0	0	540 (45)
TOTAL ACRES TO BE CONVERTED INDIRECTLY	0	0	560 (55)
3. ACRES NOT COVERTED	600 (55)	600 (55)	0 (55)
4. TOTAL ACRES IN SITE	600	600	600

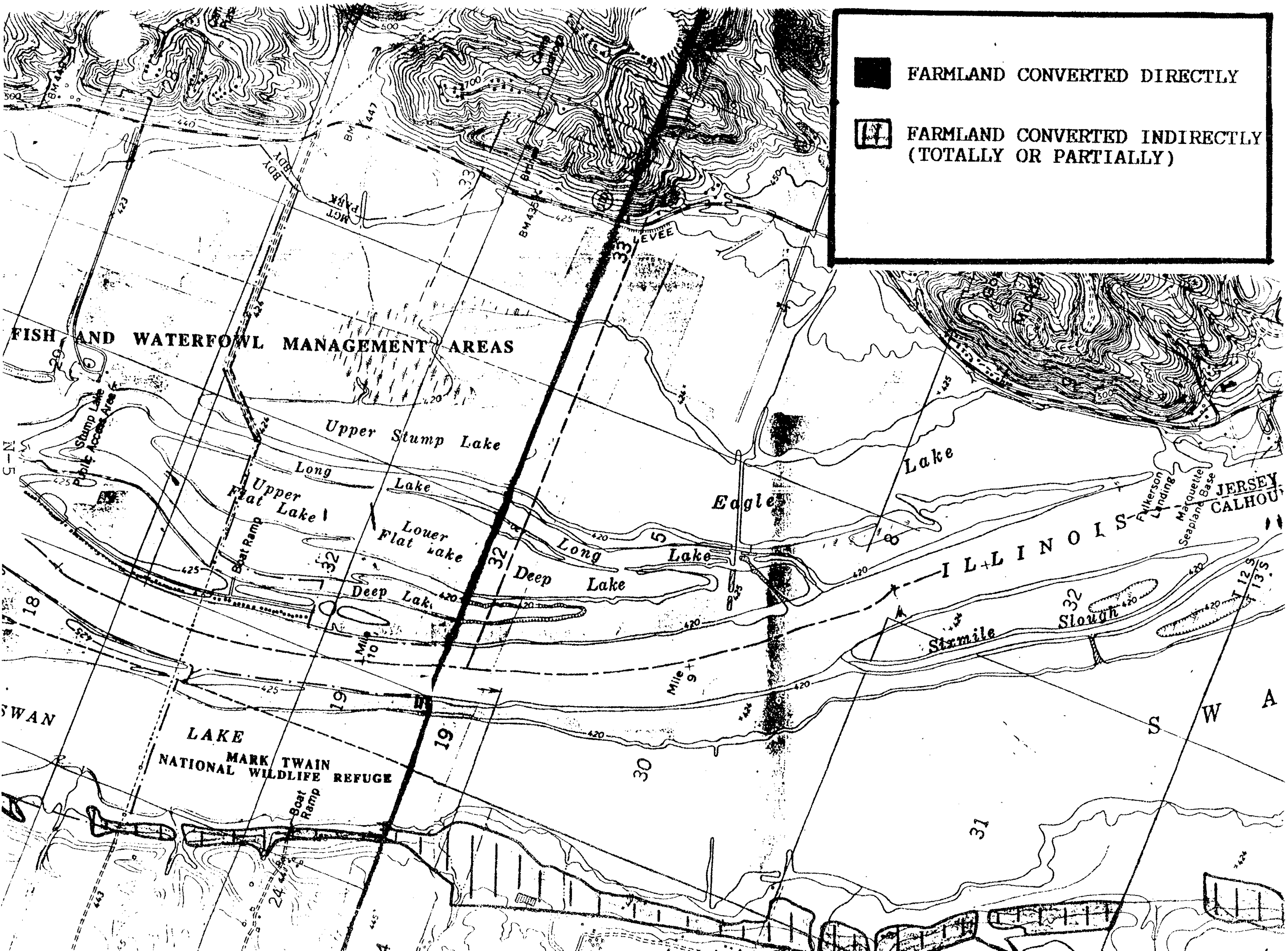
1/ Does not include acreage impacts associated with a hillside sediment control program.

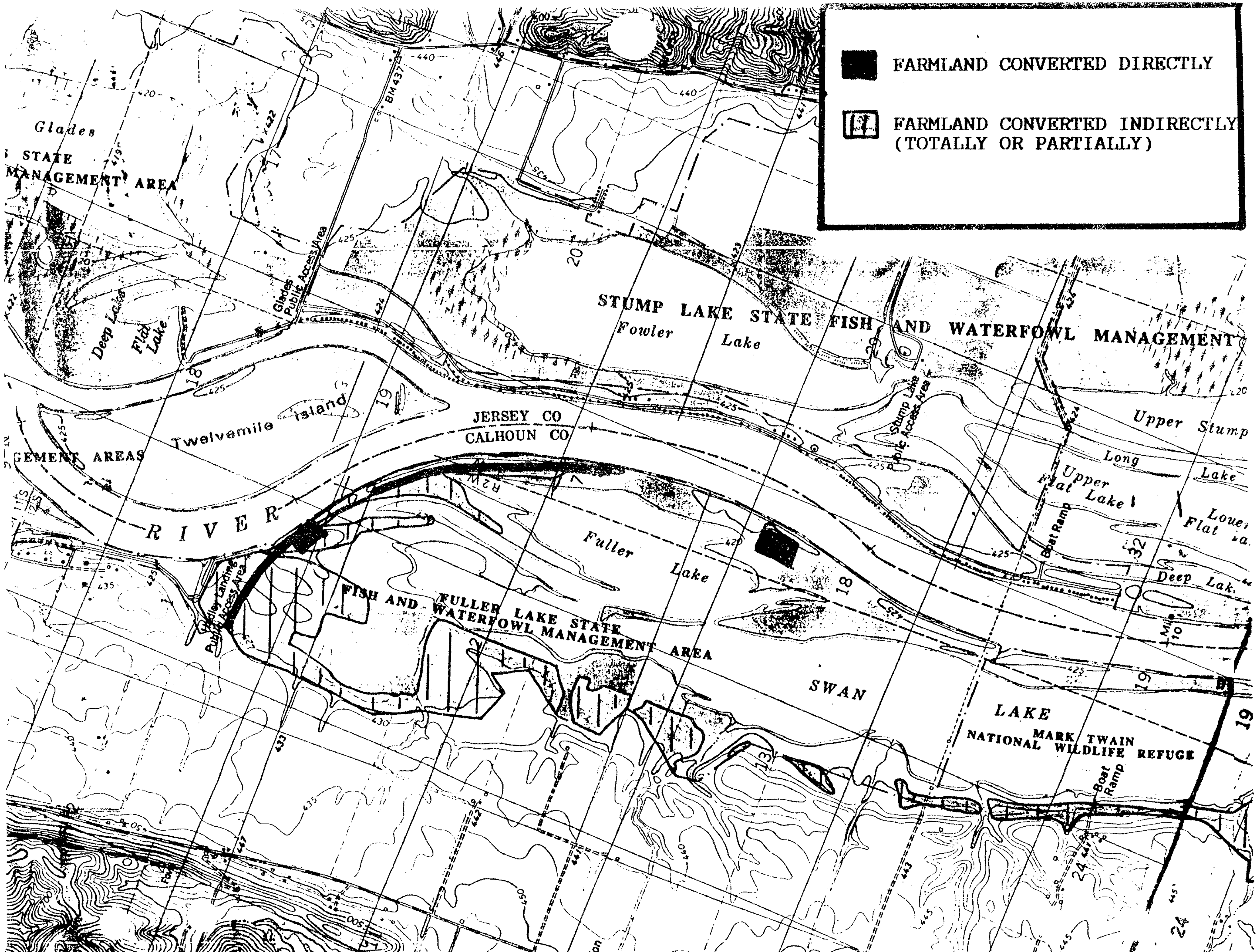
2/ The productivity of these lands could be diminished due to a project modification of local hydrology. Lake will be managed at times one foot higher than previously. If it is assumed that this elevated water is severe enough to totally eliminate crop production, then about 20 acres of cropland would be eliminated. Due to closing off of the lower lake, lake water level fluctuations will be more dependent on interior runoff than on river stage. Hyrology effects could extend up to elevation 424 NGVD, this could conceivably impact up to an additional 540 acres of cropland, most of which is Federally owned. It is assumed that the higher the cropland is from the lake surface, the less severe will be the impacts to these lands.

(#) = Portion of acres that are privately owned, all other cropland acreages are Federally owned lands managed for fish and wildlife purposes.



FARMLAND CONVERTED DIRECTLY
FARMLAND CONVERTED INDIRECTLY (TOTALLY OR PARTIALLY)
Royal Lake
CALHOUN
Deer Plain
Gilbert
Lake
RIVER
Slough
Murphy
NORMAL POOL ELEVATION 419
Mile 5
JERSEY CO
CALHOUN CO
Hartford Ch
BM 452
Seaplane Base
Marquette


FARMLAND CONVERTED DIRECTLY
FARMLAND CONVERTED INDIRECTLY (TOTALLY OR PARTIALLY)
FISH AND WATERFOWL MANAGEMENT AREAS
Upper Stump Lake
Long Lake
Upper Flat Lake
Lower Flat Lake
Long Lake
Deep Lake
Deep Lake
Eagle Lake
Stump Lake Public Access Area
Boat Ramp
ILLINOIS
JERSEY
CALHOUN
Fulkerson Landing
Marquette Seaplane Base
Sixmile Slough
Mile 10
Mile 9
LEVEE
SWAN LAKE
MARK TWAIN NATIONAL WILDLIFE REFUGE
Boat Ramp
SWAN



FARMLAND CONVERTED DIRECTLY
FARMLAND CONVERTED INDIRECTLY
(TOTALLY OR PARTIALLY)
Glades
STATE
MANAGEMENT AREA
Deep Lake
Flat Lake
Glades Public Access Area
STUMP LAKE STATE FISH AND WATERFOWL MANAGEMENT
Fowler Lake
Stump Lake Public Access Area
Upper Stump
Long Lake
Upper Flat Lake
Lower Flat La
Deep Lak
Boat Ramp
Twelvemile Island
JERSEY CO
CALHOUN CO
GEMENT AREAS
RIVER
Fuller Lake
Fuller Landing Public Access Area
FISH AND WATERFOWL MANAGEMENT AREA
FULLER LAKE STATE
SWAN LAKE
MARK TWAIN NATIONAL WILDLIFE REFUGE
Boat Ramp

United States Department of Agriculture
Soil Conservation Service
90 Kriege Farm Road
Edwardsville, Illinois
62025

September 3, 1991

Mr. Steve Chard, Chief
Bureau of Farmland Protection
Division of Natural Resources
Illinois Department of Agriculture
State Fairgrounds Box 19281
Springfield, IL 62794-9281

Dear Mr. Chard:

Please apply the statewide LISA system to the Swan Lake project in Calhoun County.

An AD-1006 with attachments are enclosed. Please send your report to:

Clarence Buel
Planning Division
U.S. Army Corps. of Engineers
1222 Spruce St.
St. Louis, MO 63101-2833

Roy Bailey mr

Roy Bailey
Area Resource

cc: Clarence Buel

RB/mr:lisaswnlk

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request Dec 31, 1990
Name Of Project Swan Lake Habitat Rehabilitation	Federal Agency Involved US Army Corps of Engineers
Proposed Land Use fish & wildlife management	County And State Calhoun Co., Il.
PART II *(To be completed by SCS)*	Date Request Received By SCS June 5, 1991

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply — do not complete additional parts of this form).*	Yes ☒ No ☐	Acres Irrigated —	Average Farm Size 321
Major Crop(s) corn, soybeans	Farmable Land In Govt. Jurisdiction Acres: 31,200,000 % 87.6		Amount Of Farmland As Defined in FPPA Acres: 31,200,000 % 87.6
Name Of Land Evaluation System Used statewide	Name Of Local Site Assessment System statewide		Date Land Evaluation Returned By SCS 9-3-91

	Maximum Points	Site A	Site B	Site C	Site D
		Alternative Site Rating			
PART III *(To be completed by Federal Agency)*					
A. Total Acres To Be Converted Directly		0	0	35	
B. Total Acres To Be Converted Indirectly		0	0	—	
C. Total Acres In Site		600	600	35	
PART IV *(To be completed by SCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		—	—	33	
B. Total Acres Statewide And Local Important Farmland		—	—	—	
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		—	—	.060001	
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		—	—	32.5	
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		—	—	88	
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

Form AD-1006 (10-83)

State of Illinois
DEPARTMENT OF AGRICULTURE
Division of Natural Resources
State Fairgrounds, P.O. Box 19281, Springfield, IL 62794-9281, 217 782-6297

Bureau of Farmland Protection Bureau of Soil Conservation

September 11, 1991

Mr. Clarence Buel
Planning Division
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63101-2833

Re: Swan Lake Habitat Rehabilitation Project
Calhoun County, Illinois

Dear Mr. Buel:

The Illinois Department of Agriculture (IDOA) received a partially completed Farmland Conversion Impact Rating, Form AD-1006 from Roy Bailey, USDA Soil Conservation Service, 90 Kriege Farm Road, Edwardsville, IL 62025. The IDOA was requested to complete Parts VI and VII and return the form to you.

No information regarding the project was provided to the IDOA to enable us to complete the form, except some location maps. Please provide the following information so that we may complete the AD-1006 form. Please answer the questions as specifically as possible for each alternative.

1. Nature and scope of the project.

2. Distance of the project to the nearest municipal boundaries.

3. Distance of the project to the nearest central waste system.

4. Distance of the project to the nearest central water disposal system.

5. Type of road (earthen, aggregate, hard surface, access controlled) providing access to the project site.

6. Land uses adjacent to all sides of the project site.

7. Zoned land uses adjacent to all sides of the project site.

8. Size of the site.

9. Planned land use (from an officially adopted municipal, county, or regional land use plan) of the site.

10. Percent of the area with 1½ miles of the site which is currently used for agricultural purposes.

11. Percent of the site in agricultural use.

12. Have prior governmental actions (provisions of utilities, road improvements, zoning, comprehensive planning) committed the site to development for the planned use? (Please explain.)

13. Do the soils present at the site pose any limitations for the planned use? If so, are the limitations slight, moderate, or severe?

Please contact our office should you have questions concerning our informational needs. We will await your response prior to completing the Farmland Conversion Impact Rating, Form AD-1006.

Sincerely,

James R. Hartwig

James R. Hartwig
Bureau of Farmland Protection

JRH:mdg

cc: Roy Bailey, SCS
Ronald Darden, SCS
Calhoun County SWCD

State of Illinois
DEPARTMENT OF AGRICULTURE
Division of Natural Resources
State Fairgrounds, P.O. Box 19281, Springfield, IL 62794-9281, 217/782-6297

Bureau of Farmland Protection   Bureau of Soil Conservation

October 7, 1991

Mr. Clarence Buel
Planning Division
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63101-2833

Re: Swan Lake Rehabilitation and Enhancement
Pool 26, Illinois River
Calhoun County, Illinois

Dear Mr. Buel:

The Illinois Department of Agriculture (IDOA) has reviewed the Swan Lake Rehabilitation and Enhancement Main Report as referenced above. We have reviewed the project's potential to negatively impact the area's agricultural resources.

According to the report, approximately 20 acres of Prime farmland will be used as a source of borrow materials for levee construction. The IDOA would recommend that the Army Corps of Engineers locate a source of borrow on federally-owned land that will not impact Prime farmland. This would be in keeping with the spirit and intent of the federal Farmland Protection Policy Act.

Enclosed is the Farmland Conversion Impact Rating, Form AD-1006 on which the IDOA has completed Parts VI and VII. We are returning the form to you as per your request.

Sincerely,

James R. Hartwig

James R. Hartwig
Bureau of Farmland Protection

JRH:mdg

Enclosure

cc: Calhoun County SWCD

SWAN LAKE
REHABILITATION 7 ENHANCEMENT
POOL 26
ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS

PART VI-B **Illinois Site Assessment CORRIDOR Factors**	**Maximum Points**	**Site A**	**Site B**	**Site C**
1. Compatibility With Normal Agricultural Operations	30	0	0	5
2. Project Benefits Agriculture	10	10	10	9
3. Consideration Of Less Productive Sites	10	0	0	10
4. Compatibility With Local Comprehensive Plan	20	10	10	10
5. Project Located Within Official Ag AreA	20	0	0	0
6. Project Promotes Infill	20	10	10	10
7. Alternatives Meet Special Siting Requirements	20	20	0	0
8. Total Value Of Agriculture Production Lost	20	0	0	20
TOTAL SITE ASSESSMENT CORRIDOR POINTS	**150**	**50**	**30**	**64**

PART VII

Relative Value of Farmland	150	0	0	132
Total Site Assessment CORRIDOR Factors	150	50	30	64
TOTAL ILLINOIS LESA POINTS	**300**	**50**	**30**	**196**

100791
JRH:mdg

★ U.S. GOVERNMENT PRINTING OFFICE 1984 451-159/1324

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*

Date Of Land Evaluation Request: Dec 31, 1990

Name Of Project: Swan Lake Habitat Rehabilitation

Federal Agency Involved: US Army Corps of Engineers

Proposed Land Use: fish & wildlife management

County And State: Calhoun Co., Il.

PART II *(To be completed by SCS)*

Date Request Received By SCS: June 5, 1991

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply — do not complete additional parts of this form).* Yes ☒ No ☐

Acres Irrigated: —

Average Farm Size: 321

Major Crop(s): Corn, soybeans

Farmable Land In Govt. Jurisdiction: Acres: 31,200,000 % 87.6

Amount Of Farmland As Defined in FPPA: Acres: 31,200,000 % 87.

Name Of Land Evaluation System Used: statewide

Name Of Local Site Assessment System: statewide

Date Land Evaluation Returned By SCS: 9-3-91

		Alternative Site Rating			
PART III *(To be completed by Federal Agency)*		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		0	0	35	
B. Total Acres To Be Converted Indirectly		0	0	—	
C. Total Acres In Site		600	600	35	
PART IV *(To be completed by SCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		—	—	33	
B. Total Acres Statewide And Local Important Farmland		—	—	—	
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		—	—	.060001	
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		—	—	32.5	
PART V *(To be completed by SCS)* Land Evaluation Criterion X 1.5* Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		0 —	0 —	132 ~~88~~	
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area	(See attached Site Assessment Corridor Facto				
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS *150	~~160~~	50	30	64	
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)* *150	~~100~~	0	0	132	
Total Site Assessment *(From Part VI above or a local site assessment)* *150	~~160~~	50	30	64	
TOTAL POINTS *(Total of above 2 lines)* *300	~~260~~	50	30	196	

Site Selected:

Date Of Selection

Was A Local Site Assessment Used? Yes ☒ No ☐
State System

Reason For Selection:

*Utilizing the state Site Assessment corridor factors, 150 points are assigned to the Land Evaluation portion and 150 points are assigned to the Site Assessment portion, for a maximum score of 300 points.

APPENDIX DPR-O

SOIL CONSERVATION SERVICE INFORMATION

FOREWORD

APPENDIX DPR-O provides various information furnished by the Soil Conservation Service with relevance to the project recommended hillside sediment control program. The appendix is subdivided into three sections. Section 1 is an overall summary of the program and anticipated benefits to be derived from a program involving the allocation of EMP funds (through a cooperative agreement) with the Calhoun County Soil and Water Conservation District. Section 2 shows the locations proposed for the sediment traps and provides some typical past applications of such features within the county.

SECTION 1

HILLSIDE SEDIMENT CONTROL PROGRAM DATAM ASSUMPTIONS

Swan Lake Resources Planning Unit Assumptions

I. Sediment load datum assumptions.

A. Sediment delivery efficiency to Swan Lake.
   1. Sheet and rill = 75%
   2. Ephemeral = 85%
   3. Gully = 100%

B. Ephemeral erosion assumed to equal sheet and rill total times .37.

C. Watersheds 1 through 5.
   1. Approx. 4T/ac/yr soil loss in the hill ground.
   2. Approx. 5t/ac/yr soil loss in the bottomland.
   3. Sediment transport efficiency = 40%.

E. Watershed 6
   1. Approx. 12T/ac/yr soil loss in the hill ground
   2. Approx. 5T/ac/yr soil loss in the bottomland.
   3. Sediment transport efficiency = 40%.

F. Watershed 7.
   1. Approx. 18T/ac/yr soil loss in the hill ground.
   2. Approx. 5T/ac/yr soil loss in the bottomland.
   3. Sediment transport efficiency =43%

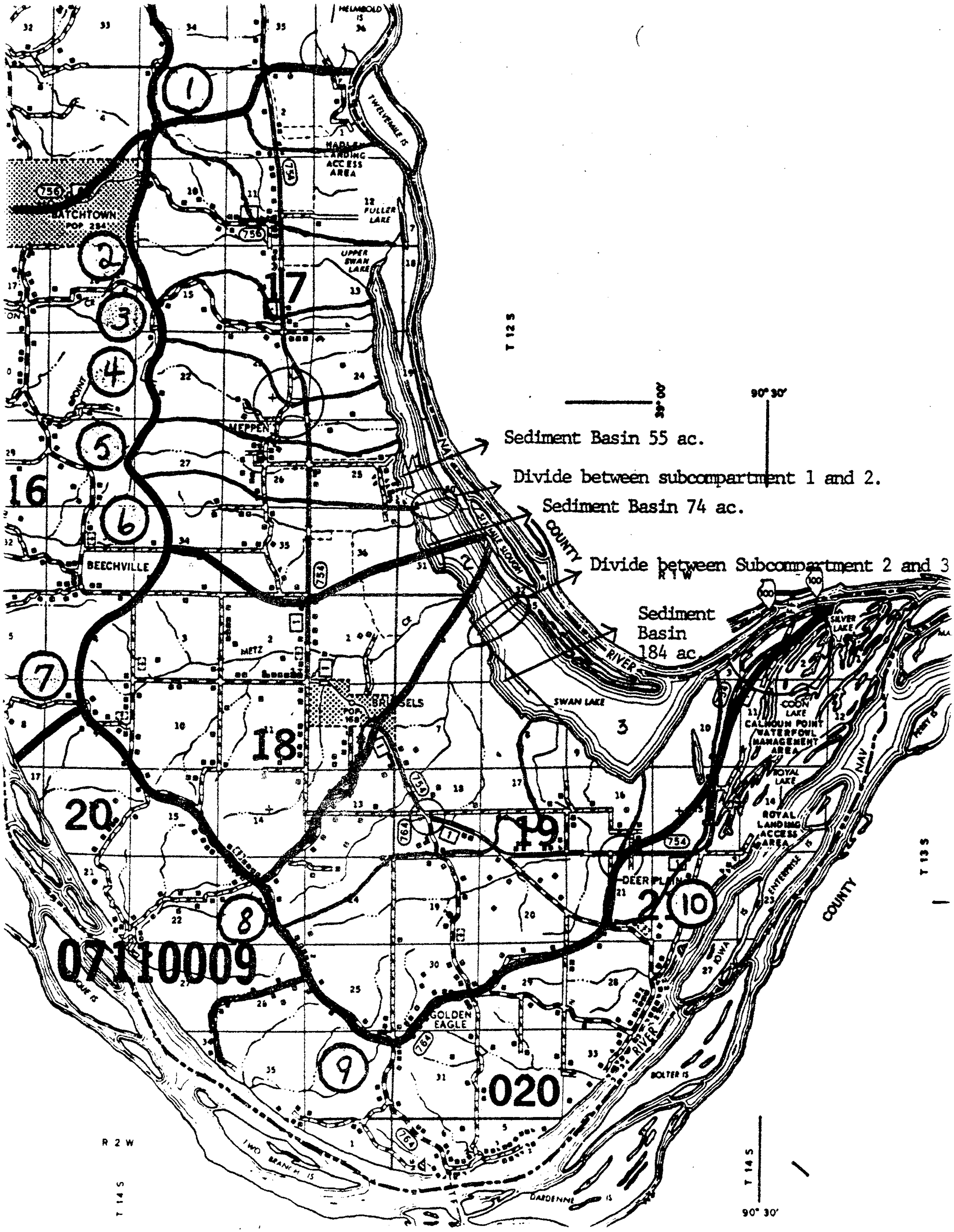
G. Watersheds 8, 9 and 10.
   1. Approx. 18T/ac/yr soil loss in the hill ground.
   2. Approx. 5T/ac/yr soil loss in the bottomland
   3. Sediment transport efficiency = 41%

I. All soil loss tonnages are based on air dried weights.
   1. Average in situ bulk density = 1.2 g/cc or 1.762 T/cu. yd.
   2. Average bulk density after deposition in Swan Lake = .64 g/cc or 0.945 T/cu. yd.

J. Lake sediment volume in acre feet
   1. Assumes density of 70 lbs. per cubic foot.

II. 1985 Food Security Act sediment reduction assumptions.

A. Assumes 70 percent compliance.
B. Watersheds 1 through 5 average savings in the hills of 1 T/ac/yr.
C. Watershed 6 average savings in the hills of 3 T/ac/yr.
D. Watersheds 7 through 10 average savings in the hills of 5 T/ac/yr.
E. Resulting sediment load reduction is 17.5 percent.


Sediment Basin 55 ac.
Divide between subcompartment 1 and 2.
Sediment Basin 74 ac.
Divide between Subcompartment 2 and 3
Sediment Basin 184 ac.
BATCHTOWN
BEECHVILLE
MEPPEN
METZ
BRUSSELS
DEER PLAIN
GOLDEN EAGLE
SWAN LAKE
CALHOUN POINT WATERFOWL MANAGEMENT AREA
ROYAL LANDING ACCESS AREA
HADLEY LANDING ACCESS AREA
07110009
020
T 12 S
T 13 S
T 14 S
R 2 W
R 1 W
90° 30'

Dave Gates
St. Louis District
U.S. Army Corps of Engineers

Christopher C. Borden
Calhoun County
Soil Conservation Service

Dear Dave,

Attached is the data we collected on the amount of interest there is in building sediment traps at 90 percent construction cost share. The data collected on interest at 75 percent cost share was not sufficient to be statistically significant. Please review the figures, if there is any way I can make this data more understandable let me know. There is a good possibility of coming up with a non-federal sponsor with some extra cost share help.

Sincerely

Christopher C. Borden

Christopher C. Borden
District Conservationist Calhoun County

cc: Clarence Buel
Rick Macho
Roy Bailey
Mike Andreas

Swan Lake Survey Of Structural Needs at a 90 Percent Cost Share Level

	Interest? 1 = yes 0 = no	Number of Ponds	Number of Terraces	Number of Basins	Acres They Represent	Estimated Cost
1.	1	2	0	3	240	22500
2.	0	0	0	2	40	5000
3.	0	0	0	0	0	0
4.	1	0	0	0	52	0
5.	1	3	0	0	99	22500
6.	1	1	1	1	40	12500
7.	1	6	0	6	750	60000
8.	1	0	0	0	50	0
9.	1	2	0	0	244	15000
10.	1	1	1	1	57	12500
11.	1	0	0	1	160	2500
12.	1	0	3	0	80	7500
13.	1	0	3	1	90	10000
14.	1	0	3	1	90	10000
15.	1	0	0	10	750	25000
16.	0	0	0	0	0	0
Totals		15	11	26	2742	205000 **747629.4**

Average pond cost is 7500 dollars (includes 300$ for Phase 1 survey).
Average terrace cost is 2500 dollars (includes 300$ for Phase 1 surve
Average basin cost is 2500 dollars (includes 300$ for Phase 1 survey)

Extrapolated total number of ponds.	**55**
Extrapolated total number of terraces.	**40**
Extrapolated total number of basins.	**95**
Extrapolated total construction cost.	747629.4
Eighteen percent administrative cost.	134573.3
Total Project Cost.	882202.7

Sedimentation Reduction to Swan Lake at 90 Percent Cost Share

A.	Number of ponds in survey.	15
B.	Number of terraces in survey.	11
C.	Number of sediment control basins in survey.	26
D.	Acres of cropland in hills.	10000
E.	Survey respondent acres.	2742
F.	Average gross soil loss in pond watersheds.	12
G.	Average gross soil loss in terrace and basin watersheds.	18
H.	Sheet and rill erosion sediment delivery ratio.	0.75
I.	Ephemeral erosion sediment delivery ratio.	0.85
J.	Gully erosion sediment delivery ratio.	1
K.	Average sediment transport efficiency.	0.43
L.	Ratio of ephemeral to sheet and rill erosion.	0.37
M.	Ratio of gully to sheet and rill erosion.	0.05
N.	Average pond trapping efficiency.	0.95
O.	Average pond watershed acres.	40
P.	Average terrace and basin trapping efficiency.	0.72
Q.	Average terrace and basin watershed acres.	14

R. Sediment reduction to be gained from ponds in T/Ac/Yr. 11954

Formula {[Ax(D/E)]x[(FxHxK)+(FxIxLxK)+(FxJxMxK)]}xNxO=R

S. Sediment reduction to be gained from terraces in T/Ac/Yr. 3488.

Formula {[Bx(D/E)]x[(GxHxK)+(GxIxLxK)+(GxJxMxK)]}xPxQ=S

T. Sediment reduction to be gained from basins in T/Ac/Yr. 8244.

Formula {[Cx(D/E)]x[(GxHxK)+(GxIxLxK)+(GxJxMxK)]}xPxQ=T

U. Percent sediment reduction gained from EMP structures. 21.53

Formula [(R+S+T)/110000]x100=U

V. Percent sediment reduction gained through EMP initiated farm planning. 11

W. Minimum total percent sediment reduction to be gained from Upland EMP Project. 32.53

Formula (U+V) = W

Wildlife Benefits of Proposed SWCD Initiated Upland Treatment using Missouri Upland WHAG.

Species	Habitats Units Present	Habitat Units Future **	Change
Deer	11,622	13,092	+1470
Turkey	11,371	12,815	+1444
Pileated Woodpecker	2,746	2,833	+87
Fox Squirrel	3,886	4,002	+116
Bluebird	1,694	1,717	+23
Bobwhite Quail	8,534	9,535	+1001
Indigo Bunting	2,000	2,024	+24
Ring-necked Pheasant	9,797	12,052	+2255

** Future condition assumes 0.5 Mil. in upland land treatment. Double the change to arrive at the benefit gained from 1.0 Mil. in upland land treatment.

SECTION 2

LOCATIONS AND TYPICAL DESIGN

Clyde Hopple
US Army Corps of Engineers
St Louis District
St Louis, MO 63103

Dear Clyde,

Enclosed is the information you requested. You can contact me at (618) 576-2723 .

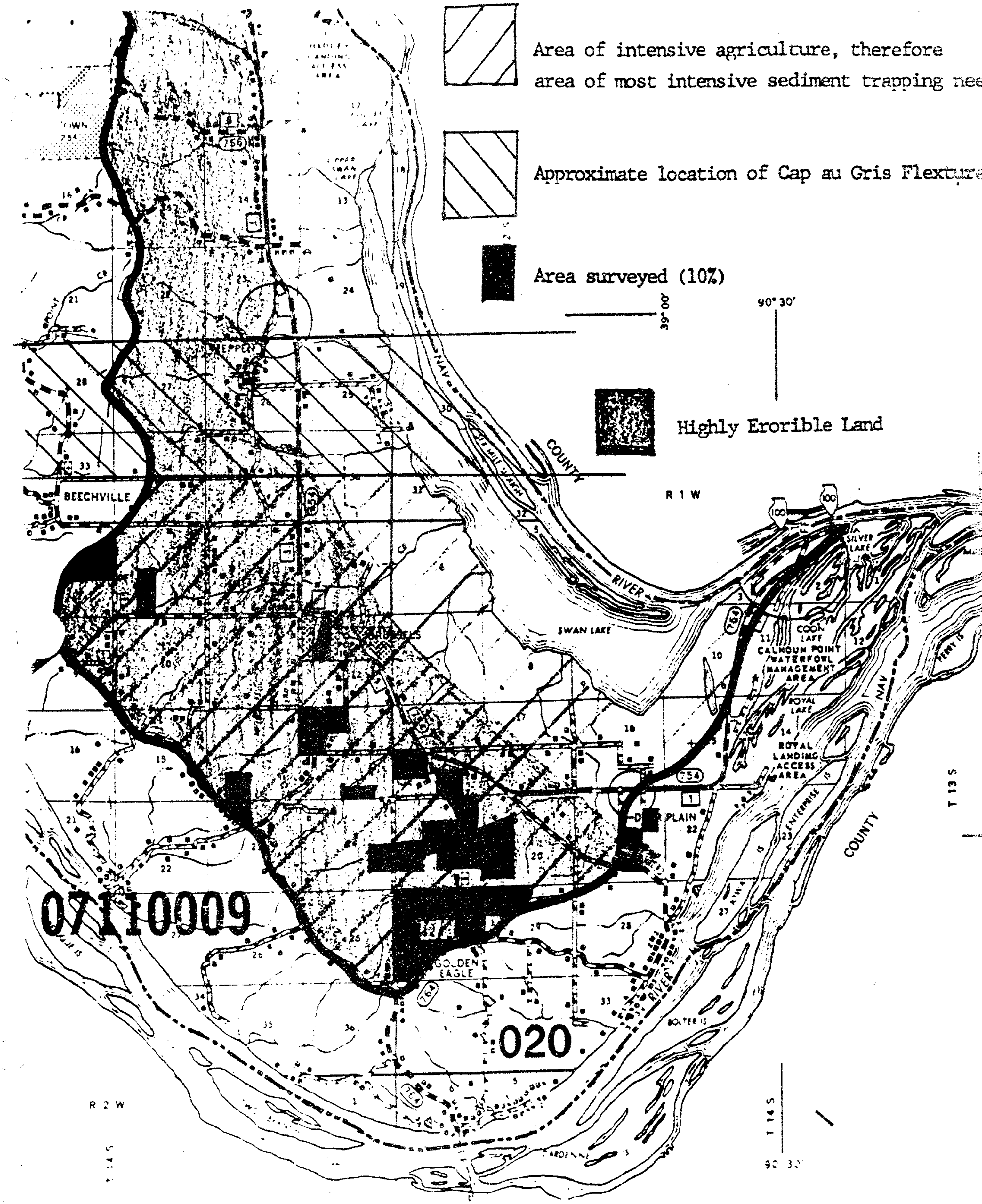
The topographic maps are 2.25X enlargements from the USGS 7.5 minute Winfield and Brussels quadrangle maps. The contour interval is 10 ft. T RF is 1:10667. The legal description is written on each sheet. The area outlined in green are the ten percent survey locations.

I have also included a sample of an SCS pond design (Richard Halemeyer). Also enclosed is the output of our new CAD pond program (John Everett). If you need anything else, call me.

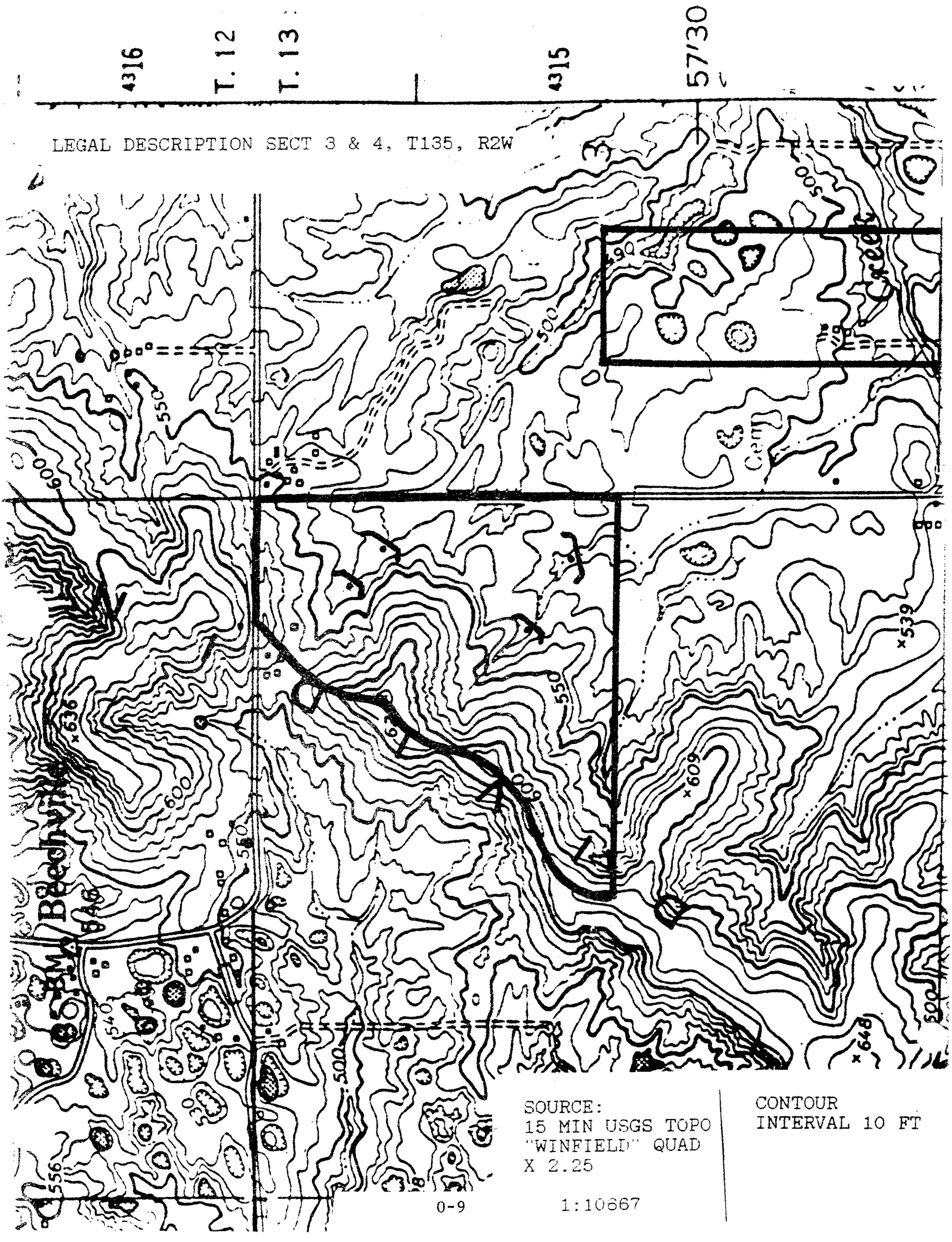
Sincerely,

Christopher C. Borden
SCS District Conservationist

STRUCTURE LOCATIONS



Area of intensive agriculture, therefore
area of most intensive sediment trapping nee
Approximate location of Cap au Gris Flexture
Area surveyed (10%)
Highly Erorible Land
39° 00'
90° 30'
BEECHVILLE
R 1 W
R 2 W
RIVER
COUNTY
SWAN LAKE
SILVER LAKE
COON LAKE
CALHOUN POINT WATERFOWL MANAGEMENT AREA
ROYAL LAKE
ROYAL LANDING ACCESS AREA
GOLDEN EAGLE
PLAIN
T 13 S
T 14 S
07110009
020

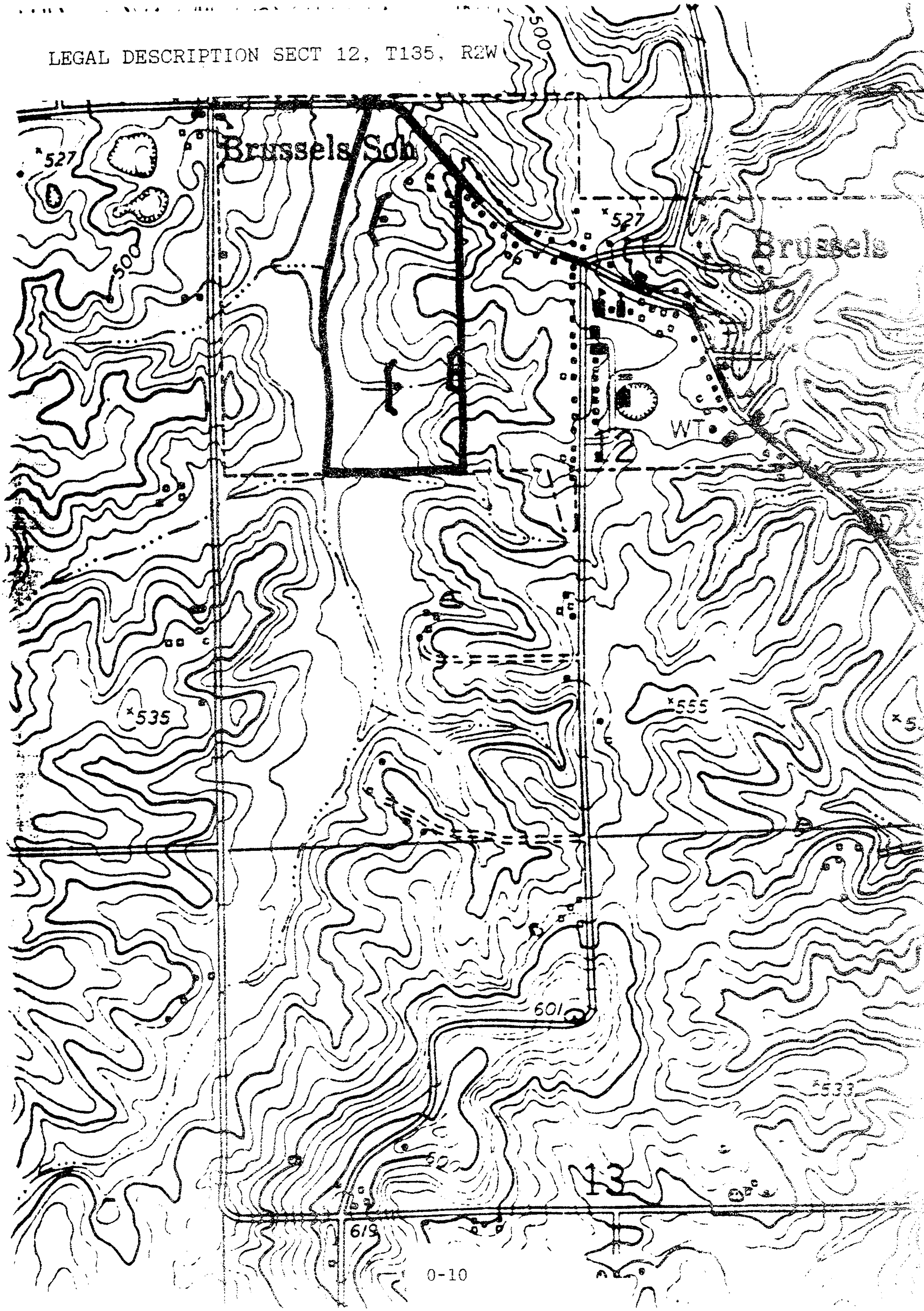


SOURCE:
15 MIN USGS TOPO
"WINFIELD" QUAD
X 2.25

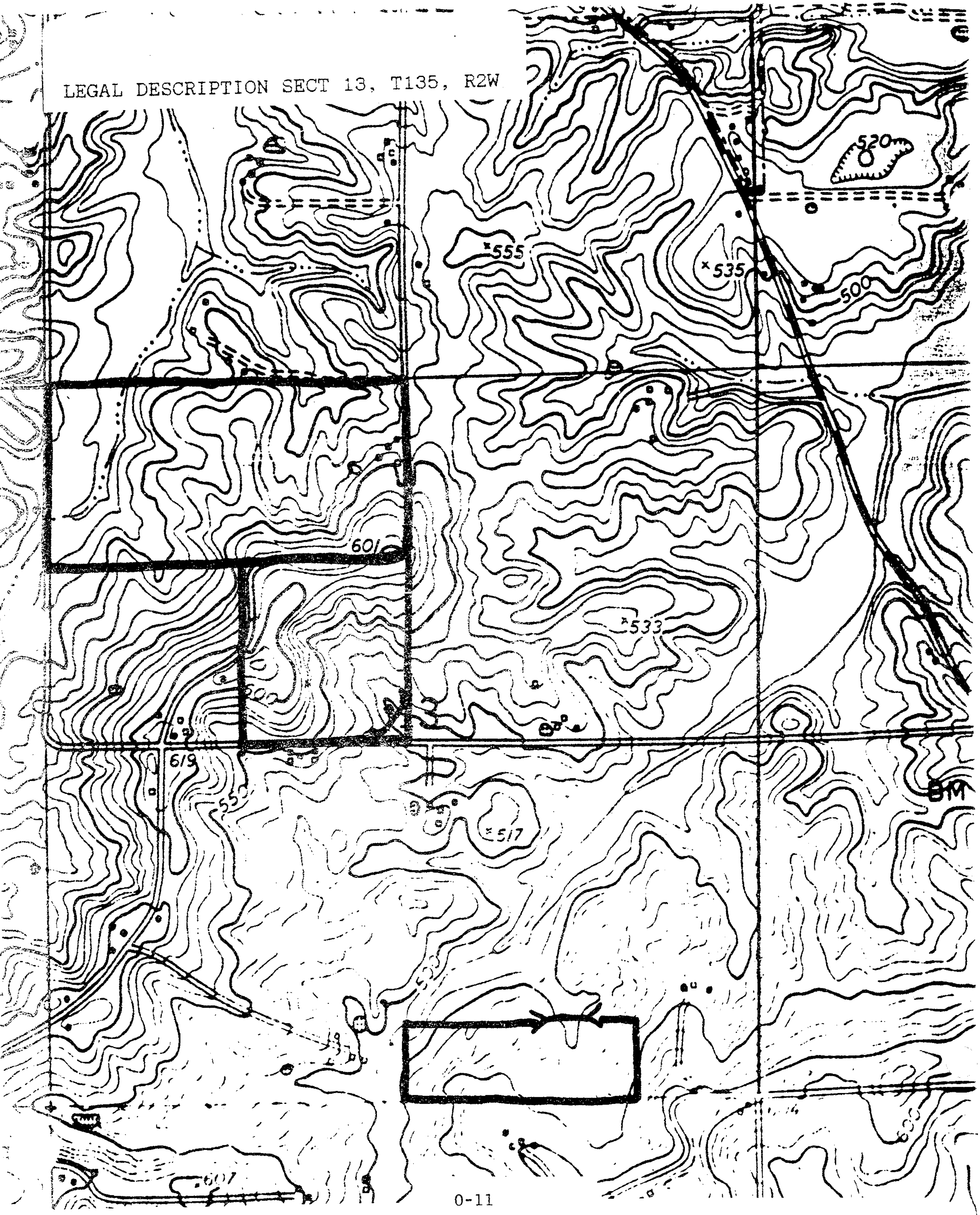
CONTOUR
INTERVAL 10 FT

1:10667

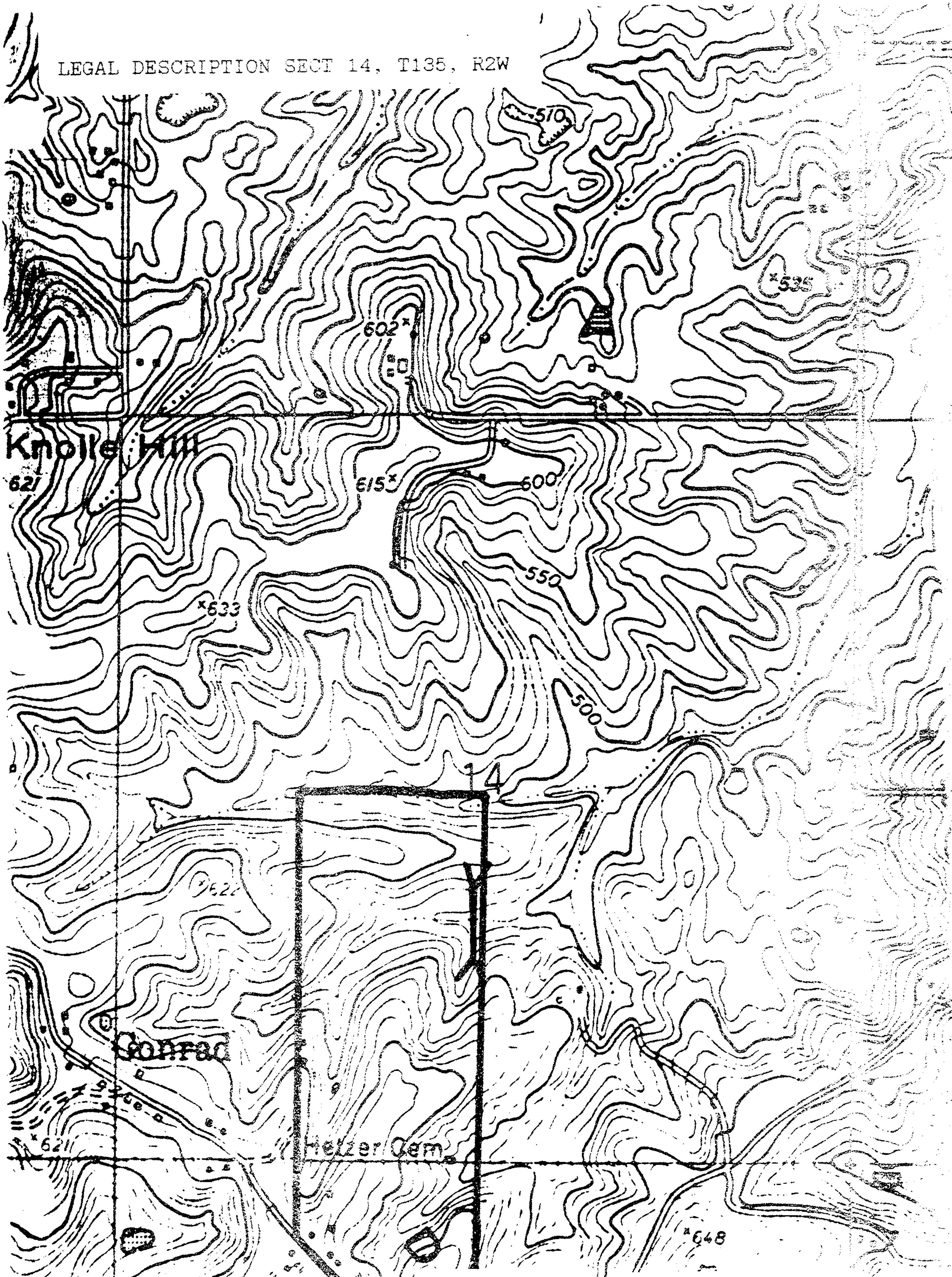
LEGAL DESCRIPTION SECT 12, T135, R2W



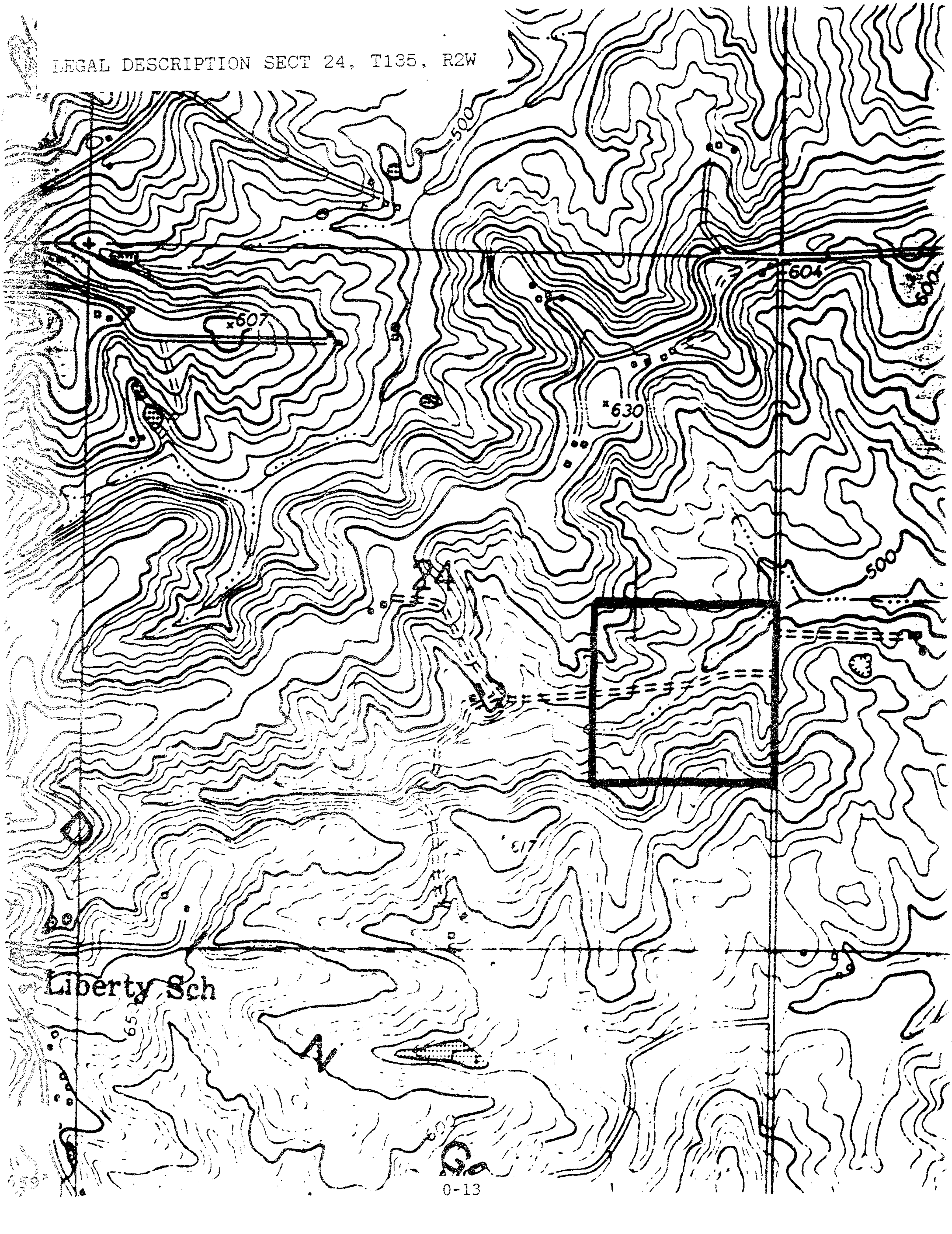
LEGAL DESCRIPTION SECT 13, T135, R2W



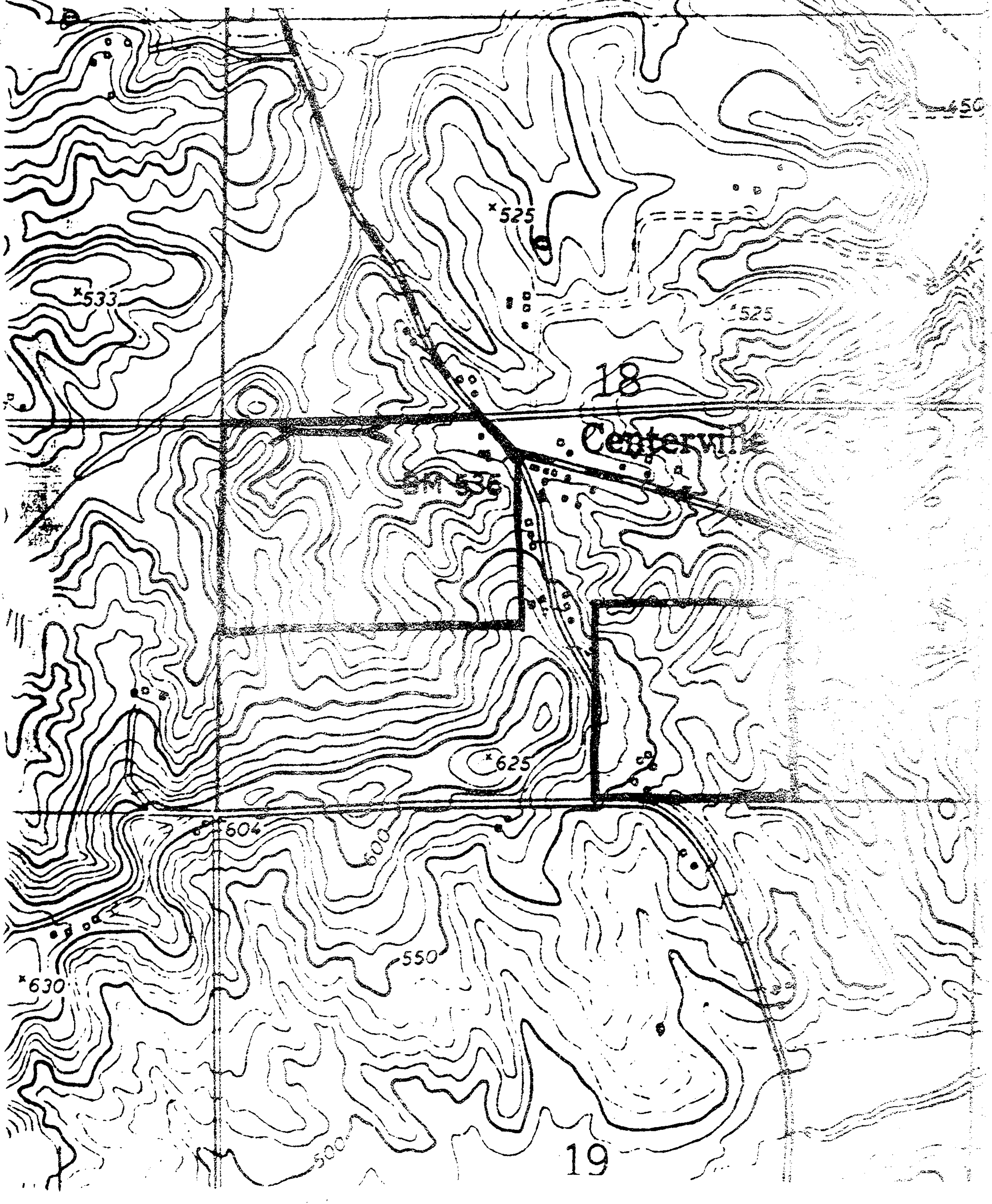
LEGAL DESCRIPTION SECT 14, T135, R2W



LEGAL DESCRIPTION SECT 24, T135, R2W



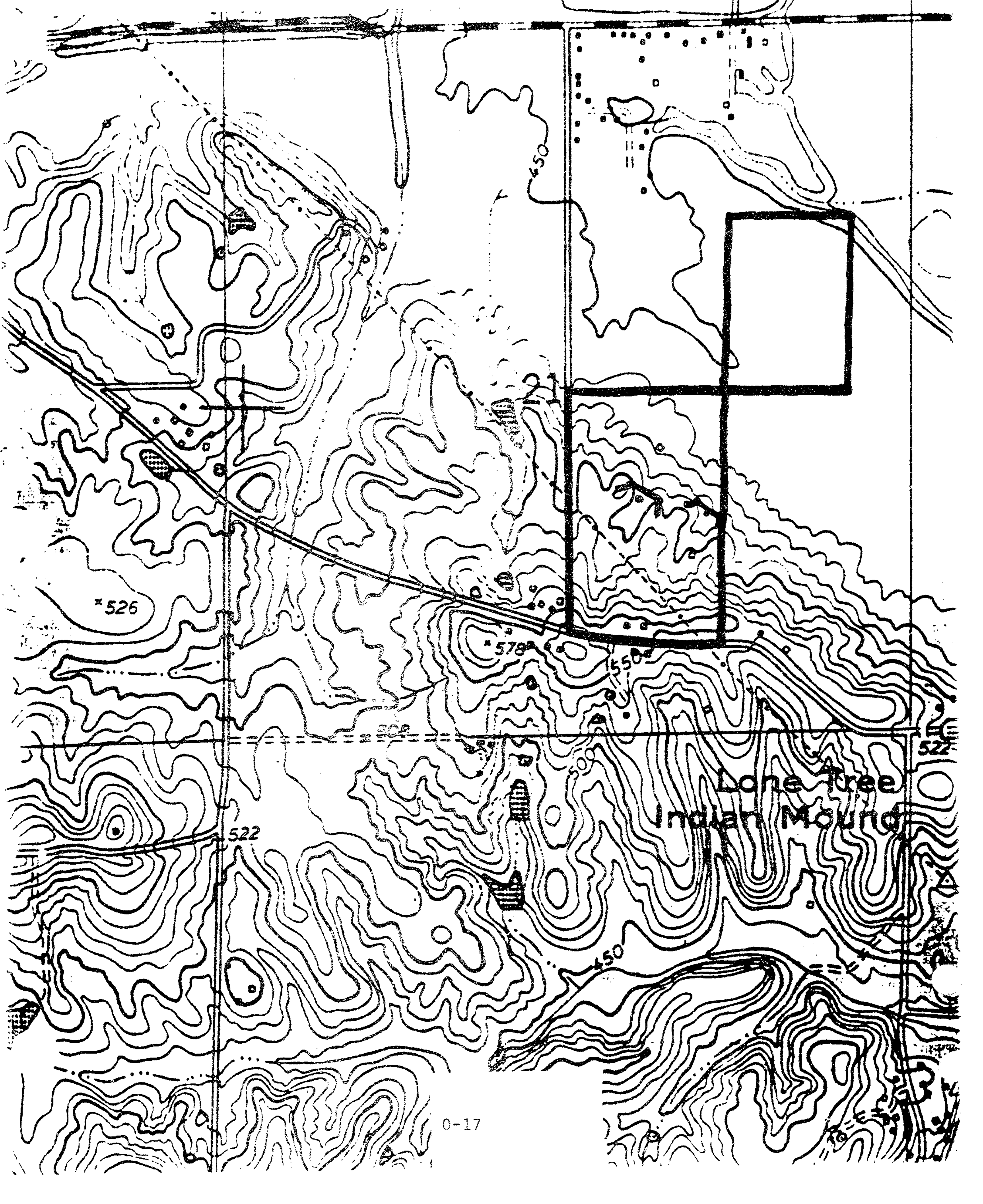
LEGAL DESCRIPTION SECT 18, T135, R1W



LEGAL DESCRIPTION SECT 19, T135, R1W

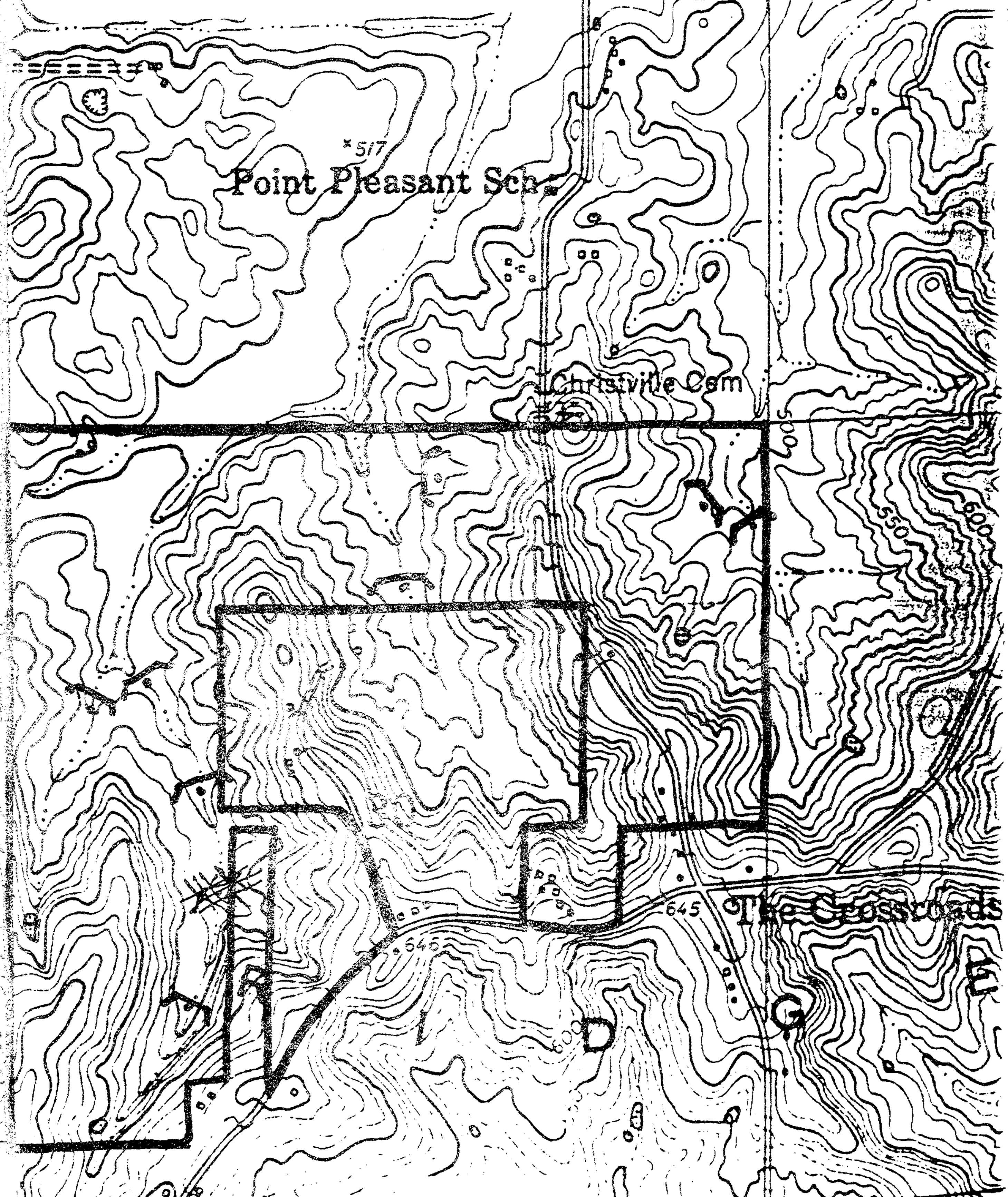
LEGAL DESCRIPTION SECT 20. T135, R1W

LEGAL DESCRIPTION SECT 21, T135, R1W



LEGAL DESCRIPTION SECT 29, T135, R1W

LEGAL DESCRIPTION SECT 30, T135, R1W



TYPICAL DESIGN

IL-ENG-26
Rev. 11/85

UNITED STATES DEPARTMENT OF AGRICULTURE-SOIL CONSERVATION SERVICE
24-HOUR PEAK DISCHARGE COMPUTATION FOR SMALL WATERSHEDS-TYPE II

County CALHOUN Practice WATER IMPOUNDMENT
Landowner HALEMEYER By [illegible] E.S. Date 9/1[illegible]/8[illegible]

Land Use	Treatment Or Practice	Hyd Cond	A Acres	A CN	B Acres	B CN	C Acres	C CN	D Acres	D CN	Sum Prod Acres x CN
Row Crop	* Without Conservation	P		72		81		88		91	
		G		67		78		85		89	
	With Conservation	P		68		77		82		85	
		G		64		73		80		84	
	W/Conservation + Cons. Till.	P		67		76		81		84	
		G		63		72		79		83	
Small Grain	* Without Conservation	P		65		76		84		88	
		G		63		75		83		87	
	With Conservation	P		62		73		81		84	
		G		60		72		80		83	
	W/Conservation + Cons. Till.	P		61		72		80		83	
		G		59		71		79		82	
Pasture		P		68		79		86		89	
		F		49	5	69		79		84	3[illegible]
		G		39		61		74		80	
Meadow		G		30		58		71		78	
Woodland		P		45		66		77		83	
		F		36	9	60		73		79	5[illegible]
		G		25		55		70		77	
Roads	Hard Surface	-		74		84		90		92	
Farmsteads		-		59		74		82		86	
Residential Under Development	¼ Ac. thru ½ Ac.	-		87		92		95		97	
	½ Ac. thru 2 Ac.	-		83		90		93		95	
Residential With Vegetation	¼ Ac. thru ½ Ac.	-		58		73		82		86	
	½ Ac. thru 2 Ac.	-		51		68		79		84	
Newly Graded		-		81		89		93		95	
Other											

Total Acres 14 Total Product [illegible]

Computed Runoff CN = $\frac{\text{Total Product}}{\text{Total Acres}}$ = 63 Use CN** [illegible]

*For Straight-Row Crops and Small Grain With Conservation Tillage, Reduce the CN sh[own] under Without Conservation by 1 for Poor and by 3 for Good.

**When the job warrants the use of a CN other than 65, 70, 75, etc., a straight lin[e] interpolation can be made between discharge values for bracketing CN's.

Table E-1 Slope adjustment factors by drainage areas

Slope (percent)	10 acres	14	20 acres	50 acres	100 acres	200 acres	500 acres	1,000 acres	2,000 acres
FLAT SLOPES									
0.1	0.49		0.47	0.44	0.43	0.42	0.41	0.41	0.40
0.2	.61		.59	.56	.55	.54	.53	.53	.52
0.3	.69		.67	.65	.64	.63	.62	.62	.61
0.4	.76		.74	.72	.71	.70	.69	.69	.69
0.5	.82		.80	.78	.77	.77	.76	.76	.76
0.7	.90		.89	.88	.87	.87	.87	.87	.87
1.0	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.5	1.13		1.14	1.14	1.15	1.16	1.17	1.17	1.17
2.0	1.21		1.24	1.26	1.28	1.29	1.30	1.31	1.31
MODERATE SLOPES									
3	.93		.92	.91	.90	.90	.90	.89	.89
4	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.04		1.05	1.07	1.08	1.08	1.08	1.09	1.09
6	1.07		1.10	1.12	1.14	1.15	1.16	1.17	1.17
7	1.09		1.13	1.18	1.21	1.22	1.23	1.23	1.24
STEEP SLOPES									
8	.92		.88	.84	.81	.80	.78	.78	.77
9	.94		.90	.86	.84	.83	.82	.81	.81
10	.96		.92	.88	.87	.86	.85	.84	.84
11	.96		.94	.91	.90	.89	.88	.87	.87
12	.97		.95	.93	.92	.91	.90	.90	.90
13	.97		.97	.95	.94	.94	.93	.93	.92
14	.98		.98	.97	.96	.96	.96	.95	.95
15	.99		.99	.99	.98	.98	.98	.98	.98
16	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.03		1.04	1.05	1.06	1.07	1.08	1.09	1.10
25	1.06		1.08	1.12	1.14	1.15	1.16	1.17	1.19
30	1.09		1.11	1.14	1.17	1.20	1.22	1.23	1.24
40	1.12		1.16	1.20	1.24	1.29	1.31	1.33	1.35
50	1.17		1.21	1.25	1.29	1.34	1.37	1.40	1.43

Average Watershed Land Slope = 15 %
Flat (0-2) Moderate (3-7) Steep (8+)

Frequency 10 years Rainfall 4.8 inches

Frequency ______ years Rainfall ______ inches

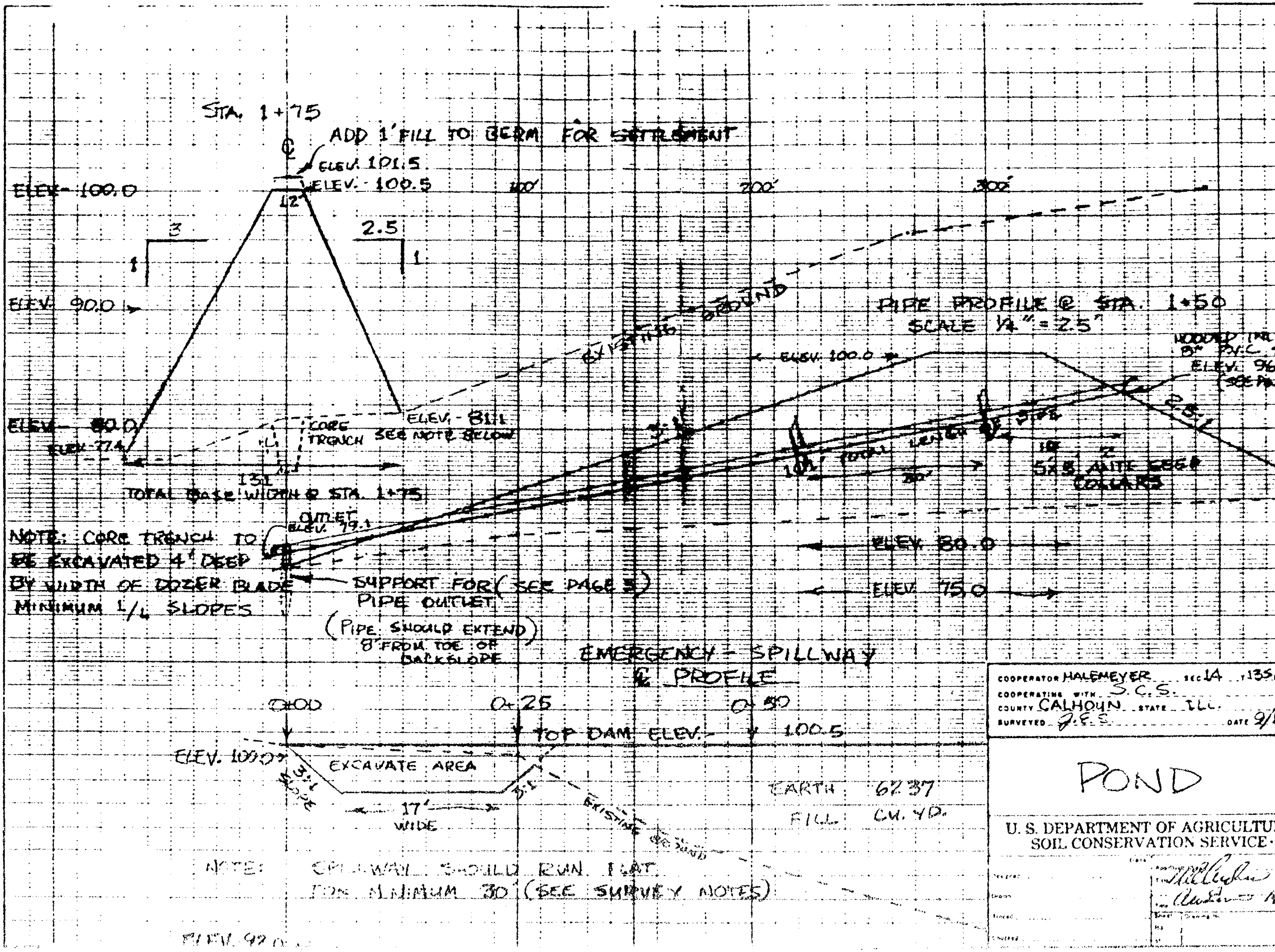
Frequency ______ years Rainfall ______ inches

Peak Discharge 23 CFS x .99 = 22.8 CFS
(From ES-1027) (Slope factor-Table E-1)

Peak Discharge ______ CFS x ______ = ______ CFS

Peak Discharge ______ CFS x ______ = ______ CFS

Runoff Volume 10 year frequency = 4.8 inches
= 1.38 ac-ft


STA. 1+75
ADD 1' FILL TO BERM FOR SETTLEMENT
ELEV. 101.5
ELEV. 100.5
ELEV. 100.0
12'
3
1
2.5
1
ELEV. 90.0
ELEV. 80.0
ELEV. 77.4
ELEV. 81.1
CORE TRENCH
SEE NOTE BELOW
131
TOTAL BASE WIDTH @ STA. 1+75
100'
200'
300'
EXISTING GROUND
PIPE PROFILE @ STA. 1+50
SCALE 1/4" = 2.5'
ELEV. 100.0
HOODED INLET
8" P.V.C.
ELEV. 96.
OUTLET
ELEV. 79.1
5X5 ANTI SEEP COLLARS
ELEV. 80.0
ELEV. 75.0
NOTE: CORE TRENCH TO BE EXCAVATED 4' DEEP BY WIDTH OF DOZER BLADE MINIMUM 1/4 SLOPES
SUPPORT FOR PIPE OUTLET (SEE PAGE 3)
(PIPE SHOULD EXTEND 8' FROM TOE OF BACKSLOPE)
EMERGENCY SPILLWAY
℄ PROFILE
0+00
0+25
0+50
TOP DAM ELEV. 100.5
ELEV. 100.0
EXCAVATE AREA
3:1 SLOPE
3:1
17' WIDE
EXISTING GROUND
EARTH 6237
FILL CU. YD.
NOTE: SPILLWAY SHOULD RUN FLAT FOR MINIMUM 30' (SEE SURVEY NOTES)
COOPERATOR HALEMEYER SEC 14 T 13S
COOPERATING WITH S.C.S.
COUNTY CALHOUN STATE ILL.
SURVEYED J.E.S.
POND
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

U.S. Department of Agriculture
Soil Conservation Service

IL-ENG-10
9/69
(File Code-ENG-16)

ESTIMATING SEDIMENT ACCUMULATION IN RESERVOIRS

Location POINT TOWNSHIP Site No.________

Date 9/15/88 Computed By J.E.S.

Total Acres 14 County________
(Limited to 250 acres)

Present ☐ or Future ☒ Conditions (Check one)

TYPE EROSION		(ACRES)	SOIL LOSS (TONS/AC.)	TOTAL (TONS)
Cropland				
Pasture or Woods		14	5	70
Other				—

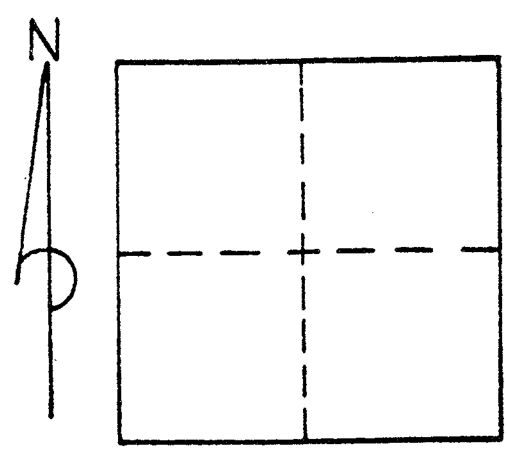
Total Delivery Rate 0.50 (Use 0.50 to 0.75) X 70 = 35 Tons Delivere

Tons Delivered 35 X 0.90 (Trap Efficiency) = 31.5 Tons X 10 (Design Years) = 315 Tons

Sediment Storage 315 Tons X .00077 Ac.Ft./Ton = .24 Acre Feet.

Conversion Table

lb/ft^3	AcFt/Ton	
50	0.00092	← Most Soils
55	0.00084	
60	0.00077	
65	0.00071	
70	0.00066	← Sand or Gravel



____Sec.____T____R____

5,L-27,623

IL-ENG-11
(Rev. 9/76)
File Code 11-5

DATA SHEET FOR DAMS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Name RICHARD HALEMEYER County CALHOUN

By J.E.S. Date 9/14/88 Checked by ______ Date ______

Practice Name POND Field No. ______ Str. No. ______ Sheet ___ of ___

Land Use	Treatment	A Acres	A CN	B Acres	B CN	C Acres	C CN	D Acres	D CN	Sum of Product Ac x CN
		Hydrologic Soil Group								
Cropland	Without Conservation		68		79		86		89	
	With Conservation		63		74		81		85	
Pasture	Poor		68		79		86		89	
	Fair		49	5	69		79		84	345
	Good		39		61		74		80	
Meadow	Good		30		58		71		78	
Woodland	Poor Cover		45		66		77		83	
	Fair Cover		36	9	60		73		79	540
	Good Cover		25		55		70		77	
Roads	Includes R.O.W.		74		84		90		92	
Farmsteads			59		74		82		86	
Other										

Total Product 885

Drainage Area 14 ac.

Average Watershed Slopes: (circle one) Flat (0-2) Med. (3-2) Steep (8%+)

Compute Runoff CN = $\frac{\text{Total Product}}{\text{Drainage Area}}$ = 63;

Use CN = 63

	Principal Spillway	Emergency Spillway
Frequency	— yr.	10 yr.
24-Hour Rainfall	— in.	4.8 in.
Peak Inflow, Q_i	___ cfs	23 cfs
Watershed Runoff	1.33 in.	

IL-ENG-7
6-82

U.S. Department of Agriculture
Soil Conservation Service

Earth Fill Computations Using Center Height Method

Owner RICHARD HALEMEYER County CALHOUN

By J.E.S. Date 9/14/88 Checked By ______ Date ______

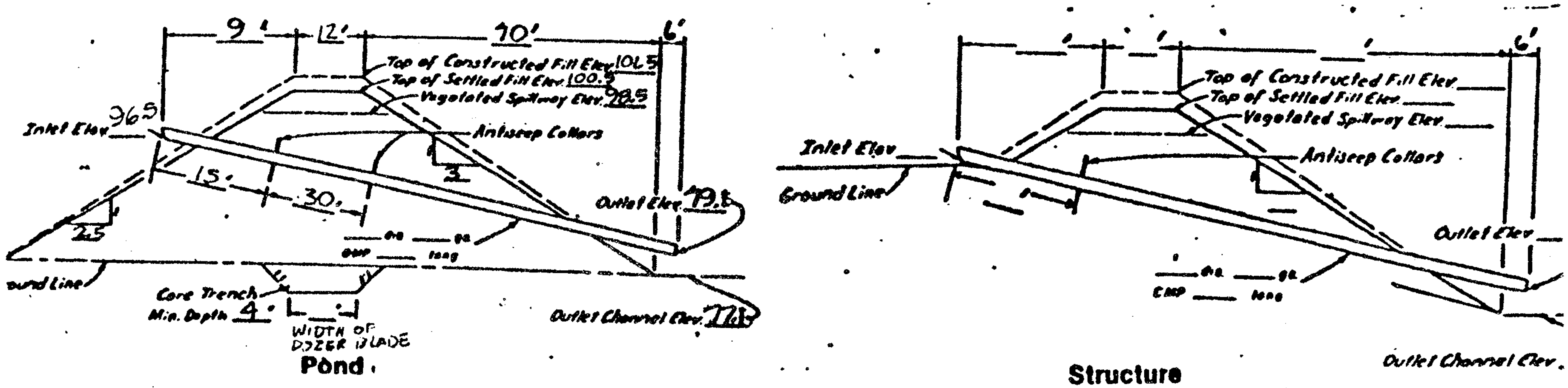
Top of Dam Elevation 100.5

Top Width of Fill 12 ft. Slopes: U.S. 2.5/1 D.S. 3/1 Berm Width 131 ft.

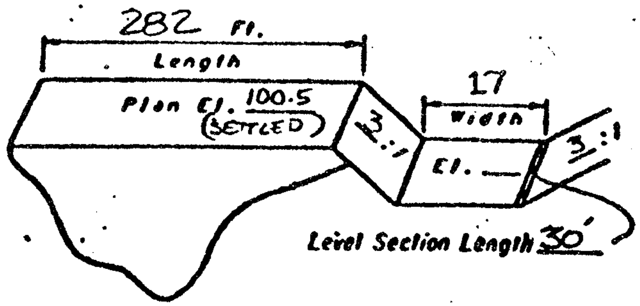
(1) Station Feet	(2) Ground Elev. Feet	(3) Center Height of Embank. Feet	(4) Volume of Embank. Cu. Yds. /Ft.	(5) Berm Height of Embank. Feet	(6) Volume of Berm Cu. Yds. /Ft.	(7) Sum of Columns 4+6 Cu. Yds. /Ft.	(8) SUM E.A. ~~Average Volume (7)÷2~~ Cu. Yds. /Ft.	(9) Distance Between Stations Feet	(10) Volume of Embank. (8)x(9) Cu. Yds.
0+00	101.5	—	—				125	25	3125
[illegible]	[illegible]	0.4	125				[illegible]	50	19300
[illegible]	[illegible]	7.7	261				[illegible]	25	17425
[illegible]	[illegible]	12.7	436				1179	25	29475
1+25	83.1	14.4	743				1659	25	41475
[illegible]	84.4	16.1	916				2207	25	55175
[illegible]	80.9	19.6	1291				1917	50	95850
[illegible]	[illegible]	13.7	626				1771	50	[illegible]
[illegible]	95.1	5.4	145				145	40	5800
[illegible]	100.5	—							[illegible]6,175

÷ 54 = 5670
+ 567 10% SET.
6237 CU.YD.

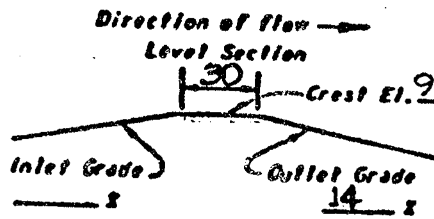
0-25



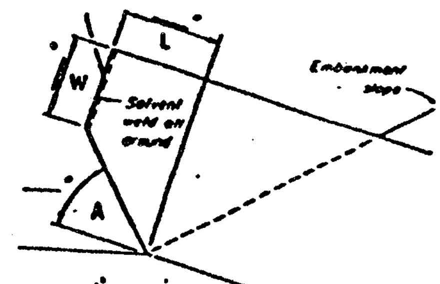
CROSS SECTION OF DAM ON CENTER LINE OF PRINCIPAL SPILLWAY



SKETCH OF DAM



PROFILE ON CENTER LINE OF EMERGENCY SPILLWAY

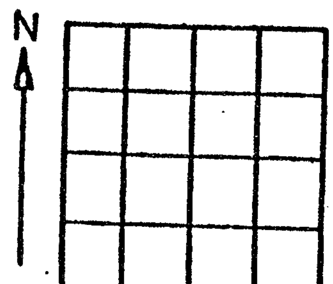


SEE CHART (PAGE 4)
IL-EFM 6-52.1

TABLE OF QUANTITIES

ITEM	UNIT	QUANTITY
Embankment	Cu. Yd.	6237
Embankment-Cutoff trench	Cu. Yd.	60
Excavation-spillway	Cu. Yd.	30

LOCATION MAP



Sec. 14, T. 13S, R. 2W
B.M. Elevation 100.00
B.M. Description TOP OF HEDGE POST 74' S.W. OF DAM STA. 0+00

PIKE COUNTY Form

PLAN FOR EARTH DAM WITH HOOD INLET PRINCIPAL SPILLWAY
(straight pipe)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Owner: HALEMEYER County: CALHOUN

Designed J.E.S. Date 9/14 Approved By [illegible] Title [illegible]

IL-ENG-11
(Rev. 9/76)
File Code 11-5

DATA SHEET FOR DAMS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Name RICHARD HALEMEYER County CALHOUN

By Q.E.S. Date 9/14/88 Checked by [illegible] Date 10/1[illegible]

Practice Name POND Field No. ______ Str. No. ______ Sheet ___ of ___

Land Use	Treatment	A Acres	A CN	B Acres	B CN	C Acres	C CN	D Acres	D CN	Sum of Product Ac x CN
Cropland	Without Conservation		68		79		86		89	
	With Conservation		63		74		81		85	
Pasture	Poor		68		79		86		89	
	Fair		49	5	69		79		84	345
	Good		39		61		74		80	
Meadow	Good		30		58		71		78	
Woodland	Poor Cover		45		66		77		83	
	Fair Cover		36	9	60		73		79	540
	Good Cover		25		55		70		77	
Roads	Includes R.O.W.		74		84		90		92	
Farmsteads			59		74		82		86	
Other										

Hydrologic Soil Group (A, B, C, D)

Total Product 885

Drainage Area 14 ac.

Average Watershed Slopes: (circle one) Flat (0-2) Med. (3-2) Steep (8+)

Compute Runoff CN = $\frac{\text{Total Product}}{\text{Drainage Area}}$ = 63

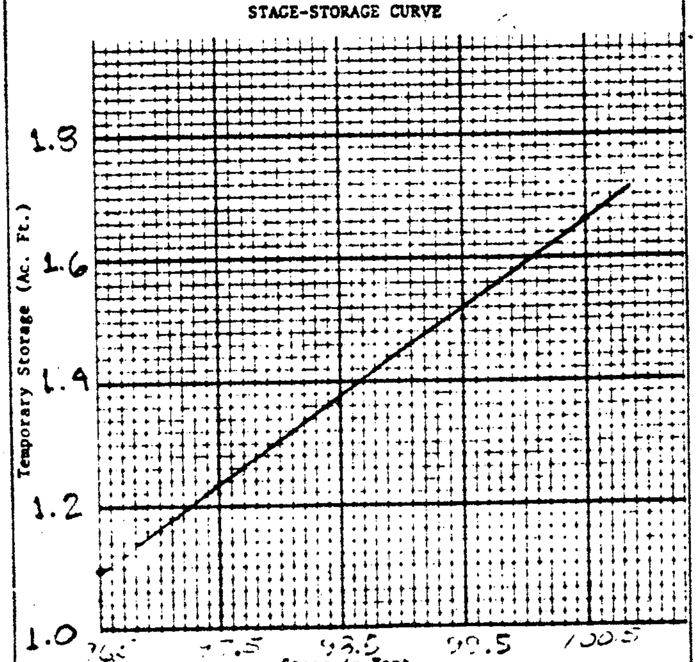
Use CN = 63

	Principal Spillway	Emergency Spillway
Frequency	2 yr.	10 yr.
24 HR -Hour Rainfall	in.	4.8 in.
Peak Inflow, Q_i	cfs	23 cfs
Watershed Runoff	1.38 in.	

Elev.	Area Sq. In.	Area Flooded Acres	Internal Storage Ac. Ft.	Accum. Storage Sed. and/or Water	Accum. Storage Temporary
96.5	19.2	1.09		.24	
97.5		1.23			
98.5		1.37		.24	
99.5		1.51			
100.5	29.0	1.66		.24	

AVAILABLE STORAGE

STAGE-STORAGE CURVE



PIPE SIZE AND STORAGE REQUIREMENTS

Pipe dia. 8 in. Kind P.V.C. Length 101 ft.

Head 15.6 ft. Q_o = ______ cfs; cfs/ac ______

If cfs/ac is less than 0.4, use Page 11-54.12 EFM.

Temporary Storage = ______ in. (From Chart)

$V_s = \frac{\text{\_\_ in.}}{12} \times$ 14 ac. = ______ ac.ft.

If cfs/ac is more than 0.4, use Page 11-54.11 EFM.

$V_r = \frac{\text{Runoff (in.) x Drainage Area (ac.)}}{12}$ = 1.61 ac.ft. 19.3 1.38 IN

$\frac{Q_o}{Q_i}$ = ______ = ______ ; $\frac{V_s}{V_r}$ = k = ______

$V_s = kV_r$ = ______ x ______ = ______ ac.ft.

Stage Required = ______ ft. (From Stage Storage Curve)

Stage used = ______ ft.

EMERGENCY SPILLWAY REQUIREMENTS

Q = Em. Spillway Peak Inflow – Prin. Spillway Peak Inflow

= 23 cfs – N/A cfs = 23 cfs

From EFM Chapter 11,

Length of Control Section = 30 ft.; Width = 17 ft.

Depth (Hp) = 1 ft. Freeboard = 1 ft.

Exit Slope = 14 % Min. Slope = 5 % Max. Slope = 1[illegible]

PHYSICAL DATA

Surface Area Pond 1.1 ac.

Maximum Depth of Water 17.6 ft.

Effective fill Ht. 17.6 ft. (Low Point on centerline to Emergency Spillway)

Volume of storage below Em. Spillway, V_t = ______ ac.ft.

Product = Eff. fill Ht. x V_t = ______

Sediment Storage: Below Crest ______ ac.ft.

Above Crest ______ ac.ft.

Elev.: Inlet 96.5, Em.Sp. 98.5, Settled Fill 100.5

(SPILLWAY VELOCITY) V.C. = 3.5 F.P.S (FROM CHART)

Pipe slope percent	End Plate width (W) inches	Canopy length (L) inches	Canopy cut angle (A) degrees	Min "h" fc full pipe flow, feet
	Pipe Diameter (D) = 6 inches			
0-5	1 1/8	3 1/4	56	0.7
5.1-15	1 1/4	4 7/8	45	0.8
15.1-25	1 5/8	6 5/8	33	0.8
25.1-32	2 1/8	7 7/8	26	0.9
	Pipe Diameter (D) = 8 inches			
0-5	1 1/2	4 3/8	56	1.0
5.1-15 17%	1 5/8	6 3/8	45	1.0
15.1-25	2 1/8	8 3/4	33	1.1
25.1-32	2 7/8	10 3/8	26	1.2
	Pipe Diameter (D) = 10 inches			
0-5	1 7/8	5 3/8	56	1.2
5.1-15	2	8	45	1.3
15.1-25	2 5/8	11	33	1.4
25.1-32	3 1/2	13	26	1.5
	Pipe Diameter (D) = 12 inches			
0-5	2 1/4	6 1/2	56	1.4
5.1-15	2 3/8	9 5/8	45	1.5
15.1-25	3 1/4	13 1/4	33	1.6
25.1-32	4 1/4	15 5/8	26	1.7
	Pipe Diameter (D) = 15 inches			
0-5	2 7/8	8 1/8	56	1.8
5.1-15	3	12	45	1.9
15.1-25	4	16 1/2	33	2.0
25.1-32	5 1/4	19 1/2	27	2.1
	Pipe Diameter (D) = 18 inches			
0-5	3 3/8	9 3/4	56	2.1
5.1-15	3 5/8	14 3/8	45	2.3
15.1-25	4 7/8	19 3/4	33	2.4
25.1-32	6 1/4	23 3/8	27	2.6
	Pipe Diameter (D) = 24 inches			
0-5	4 1/2	13	56	2.8
5.1-15	4 3/4	19 1/4	45	3.0
15.1-25	6 1/2	26 3/8	33	3.2
25.1-32	8 3/8	31 1/4	27	3.4

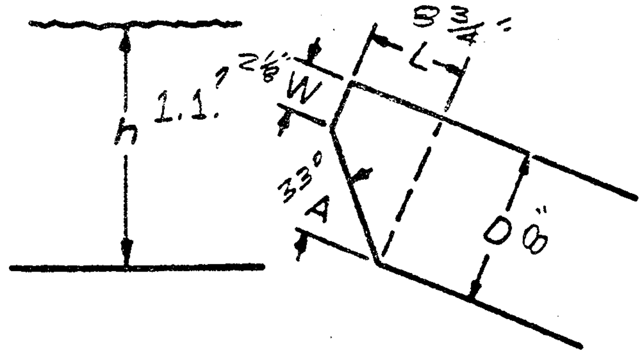


Figure 6-35.1
Canopy Inlet Dimensions for Hooded Inlets
(Not to be used on SCS Memo 27 Jobs)

SCD CALHOUN Date 9/13/

Field Office HARDIN

Name RICHARD HALEMEYER

Individual Group Unit of Govt.
(circle one)

Job WATER IMPOUNDMENT

Design Sur. Const. Layout

Const. Check Other

Ident. No. Field No.

Scale

1" =

Legal Description

POINT Sec 14 T 13S R 2

or

Location:

SCS-ENG-28 REV. 5-75

DAM & SPILLWAY -

Sta.	B.S.	H.I.	F.S. or Grade Rod	Elev. or Planned Elev.	
T.B.M.*1	5.8	105.8		100.00 (A.E.)	
⊼@ STA. 0+00 ·				5.3	
				Elev.	
T.B.M*1	5.80	74'	233°00'	100.0	
0+25	5.7	25'	358°41'	100.1	
0+75	13.0	75'	2°48'	92.8	
1+00	16.0	100'	1°45'	89.8	
1+25	19.7	120'	9°18'	86.1	
1+50	21.4	142'	14°22'	84.4	PIPE
1+75	24.9	166'	18°30'	80.9	℄
2+25	19.0	216'	23°21'	86.8	
2+75	10.7	263'	27°38'	95.1	
3+15	5.3	299'	30°07'	100.5	

GPO : 1972 O - 458-713

5/88 BECKER-WALTER

TOP OF HEDGE POST 74' SW. STA

1X2 HUB SOUTH END OF DAM

GROUND @ ℄ DAM

PIPE PROFILE

WEST			EAST
75'	50'	0	25'
28.5	24.3	21.4	21.1
77.5	81.5		

℄ PROFILE

50'	0	50'
28.4		24.6
77.4		81.2

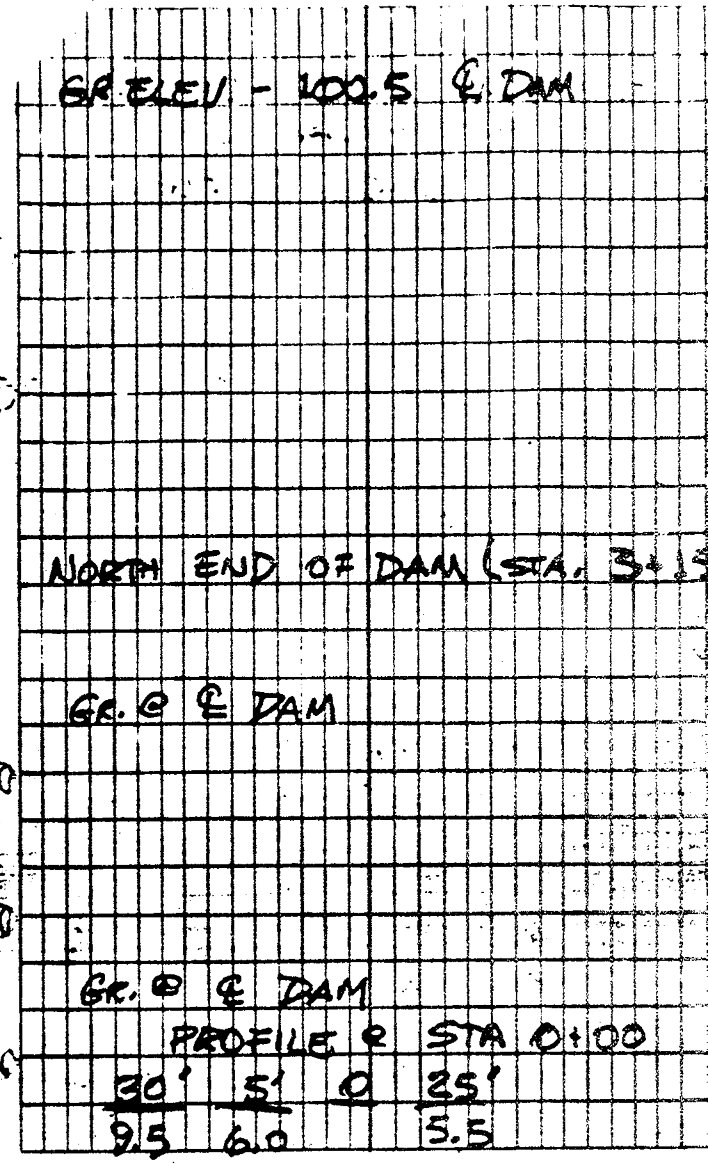
GROUND @ ℄ DAM

NORTH END OF DAM

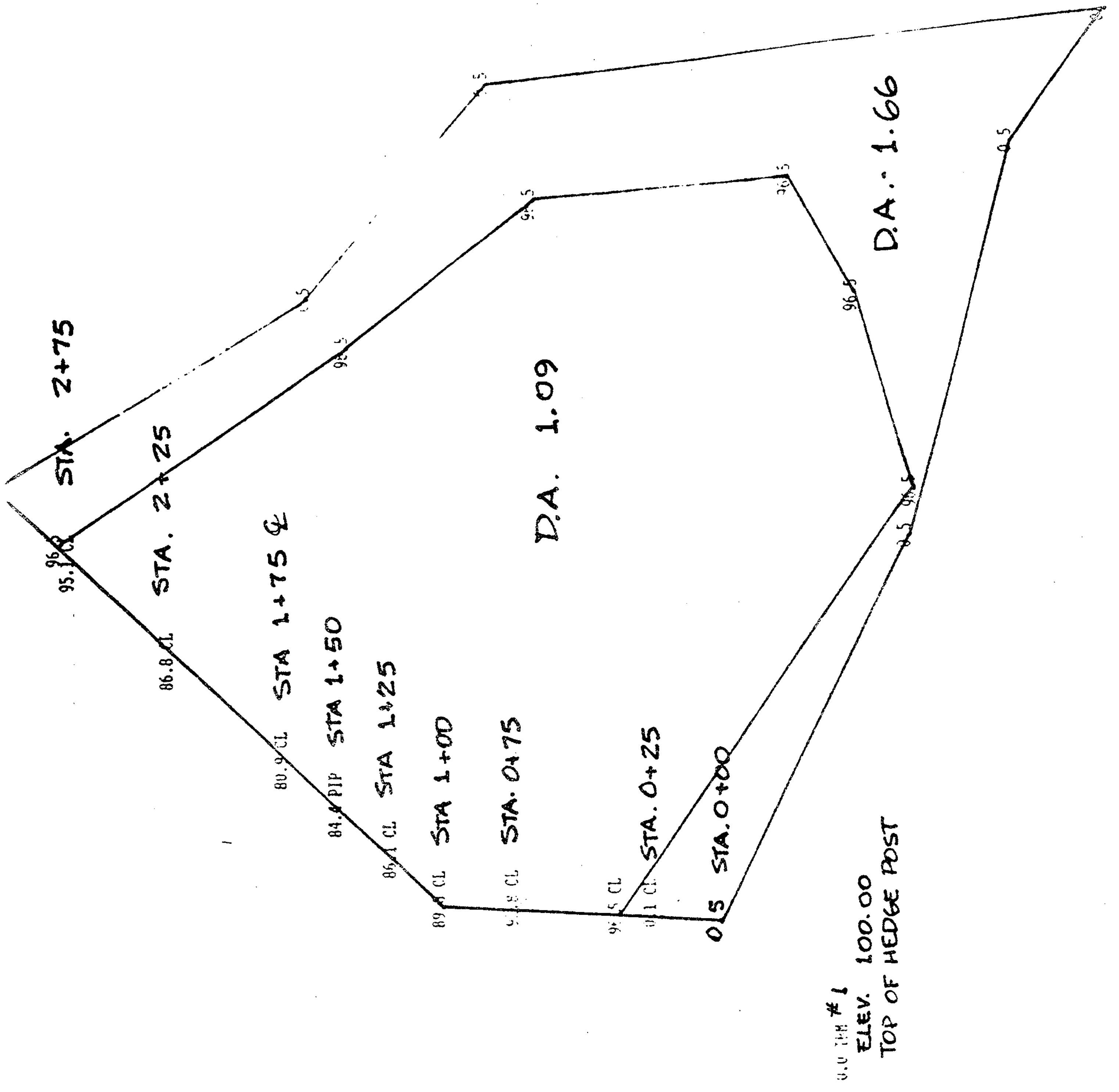
SHORE - LINE PROFILE @ EL[illegible]

Station	B.S	H.I.	F.S. or grade rod	Elev. or planned elev.	
⊼ @	STA.	0+00	H.I. - 5.3		
	H.I. -	105.8			
	ELEV	ANGLE	DIST	ELEV.	
MAG. N -	0	0°00'	0		
	5.3	116°58'	149'		
	5.3	110°36'	291'		
	5.3	112°53'	346'		
	5.3	73°16'	305'		
	5.3	55°21'	264'		
	5.3	30°07'	299'		
SHORE-LINE	PROFILE @	ELEV. - 96.5			
	9.3	28°27'	271'		
	9.3	56°04'	243'		
	9.3	74°34'	262'		
	9.3	94°55'	262'		
	9.3	102°12'	225'		
	9.3	114°43'	167'		
	9.3	0°15'	38'		
SPILLWAY					

SCS-ENG-29 (2-80) GPO : 1982 O - 369-653



EMERGENCY SPILLWAY


STA. 2+75
STA. 2+25
STA 1+75 ℄
STA 1+50
STA 1+25
STA 1+00
STA. 0+75
STA. 0+25
STA. 0+00
D.A. 1.09
D.A. 1.66
#1
ELEV. 100.00
TOP OF HEDGE POST

Hydrology and Hydraulic Design -- Principal Spillway

Landowner: John Everett   Site: 1990 ACP Pond
Location: in Calhoun County, Illinois

Computer Operator: CCB -- Routed on 09-10-1990 @ 08:53:43

<< Hydrology Input >>
Drainage Area =   18 acres -- P - 2 24 Hour Rainfall = 3.4 Inches

Type II Storm
Runoff Curve Number = 61   Time of Concentration = 0.20 Hours

<< Principal Spillway Data for a Hood Inlet >< Pipe type = SPP   >>
Pipe Diameter = 6 Inches
Type of Principal Spillway Outlet >> Cantilever
Estimated Conduit Length = 120 Feet Mannings roughness coefficient =

Inlet Elevation = 100.9   Principal spillway outlet =   81.0
Elevation of the ditch bottom at the centerline of fill =   83.1

Storage below crest = 13.65 ac. ft. Aer. sediment storage =   0.00 ac.

<< Elevation-Storage-Outflow Table >>

Elevation (Ft.)	Storage (Ac. Ft.)	Outflow (CFS)	*	Elevation (Ft.)	Storage (Ac. Ft.)	Outflow (CFS)
100.9	0.00	0.00	*	102.0	2.28	2.60
101.0	0.20	0.03	*	103.0	4.59	2.66
101.9	2.06	2.59	*	103.3	5.87	2.72

The emergency spillway is set at elevation << 101.9 >>
with a temporary storage of <<   2.06 >> acre feet
and a total storage to this elevation of << 15.71 >> acre feet

The <<TR-60>> product for this structure
is 295 and the effective fill height is 18.8 feet

The P- 2 year rainfall of 3.4 inches
produces a peak runoff of   8 cfs

Owner: John Everett - Principal Spillway Incremental Routing

TIME HR.	INFLOW CFS	OUTFLOW CFS	ELEVATION FEET	STORAGE ACRE-FT	TIME HR.	INFLOW CFS	OUTFLOW CFS	ELEVATION FEET	STORAGE ACRE-FT
11.0	0.00	0.00	100.90	0.01	18.6	0.43	0.39	101.13	0.47
11.2	0.00	0.00	100.90	0.01	18.8	0.42	0.39	101.13	0.47
11.4	0.00	0.00	100.90	0.01	19.0	0.42	0.39	101.13	0.47
11.6	0.00	0.00	100.90	0.01	19.2	0.41	0.39	101.13	0.47
11.8	0.23	0.00	100.91	0.01	19.4	0.41	0.39	101.13	0.47
12.0	1.66	0.00	100.91	0.02	19.6	0.40	0.39	101.13	0.47
12.1	5.45	0.01	100.93	0.05	19.7	0.40	0.39	101.13	0.47
12.2	8.33	0.01	100.95	0.11	19.8	0.40	0.39	101.13	0.47
12.3	6.26	0.02	100.98	0.17	19.9	0.40	0.39	101.13	0.47
12.4	3.71	0.03	101.00	0.21	20.0	0.39	0.39	101.13	0.47
12.5	2.79	0.06	101.02	0.24	20.1	0.39	0.39	101.13	0.47
12.6	2.30	0.09	101.03	0.26	20.2	0.39	0.39	101.13	0.47
12.7	1.93	0.12	101.04	0.27	20.3	0.39	0.39	101.13	0.47
12.8	1.65	0.13	101.04	0.29	20.4	0.38	0.39	101.13	0.47
12.9	1.53	0.15	101.05	0.30	20.5	0.38	0.39	101.13	0.47
13.0	1.41	0.17	101.05	0.31	20.6	0.38	0.39	101.13	0.47
13.1	1.33	0.18	101.06	0.32	20.7	0.38	0.39	101.13	0.47
13.2	1.25	0.19	101.06	0.33	20.8	0.37	0.39	101.13	0.47
13.4	1.13	0.21	101.07	0.35	21.0	0.37	0.39	101.13	0.47
13.6	1.05	0.23	101.08	0.36	21.2	0.36	0.38	101.13	0.47
13.8	0.96	0.25	101.08	0.37	21.4	0.35	0.38	101.13	0.47
14.0	0.89	0.27	101.09	0.38	21.6	0.35	0.38	101.13	0.47
14.2	0.82	0.28	101.09	0.39	21.8	0.35	0.38	101.13	0.47
14.4	0.77	0.29	101.10	0.40	22.0	0.35	0.38	101.13	0.47
14.6	0.75	0.30	101.10	0.41	22.2	0.35	0.38	101.13	0.47
14.8	0.72	0.31	101.10	0.42	22.4	0.35	0.38	101.13	0.47
15.0	0.70	0.32	101.11	0.42	22.6	0.35	0.37	101.13	0.47
15.2	0.68	0.33	101.11	0.43	22.8	0.34	0.37	101.13	0.47
15.4	0.65	0.34	101.11	0.43	23.0	0.34	0.37	101.13	0.47
15.6	0.63	0.34	101.12	0.44	23.2	0.34	0.37	101.13	0.47
15.8	0.60	0.35	101.12	0.44	23.4	0.34	0.36	101.13	0.47
16.0	0.58	0.36	101.12	0.45	23.6	0.34	0.36	101.13	0.47
16.2	0.56	0.36	101.12	0.45	23.8	0.34	0.36	101.13	0.47
16.4	0.54	0.36	101.12	0.45	24.0	0.34	0.35	101.13	0.47
16.6	0.53	0.37	101.12	0.45	24.2	0.33	0.35	101.13	0.47
16.8	0.51	0.37	101.13	0.46	24.4	0.33	0.34	101.13	0.47
17.0	0.50	0.37	101.13	0.45	24.6	0.33	0.34	101.13	0.47
17.2	0.49	0.38	101.13	0.46	24.8	0.33	0.33	101.13	0.47
17.4	0.49	0.38	101.13	0.47	25.0	0.33	0.33	101.13	0.47
17.6	0.48	0.38	101.13	0.47	25.2	0.33	0.32	101.13	0.47
17.8	0.47	0.38	101.13	0.47	25.4	0.33	0.32	101.13	0.47
18.0	0.46	0.39	101.13	0.47	25.6	0.32	0.31	101.13	0.46
18.2	0.45	0.39	101.13	0.47	25.8	[illegible]	[illegible]	101.13	0.46
18.4	0.44	0.39	101.13	0.47	26.0	[illegible]	[illegible]	101.13	0.46

Hydrology and Hydraulic Design -- Emergency Spillway

Landowner: John Everett Site: 1990 ACP Pond
Location: in Calhoun County, Illinois

Computer Operator: CCB -- Routed on 09-10-1990 @ 08:54:13

<< Hydrology Input >>
Drainage Area = 18 acres -- P - 10 24 Hour Rainfall = 4.9 Inches

Type II Storm
Runoff Curve Number = 61 Time of Concentration = 0.20 Hours

<< Principal Spillway Data for a Hood Inlet >< Pipe type = SPP >>
Pipe Diameter = 6 Inches
Type of Principal Spillway Outlet >> Cantilever
Estimated Conduit Length = 120 Feet Mannings roughness coefficient = 0.

Inlet Elevation = 100.9 Principal spillway outlet = 81.0
Elevation of the ditch bottom at the centerline of fill = 83.1

Storage below crest = 13.65 ac. ft. Aer. sediment storage = 0.00 ac.

<< Elevation-Storage-Outflow Table >>

Elevation (Ft.)	Storage (Ac. Ft.)	Outflow (CFS)	Elevation (Ft.)	Storage (Ac. Ft.)	Outflow (CFS)
100.9	0.00	0.00	102.9	4.36	17.44
101.0	0.20	0.03	103.0	4.59	18.39
101.9	2.06	2.59	103.4	5.50	36.74
102.0	2.28	3.81	103.9	6.87	98.94
102.4	3.20	9.12			

Elevation of the emergency spillway = 101.9
Bottom width of the emergency spillway = 10 feet
Vegetated Retardance = ' B' Crest Length = 30 feet

Flow depth of the water in the emergency spillway = -0.48 feet
Emergency spillway flow = 0.0 cfs with a velocity of 2.0 ft./sec
Minimum exit slope = 1% -- Maximum exit slope = 12 %

Maximum water surface in the emergency occurs at elevation 101.4

The P- 10 year rainfall of 4.9 inches
produces a peak runoff of 26 cfs

The total storage to the top of fill elevation 103.9 equals 20.5 acre

Owner: John Everett - Emergency Spillway Incremental Routing

TIME HR.	INFLOW CFS	OUTFLOW CFS	ELEVATION FEET	STORAGE ACRE-FT	TIME HR.	INFLOW CFS	OUTFLOW CFS	ELEVATION FEET	STORAGE ACRE-FT
11.0	0.16	0.00	100.91	0.01	18.6	0.85	1.15	101.40	1.03
11.2	0.20	0.00	100.91	0.01	18.8	0.84	1.15	101.40	1.02
11.4	0.26	0.00	100.91	0.02	19.0	0.83	1.14	101.40	1.02
11.6	0.33	0.00	100.91	0.02	19.2	0.82	1.13	101.40	1.02
11.8	1.84	0.00	100.92	0.04	19.4	0.81	1.12	101.39	1.01
12.0	8.05	0.01	100.95	0.10	19.6	0.80	1.11	101.39	1.01
12.1	20.99	0.04	101.01	0.22	19.7	0.80	1.11	101.39	1.01
12.2	25.82	0.31	101.10	0.41	19.8	0.79	1.11	101.39	1.01
12.3	17.78	0.55	101.19	0.59	19.9	0.79	1.10	101.39	1.01
12.4	9.76	0.70	101.24	0.70	20.0	0.78	1.10	101.39	1.01
12.5	6.91	0.79	101.27	0.76	20.1	0.78	1.09	101.39	1.01
12.6	5.48	0.85	101.29	0.81	20.2	0.76	1.09	101.39	1.00
12.7	4.48	0.90	101.31	0.84	20.3	0.76	1.08	101.39	1.00
12.8	3.79	0.93	101.32	0.87	20.4	0.75	1.08	101.39	1.00
12.9	3.49	0.97	101.33	0.89	20.5	0.75	1.07	101.39	1.00
13.0	3.19	0.99	101.34	0.91	20.6	0.74	1.07	101.39	1.00
13.1	2.98	1.02	101.35	0.93	20.7	0.74	1.07	101.39	1.00
13.2	2.78	1.04	101.36	0.94	20.8	0.73	1.06	101.38	0.99
13.4	2.50	1.07	101.37	0.97	21.0	0.72	1.05	101.38	0.99
13.6	2.29	1.10	101.38	0.99	21.2	0.71	1.04	101.38	0.99
13.8	2.08	1.13	101.39	1.01	21.4	0.70	1.03	101.38	0.98
14.0	1.90	1.15	101.40	1.02	21.6	0.70	1.03	101.38	0.98
14.2	1.75	1.16	101.40	1.03	21.8	0.69	1.02	101.38	0.98
14.4	1.63	1.17	101.41	1.04	22.0	0.69	1.01	101.37	0.97
14.6	1.57	1.18	101.41	1.05	22.2	0.69	1.00	101.37	0.97
14.8	1.51	1.19	101.41	1.05	22.4	0.68	0.99	101.37	0.97
15.0	1.46	1.20	101.42	1.06	22.6	0.68	0.98	101.37	0.97
15.2	1.40	1.20	101.42	1.06	22.8	0.68	0.97	101.37	0.96
15.4	1.35	1.21	101.42	1.06	23.0	0.67	0.96	101.37	0.96
15.6	1.29	1.21	101.42	1.07	23.2	0.67	0.95	101.37	0.96
15.8	1.24	1.21	101.42	1.07	23.4	0.67	0.94	101.36	0.95
16.0	1.18	1.21	101.42	1.07	23.6	0.66	0.92	101.36	0.95
16.2	[illegible]	1.21	101.42	1.07	23.8	0.66	0.91	101.36	0.95
16.4	1.10	1.21	101.42	1.06	24.0	0.66	0.90	101.36	0.94
16.6	1.05	1.20	101.42	1.06	24.2	0.65	0.89	101.36	0.94
16.8	1.04	1.20	101.42	1.06	24.4	0.65	0.87	101.36	0.94
17.0	1.01	1.20	101.41	1.06	24.6	0.65	0.86	101.35	0.93
17.2	1.00	1.19	101.41	1.05	24.8	0.64	0.84	101.35	0.93
17.4	0.98	1.19	101.41	1.05	25.0	0.64	0.83	101.35	0.93
17.6	0.96	1.18	101.41	1.05	25.2	0.64	0.81	101.35	0.92
17.8	0.94	1.18	101.41	1.04	25.4	0.63	0.80	101.35	0.92
18.0	0.91	1.17	101.41	1.04	25.6	0.62	0.78	101.35	0.92
18.2	0.89	1.17	101.40	1.03	25.8	0.60	0.76	101.35	0.91
18.4	0.87	1.16	101.40	1.03	26.0	0.59	0.75	101.34	0.91

<<Earthfill quantities based of centerline of fill section>>
Under file code JohnEve.xse

(Includes berm, main fill, core trench & spway dike)

Landowner ----- John Everett   Site no.------- 1990 ACP Pond
District ------ Calhoun County
Location --------
Computed by --- CCB
Date ---------- 09-10-1990 @ 08:57:24

Top of fill elev ------------- 103.9
Top width -------------------- 10 Feet
Emergency spillway elev. ----- 101.9
The emergency spillway is located on the left side
Upstream fill slope = 2.5:1   Downstream fill slope = 3.0:1
Elevation of crest ------------------- 100.9
Berm width -------------------- 0 feet

Core trench depth = 5.0 feet with a length of 242.0 feet
(Core trench assumed 10.0 ft. bottom w/ 1.0:1 sideslopes)

Spillway dike length = 0 feet with a 15 % sidehill slope
Emergency dike topwidth = 8 feet with sideslopes of 3.0:1 and 2.5:1
with a fill height of 2.0 feet

Station	Elevation	Yardage x 2
150.0	105.3	0.0
172.1	101.9	0.0
178.1	101.0	18.3
178.6	100.9	3.0
250.0	89.9	2481.5
300.0	84.1	4543.8
350.0	92.0	4152.9
400.0	99.5	1447.8
420.6	100.9	162.6
450.0	102.9	112.4
481.3	103.9	35.1
500.0	104.5	0.0

Main fill including berm (if any berm) ------ 6461.0 cu. yds.
Emergency spway dike fill ------------------ -1.0 cu. yds.
Core trench -------------------------------- 584.8 cu. yds.

Total structure yardage -------------------- 7044.8 cu. yds.

<< Notes >>

Fill yardage includes stripping 0.50 ft. deep plus (berm yardage)
Emergency dike yardage based on depth plus 0.50 ft. deep stripping
Core trench yardage based on depth minus 0.50 ft. deep stripping
Settlement of 10.0 % was used on the earthfill computations

<< Structure Summary >>

Computed by: CCB on 09-10-1990 @ 08:58:21

Owner's Name -- John Everett
Site name or number --------------------------------- 1990 ACP Pond
District -- Calhoun County, Illi
Location --
Drainage area --------------------------------------- 17.6 Acres

Permanent pond area --------------------------------- 1.94 acres
Permanent storage below crest ----------------------- 13.65 acre feet
Temporary storage to the emergency spillway --------- 2.06 acre feet
Total storage to the emergency spillway ------------- 15.71 acre feet
Total storage to the top of fill -------------------- 20.52 acre feet

Fill height at centerline of fill ------------------- 20.8 feet
Effective fill height ------------------------------- 18.8 feet
Overall fill height to downstream toe --------------- 23.4 feet

TR-60 product > > > 295 < < <

<< Principal Spillway Hydrology Design >>

Rainfall Distribution Type >>II << Runoff Curve Number 61
P 2 - 24 hr. rainfall = 3.4 inches -- time of concentration = 0.20
Peak runoff = 8 cfs -- Peak runoff volume = 0.78 ac. ft.

<< Principal Spillway >>

108 Lin. Feet of 6 inch diam. SPP with a Hood inlet
Mannings Friction value 'n' = 0.0100

<< Emergency Spillway Hydrology Design >>

P 10 - 24 hr. rainfall = 4.9 inches
Peak runoff = 26 cfs -- Peak runoff volume = 1.92 ac. ft.

<< Emergency Spillway >>

Bottom width of the emergency spillway = 10 feet
Vegetated Retardance = ' B' Crest Length = 30 feet
Emergency spillway flow = 0.0 cfs with a velocity of 2.0 ft.
Minimum exit slope = 1% -- Maximum exit slope = 12%

Computed by: CCB on 09-10-1990 @ 08:59:00

Owner's Name -- John Everett
Site name or number -------------------------------- 1990 ACP Pond

District -- Calhoun County, Illi
Location --

* * * Pipe layout dimensions * * *

Top of constructed fill = 106
Settled top of fill = 103.9
Upstream fill slope = 2.5:1
Emergency spillway = 101.9
Pipe outlet = 81.0
Elevation of crest = 100.9
Frontslope dimension = 12.7 feet
Length of pipe beyond toe = 5.0 feet

Top width = 10 feet
Downstream fill slope = 3.0:1
Downstream toe elevation = 80.5
Berm width = 0
Backslope dimension = 76.5 feet

**** Cost Estimate ***

6460 cubic yards earth fill @	1.25 =	8075.14
585 cubic yards core trench @	1.25 =	731.00
108 lin. ft. of 6 in. diameter SPP conduit @	3.00 =	324.00
Total estimated cost		9130.14

APPENDIX DPR-P

SITE WATER REGULATION PLAN

FOREWORD

APPENDIX DPR-P provides a discussion of future water regulation at the project area.

The appendix also includes a general description of water control unit functions, and the results of two site regulation hydrograph simulations for the refuge area. One hydrograph (FIGURE P-2) simulates the management of a lake compartment for fish and waterfowl during a "typical" year (taken as 1978). It should be noted that the desired lake elevation represents only one of a number of potential water regulation regimes that could be applied to the site. However, it still provides a general indicator of project performance. The other hydrograph (FIGURE P-3) provides a simulation of a drawdown for bottom solidification during a typical year.

The last item in the appendix (FIGURE P-4) is an informational graph displaying the relationship between drawdown elevation and mudflat exposure for the three lake compartments.

WATER MANAGEMENT PLAN FOR UPPER SWAN/FULLER LAKE

The IDOC portion of the project area would be managed similar to the way it has been managed in the past (FIGURE P-1). It would be managed intensively as a moist-soil unit to provide habitat for migratory waterfowl, especially dabbling ducks. Typically, in January each year, the sluice gate would be in a closed position with interior water elevations fluctuating in response to seepage and local runoff. In late June, the gate would be closed and the interior water levels would be lowered gradually using a pump. A maximum drawdown for management purposes in this unit would be elevation 417.5 NGVD, at which point approximately 60 percent of the bottom surface area would be exposed. This drawdown will permit the germination and growth of natural or aerially seeded plants beneficial to waterfowl (primarily dabbling ducks). However, with a favorable response by submerged aquatics, the magnitude of drawdown may be less than 2 feet on a given year. About mid-September, water levels would be raised as quickly as possible (normally taking about two weeks). This flooding would allow plant seed heads to remain above water and available to waterfowl. The unit is recharged, as needed, during the remainder of the waterfowl migration season. Periodic bottom resolidification periods will be included as needed. Special features for fish passage are not included. Although management practices in this unit preclude its year-round use by fish, it may still have some utility as a spawning/nursery area for river fishes.

WATER MANAGEMENT PLAN FOR MIDDLE AND LOWER SWAN LAKE

The manner in which the refuge compartments are managed for waterfowl and fish during the post-construction period has been the focus of considerable discussion between agencies. There is general agreement that the project, as designed, will provide the flexibility needed for achieving significant biological benefits at the site; however, there is some uncertainty on the specific details for a long-term site water regulation plan (i.e., particularly with regard to the timing of gate opening and closing). This problem stems primarily from a lack of information on the timing of fish movements into and out of river backwater areas. Until more is known, IDOC believes that the gates to lower Swan Lake should be left open to the river (except for impending floods and for bottom solidification) on a year-round basis. In addition, the exact response of waterfowl at the site to various water regimes is also speculative. Accordingly, agency biologists would prefer to employ a more cautious "wait and see" approach to site regulation. It has been agreed that studies will be developed and implemented during the early years of the project to access the biological impacts of various water manipulations. The source of these studies is the biological response analyses presented as a draft proposal in APPENDIX DPR-Q. With the benefit of this new knowledge, interagency meetings between the IDOC, USFWS, and Corps will be conducted annually (in conjunction with the Cooperative Agreement Plan) for the purpose of fine tuning a long-term refuge water management plan. All agencies have expressed a commitment to achieve a balanced approach to site management.

The short-term management approach calls operating the deeper middle Swan Lake compartment primarily for waterfowl (particularly diving ducks). The plan calls for an annual partial drawdown (about 0.5 feet), exposing about 10 percent of the lake's bottom substrate. This water level change will promote the growth of moist-soil and emergent vegetation along the lake margin, and submergent aquatic vegetation on the lake's interior.

The lower lake compartment would be managed at a nearly constant normal pool elevation (419.5 NGVD) on a year-round basis. The gates would be generally left open to the river based on the needs of fish to access the lower compartment for overwintering and reproduction (except during periods of impending floods and for bottom consolidation). In this manner, the lower compartment would be managed primarily for fisheries benefits but would also provide some benefits to resting and feeding waterfowl.

UPPER SWAN/FULLER LAKE--DESIRED ANNUAL WATER LEVELS

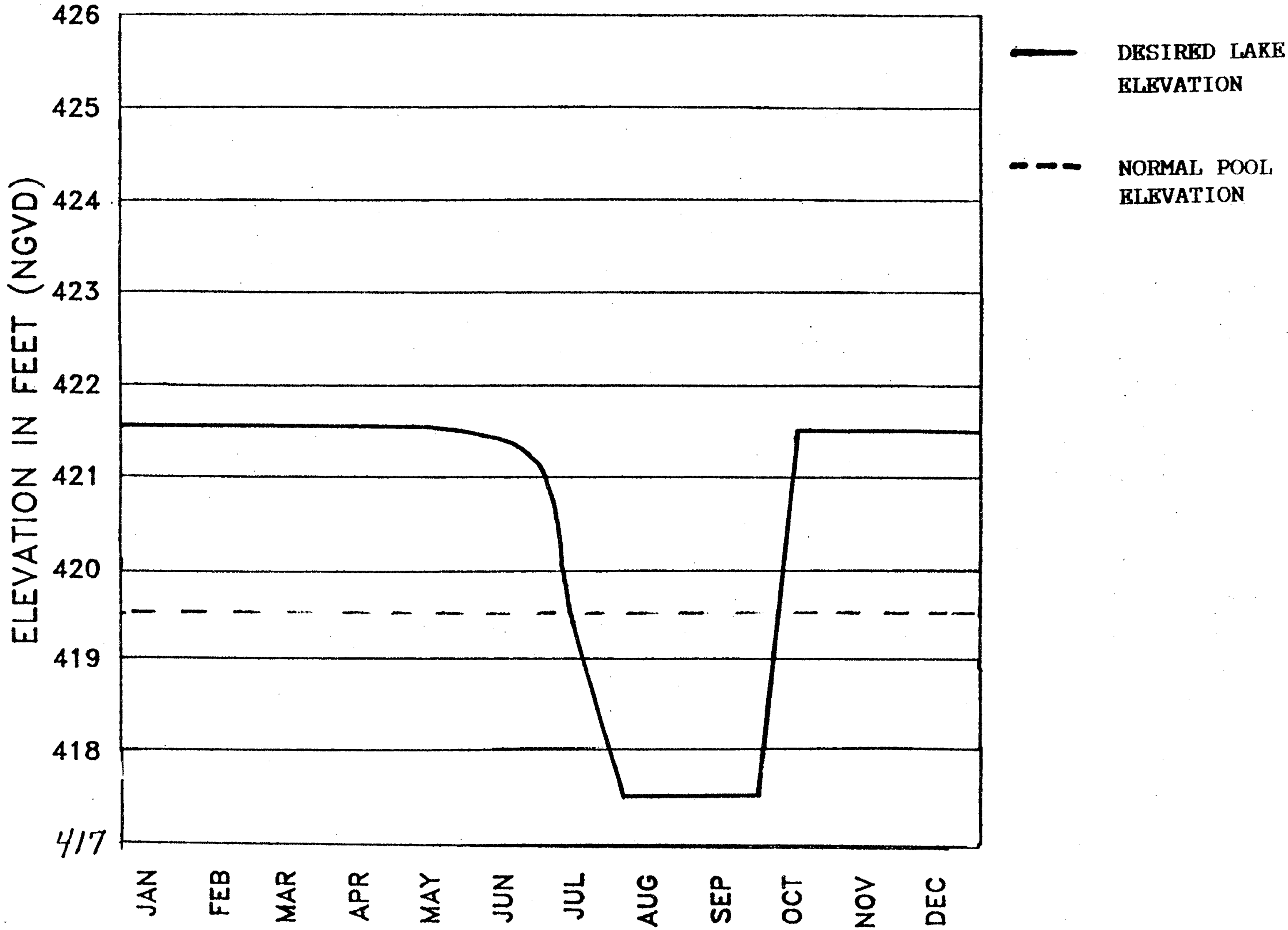


FIGURE P-1

Bottom solidification would occur at approximately 8 to 10 year intervals. Each compartment would be drained as low as possible on a rotational basis to solidify the lake bottom. This will enhance the rooting of aquatic macrophytes and improve water clarity, which will further enhance the quality of the reflooded habitat for waterfowl, fish, invertebrates, and other species.

POTENTIAL WATER CONTROL STRUCTURE FUNCTIONS-- FOR REFUGE LAKE COMPARTMENTS

STOP-LOG STRUCTURE

This structure could serve to (1) establish specific elevations for the automatic discharge of minor increases in lake water elevation, (2) to prevent an influx of river flood waters, and (3) to allow for fish passage.

Set points for water overflow could be established for any 0.5 foot increment. When river flood waters threaten, additional stop-logs could be placed to prevent the entry of water to the lake. For compartment specific periods during the year, it would be possible to remove some or all stop-logs, thus allowing for free fish movement between the Illinois River and Swan Lake. Normally, stop-logs would be placed and removed under conditions when no head differential exists.

SLUICE GATE AND SLIDING GATE

The sluice gate would serve (1) to make major increases or decreases in lake levels via gravity flow, (2) in combination with the sliding gate would provide pump reversibility, and (3) at times could also be used to facilitate fish passage.

The discharge of water from the lake will be particularly important in responding to storm events from the local watershed. The sluice gate has been sized to release waters from a 2-year interior storm event within 10-days. At times, it may be possible to input additional water onto the lower lake prior to pump activation. This would be done by opening the middle compartment sluice gate and taking advantage of river slope.

By opening or closing the sluice gate (lakeside of the control structure housing) and by placing or removing the sliding gate (riverside of the structure housing), it will be possible to move water from river to lake or lake to river, as desired. This capability will aid in minor drawdowns for plant production, major drawdowns for bottom solidification, and in raising or lowering interior water elevations.

OVERFLOW STRUCTURE

At river stages above the invert of the project's 2,000-foot overflow structure, water would fill the lake to equalize the head differential prior to dike/levee overtopping.

COMPARISON OF RIVER STAGE WITH A HYPOTHETICAL DESIRED
AND ESTIMATED ACTUAL LAKE FLUCTUATIONS
DURING A TYPICAL MANAGEMENT YEAR

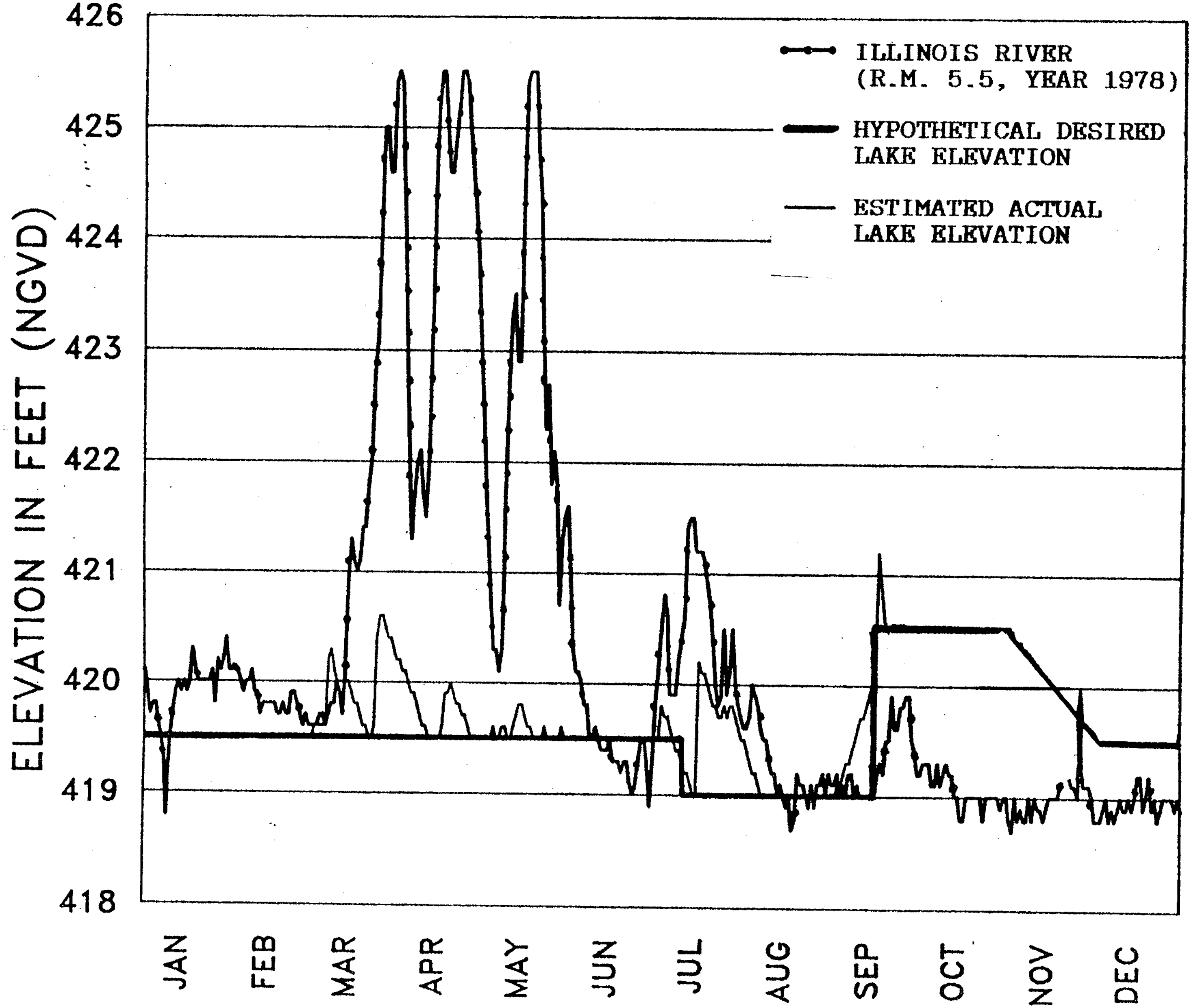


FIGURE P-2

COMPARISON OF RIVER STAGE WITH HYPOTHETICAL DESIRED AND ESTIMATED ACTUAL LAKE FLUCTUATIONS DURING A TYPICAL BOTTOM SOLIDIFICATION YEAR

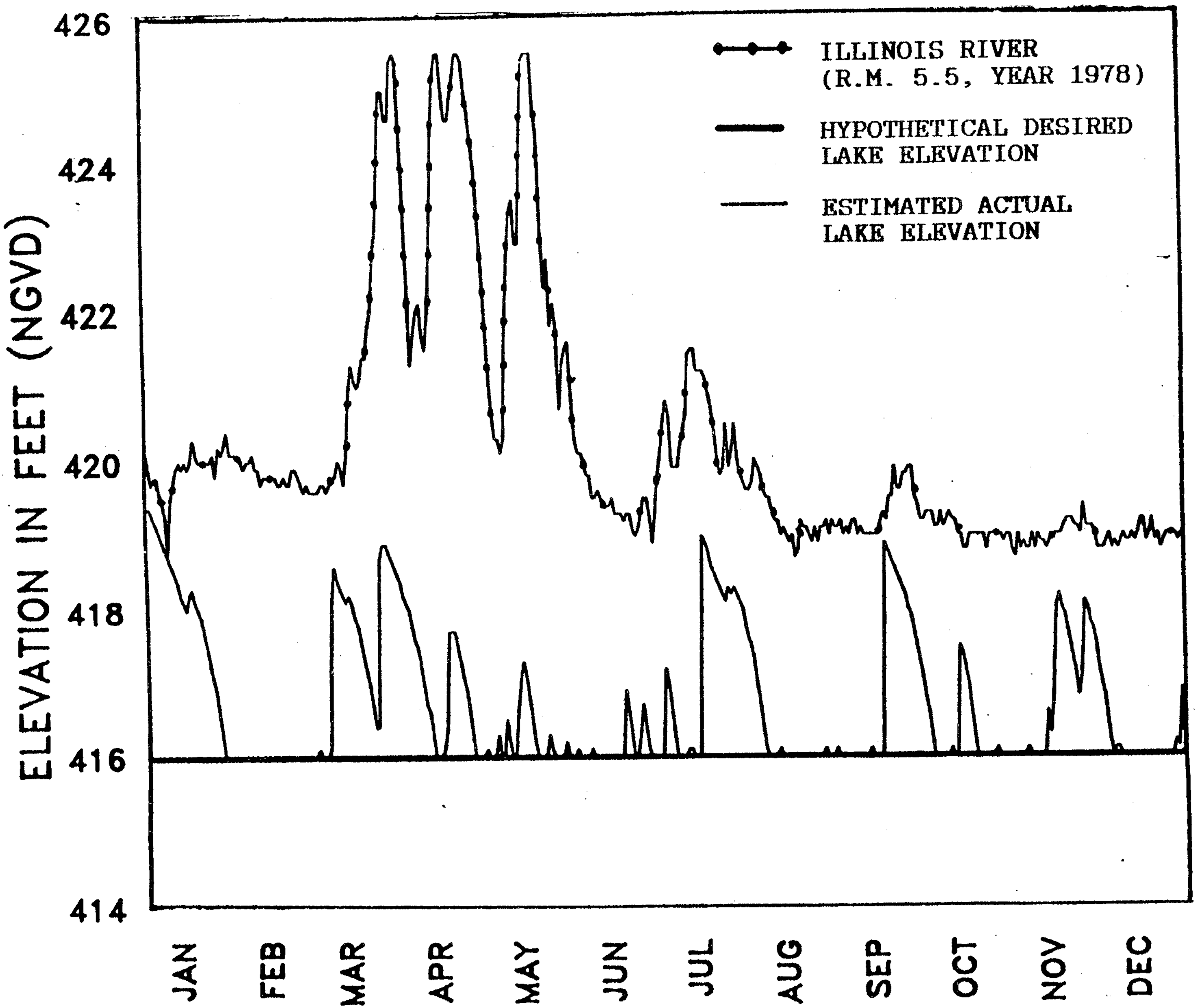


FIGURE P-3

RELATIONSHIP BETWEEN DRAWDOWN ELEVATION AND MUDFLAT EXPOSURE

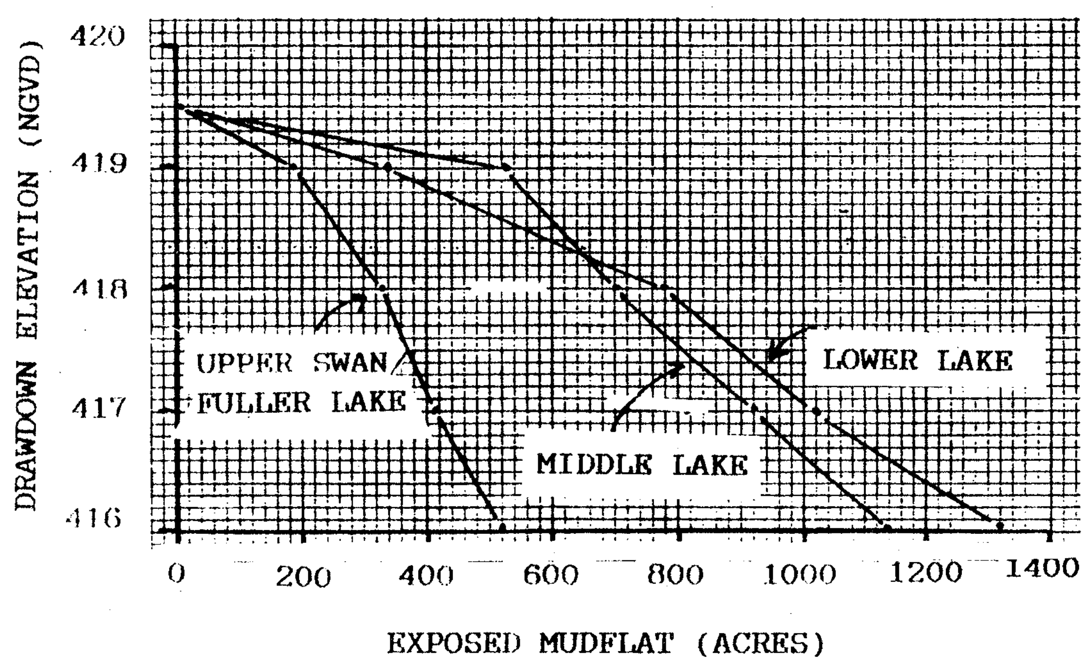


FIGURE P-4

APPENDIX DPR-Q

BIOLOGICAL RESPONSES ANALYSIS

FOREWORD

APPENDIX DPR-Q provides the Swan Lake portion of a [redacted] District plan of analysis for biological responses to HREP projects. This analysis will test various project design assumptions and will serve as an information base from which future site management decisions can be made.

SWAN LAKE HREP
BIOLOGICAL RESPONSES MONITORING
PLAN OF STUDY

1. INTRODUCTION.

The Water Resources Development Act of 1986 (Public Law 99-662) authorized the Upper Mississippi River System Environmental Management Program (UMRS-EMP). A major component of that program is the Rehabilitation and Enhancement Projects (HREPs). The purpose of the HREPs is to plan, construct, and evaluate measures for fish and wildlife habitat improvement.

The ultimate responsibility for demonstrating the success or failure of HREPs rests with the Corps of Engineers. Both the Comprehensive Master Plan, and the UMRS-EMP authorizing legislation, includes an evaluation component in the habitat project element. Coupled with this, is the recognition that the Long Term Resource Monitoring (LTRM) element of the UMRS-EMP derives scientific benefits from a close association with HREPs. In addition to evaluations of the desired physical and chemical outputs of all HREPs, the Corps' North Central Division has instructed that at least two projects within each Corps District be selected for the programmatic analysis of biological outputs.

The programmatic analysis is to attain this goal by conducting investigations to determine the validity of assumptions used in designing these projects. The analysis is to focus on project features that will provide feedback on design criteria for future projects throughout the UMRS. Responsibilities for the analysis are divided between the Corps District and the USFWS.

2. SITES SELECTION.

The St. Louis District, in consultation with its UMRS-EMP partners (IDOC, MDOC and USFWS) selected two HREPs to be analyzed for their impacts on target UMRS biota. The two projects selected within the District are Swan Lake and Pharrs Island. These proposed HREP projects include different habitat management measures, intended to resolve different types of existing habitat problems.

Swan Lake was selected because (1) it is among the first large-scale habitat restoration projects conceived to address widely recognized concerns over sedimentation and deterioration of backwater habitats in the Illinois River Valley, (2) the compatibility of waterfowl and fisheries concerns was an important and contentious issue in the conception and design of this project, (3) the recognized regional importance of this area to fish (as spawning, rearing and overwintering habitat) and waterfowl (as feeding and resting habitat)--comprising 10 percent of all Illinois River backwater habitat, and 40 percent of all Pool 26 backwater habitat, and (4) the projects' compartmentalization provides a unique experimental opportunity to study the effects of various water regimes on fish and waterfowl.

3. PLAN DEVELOPMENT.

The District's general plan for the analysis of biological responses to the Swan Lake HREPs was an interagency effort that included input from (1) fisheries and wildlife cooperative research laboratories at Southern Illinois University-Carbondale, (2) fisheries assistance, refuge, ecological services, EMTC and LTRM field station personnel, (3) fisheries division and planning division personnel from IDOC, and (4) staff of the St. Louis District.

4. SWAN LAKE HREP.

(1) Introduction.

(a) Location.

The project area is located adjacent to the west bank of the Illinois River between river miles 5 and 13. The project area includes 2,900 acre Swan Lake, 200 acre Fuller Lake, and 950 acres of bottomland forest and 550 acres of cropland surrounding these lakes.

(b) Resource Problems.

Sedimentation, water level fluctuations, and wind induced wave action have severely degraded the habitat value of Swan Lake. Sedimentation (from river and local hillside) is causing a rapid conversion of aquatic habitat to terrestrial habitat with a resulting long-term quantitative loss of fish and waterfowl habitat. Fluctuating water levels at the site have impacted the productivity of the site via effects on fish spawning, rearing and wintering, and on the production of plants and their availability to waterfowl. Wind-generated wave action has caused high turbidity levels that have limited aquatic plant production at the site.

(c) Proposed Project.

The project includes: (1) a riverside dike/levee, to retard the deposition of river sediment, and to reduce the influence of river stage fluctuations, (2) an interior lake closure to subdivide the lake's refuge into independently managed compartments, (3) water and sediment control basins and ponds to reduce sediment from the hillside, (4) island groups to reduce turbidity levels, by serving as barriers to wind-generated wave action, (5) a gated corrugated metal pipe at upper Swan/Fuller Lake, and a combination sluice gate/stop-log structure with an open-top channel between river and lake in both the middle and lower lake compartments, to help regulate water levels and allow for fish passage, (6) couch pumps would be provided to meet compartment recharge and dewatering needs, and (7) boat access would be provided to mitigate for impacts to existing access areas.

(d) Proposed Site Management.

In the future, upper Swan/Fuller Lake would be managed similar to the way it has been managed in the past. It would be managed intensively to provide habitat for migratory waterfowl, especially dabbling ducks. However, with a favorable response by submerged aquatics, the magnitude of drawdown may be less than 2 feet on a given year. As of January each year (Figure 1), the sluice gate would be in a closed position with interior water elevations fluctuating in response to seepage and local runoff. In late June, the gate would be closed and the interior water levels would be lowered gradually using a pump. A maximum drawdown for management purposes in this unit would be elevation 417.5 NGVD, at which point approximately 60 percent of the bottom surface area would be exposed. This drawdown will permit the germination and growth of natural or aerially seeded plants beneficial to waterfowl (primarily dabbling ducks). About mid-September, water levels would be raised as quickly as possible (normally taking about two weeks). This flooding would allow plant seed heads to remain above water and available to waterfowl. The unit would be recharged, as needed, during the remainder of the waterfowl migration season. Although management practices in Fuller Lake largely preclude its year-round use by fish, it may still have some utility as a spawning/nursery area for river fishes.

The manner in which the refuge compartments are managed for waterfowl and fish during the post-construction period has been the focus of considerable discussion between agencies. There is general agreement that the project, as designed, will provide the flexibility needed for achieving significant

UPPER SWAN/FULLER LAKE--DESIRED ANNUAL WATER LEVELS

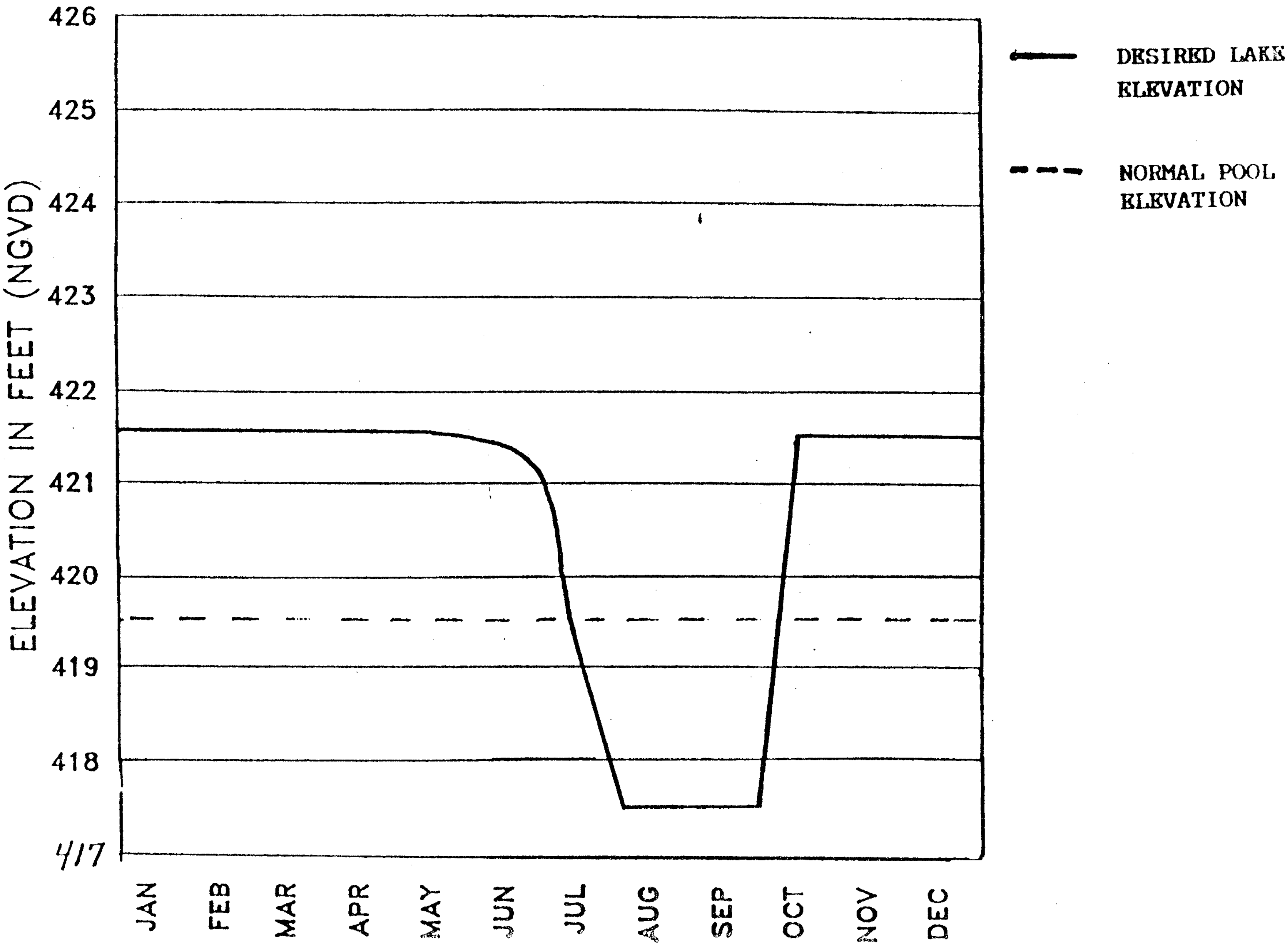


FIGURE -1
Q-3

biological benefits at the site; however, there is uncertainty on the specific details for a long-term site water regulation plan (i.e., particularly with regard to the timing of gate opening and closing). This problem stems primarily from a lack of information on the timing of fish movements into and out of river backwater areas. The exact response of waterfowl at the site to various water regimes is also somewhat speculative. Agency biologists agree that biological response studies should be implemented during the early years of the project to access the biological impacts of various water manipulations. With the benefit of this new knowledge, the fine tuning of a long-term refuge water management plan will be possible.

The short-term management approach calls for operating the deeper middle Swan Lake compartment primarily for waterfowl (particularly diving ducks). The plan calls for an annual partial drawdown (about 0.5 feet), exposing about 10 percent of the lakes's bottom substrate. This water level change should promote the growth of moist-soil and emergent vegetation along the lake margin, and submergent aquatic vegetation on the lake's interior.

The lower lake compartment would be managed at a nearly constant normal pool elevation (419.5 NGVD) on a year-round basis. The gates would be generally left open to the river based on the needs of fish to access the lower compartment for overwintering and reproduction (except during periods of impending floods and for bottom consolidation). In this manner, the lower compartment would be managed primarily for fisheries' benefits but should also provide some benefits to resting and feeding waterfowl.

Bottom solidification would occur at approximately 8 to 10 year intervals. Each of the three compartments would be drained as low as possible on a rotational basis to solidify the lake bottom. This will enhance the rooting of aquatic macrophytes and improve water clarity, which will further enhance the quality of the reflooded habitat for waterfowl, fish, invertebrates, and other species.

Thus, during the early post-construction period, Swan Lake will provide three distinctly different experimental management treatments based on water regulation requirements. Each unit will be managed with varying intensity for migratory waterfowl and fish. Upper Swan/Fuller Lake will function much like the Illinois River floodplain prior to extensive flood-control and levee construction that has occurred on the river. Floodplain inundations historically provided important sources of organic matter, spawning and nursery habitat for river fishes following spring thaw, and moist-soil feeding habitat for waterfowl. The middle Swan Lake compartment will behave similarly to a backwater that is periodically isolated from the river during periods of low flow. Such backwaters are thought to provide overwintering habitat, spawning and nursery habitat, and contribute to river fish populations. Waterfowl will benefit primarily through provision of moist-soil and submergent aquatic feeding habitats. The lower compartment of Swan Lake will function as a backwater lake normally connected to the river. It should provide the same benefits to fish as the middle compartment, but to a greater degree. There will likely be larger areas of submerged aquatic and deepwater habitats that will be used as feeding and resting sites for waterfowl. The above described water regimes will be maintained throughout the duration of the biological monitoring studies. Only minor short-term adjustments in water control structure use will be employed in order to assess certain test assumptions.

(e) Project Outputs.

If the proposed project (see map) performs as anticipated, it would eliminate approximately 60 percent of future sediment deposition into the lake. This reduction would enhance the longevity and productivity of the lake as fish and waterfowl habitat. The dike/levee, closures, gated structures and pumps, would provide a significant degree of water control. This control should enable a greater productivity and availability of food plants and associated invertebrates for migratory waterfowl. Cover for fish will also increase in response to water control. Water control will provide the ability to solidify the lake bottom, and this will stimulate increased plant production. The dike/levee will provide a barrier against cold water intrusion. The subdivision of the lake into multiple units would allow for increased habitat diversity. The islands will reduce the wave action that presently limits plant photosynthesis and plant anchorage.

(f) Construction Schedule.

Major construction efforts would not start before March of 1993.

(2) Design of Analysis for Biological Responses

(a) General Approach.

Consistent with the goals and objectives of the UMRS-EMP, there is a need to evaluate and monitor biological responses to the implementation of the Swan Lake project. Waterfowl and fish population conditions need to be established before and after project completion to ascertain the project's success. Post-project compartmentalized management provides a unique experimental opportunity to study the effects of various water level management scenarios on aquatic habitats, fisheries, and wildlife. Sound scientific data are critical to the development of long-term water level management strategies that will maximize the site's benefits to waterfowl and fish.

In addition to its site-specific implications, the results of such studies will have broad implications for future habitat restoration and enhancement projects in the UMRS. There have been few integrated studies of habitat, waterfowl, and fisheries responses to water level manipulations. Monitoring and evaluation of the Swan Lake restoration project provides a unique opportunity to address the compatibility of management for waterfowl and fisheries in shallow riverine wetlands of the UMRS.

Work needed to monitor and evaluate the Swan Lake HREP will not supplant LTRM conducted activities in the project area. LTRM data will provide useful baseline and post-project data necessary to evaluate some project impacts. Planning of data collection, analysis, and reporting will consider and incorporate information that is available through the LTRM program.

The primary goals of the Swan Lake analysis of biological responses are:

- Evaluate effects of project implementation and the three water level management regimes on fish community responses and recruitment of riverine fish populations.

- Evaluate the response of waterfowl (and other wetland birds) to habitat changes that occur before and after project implementation, and as a result of water level manipulations.

- Evaluate aquatic vegetation and invertebrate responses to project implementation and water level management before and after project implementation.

- Utilize results from these studies to develop integrated water control strategies that will maximize benefits to fish and wildlife populations at this HREP project and for future EMP projects in the Upper Mississippi River Basin.

To the maximum extent possible, the procedures employed in the analysis will be consistent with those described in the LTRM procedures manual.

(b) Products.

Products of the biological response analysis that will have site-specific (overall project and individual compartments) and/or system-wide application are:

- -Changes in fish community
- -Changes in fish population structure
- -Differences in fish habitat utilization
- -Changes in lake/river fish movement
- -Influence of Type of water control structure on fish movement
- -Overwintering habitat suitability and use by fish
- -Changes in presence and abundance of special interest wetland bird species
- -Changes in waterfowl movement and habitat use patterns
- -Changes in availability and distribution of aquatic vegetation
- -Changes in vegetation structure, taxonomic composition, biomass and production
- -Changes in aquatic invertebrate taxonomic composition, size distribution and biomass
- -Water level management strategies

(c) Experimental Design.

Experimental design of the monitoring effort will follow a series of assumptions to be tested. A series of initial assumptions, analysis objectives, sampling procedures, products, schedule and costs, and implementation source are identified below. Information obtained in the analysis effort may allow testing of additional assumptions. The specific experimental designs (sampling locations, number of samples, number of replicates, data analysis techniques, etc.) will be developed by the District's interagency study team and will subsequently undergo technical review by the EMTC. A summary of the tasks, estimated costs (including design), and schedule are displayed in TABLE 1.

(d) Relationship to Project Performance Evaluation.

The biological problems at Swan Lake are primarily related (directly or indirectly) to sedimentation and water level fluctuations. In interpretating biological changes observed at Swan Lake, it will be necessary to focus on the physical and chemical processes that caused those changes. Attachment 1 indicates various parameters that will be assessed as part of the project performance evaluation. This evaluation will include various field observations and quantitative measurements. Quantitative measurements will include such things as sediment deposition rate, continuous records of lake and river water level changes and water quality readings. In addition, various supplemental physical/chemical characteristics will be determined during the execution of the response studies per se. These characteristics are described in general terms in the proposal section dealing with assumptions to be tested.

(e) Unanticipated Events Impacting on Experimental Design.

Field work on the river is rarely predictable. Atypical water years ruin even the simplest and well-conceived experiments. For this reason, experimental designs for testing hypotheses over multiple years may need to be modified in view of unanticipated events. Annual meetings of the HREP research/planning team will be held for the purpose of evaluating annual success/failure and associated needs (if any) for modifications to study design.

At least some historical data relating to baseline biological conditions does exist for the Swan Lake project. If in the FY 92 pre-project year, data collection is severely disrupted by an unanticipated event, historical data will be used as the basis for comparing to with-project biological conditions.

Since multiple years of analysis are planned for the post-project conditions, the threat of a totally catastrophic study situation is less likely.

(2) Assumptions to be Tested:

GOAL 1: FISHERIES RESPONSES

ASSUMPTION 1 - FISH COMMUNITY DIVERSITY WITHIN OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 2 - FISH COMMUNITY DIVERSITY WILL DIFFER BETWEEN LAKE COMPARTMENTS

<u>Objective 1</u> - To evaluate the overall Swan and Fuller Lake fish community structure response to project implementation and to post-project water level management plans for each of the three compartments. This fishery objective was given fourth priority by the interagency team.

<u>Procedure</u> - Sampling methods will be consistent with those procedures for community analysis described in the fisheries chapter of the LTRM procedures manual. However, at least some modification of methods are likely to meet site-specific conditions. The target group is sediment-sensitive fishes. Multiple capture gears (e.g., electrofishing, seines, fyke nets and minnow fyke nets) will be used at sample site locations in all three lake compartments. Results of captures will be used to estimate species relative abundance, and total species present, using standard modeling techniques. Accessory physical and water quality measurements made after sampling include water temperature, transparency, water velocity and water depth.

<u>Products</u> - Estimates of species relative abundance and total species present for overall project area and for individual compartments. Comparison of Swan Lake fish community composition to other Illinois River backwater lakes. Compare fish community characteristics pre- and post-project, and between compartments to determine responses to different water level management practices.

<u>Schedule and Costs</u> - Field sampling for fisheries objectives 1-3 is during the months of March - November for one pre-project and three post-project years. Data analysis and reports are due by end of each FY, and a final summary report is due at the completion of the overall analysis. Team originally estimated implementation of this objective at $217,000. This did not take into account the cost efficiencies of accomplishing fisheries objectives 1-3 at the same time using the same field crew. LTRM-field station estimates objectives 1-3 can be accomplished for about $289,000. The cost for objective 1 is estimated to be about $102,000.

<u>Implementation</u> - District recommends that LTRM-field station in coordination with USFWS-Fisheries Assistance Office, Carterville, IL, perform the work under the administration of the EMTC.

ASSUMPTION 3 - POPULATION STRUCTURE WITHIN OVERALL PROJECT AREA WILL CHANGE TO REFLECT SUCCESSFUL REPRODUCTION AND RECRUITMENT

ASSUMPTION 4 - POPULATION STRUCTURE WILL DIFFER BETWEEN LAKE COMPARTMENTS TO REFLECT SUCCESSFUL REPRODUCTION AND RECRUITMENT

<u>Objective 2</u> - To determine differences in population age and size structure to access fish reproduction and recruitment with and without the project, and under three different water management regimes. This fisheries objective was given third priority.

Procedure - The indicator or target species for determining age and size structure is the black crappie and/or other species to the extent that data collection permits. Multiple capture gears (e.g., electrofishing, fyke nets, and seines) will be used at sample site locations within the lake compartments. Total length and weights will be obtained for the target species. Accessory physical and water quality measurements made after sampling include water temperature, transparency, water velocity and water depth.

Products - Length and age frequency distribution curves, estimates of recruitment rates, estimates of growth rates, comparison of population structure information on Swan Lake to other Illinois River lakes. Pre- and post-project comparisons and between compartment comparisons will be made.

Schedule and Costs - Field sampling for fisheries objectives 1-3 is during the months of March - November for one pre-project and three post-project years. Data analysis and reports are due by end of each FY, and a final summary report at the completion of the overall analysis effort. Assuming fisheries objectives 1-3 can be accomplished for $289,000, objective 2 is estimated to cost $110,000.

Implementation - District recommends that LTRM-field station in coordination with USFWS-Fisheries Assistance Office, Carterville, IL, perform the work under the administration of the EMTC.

ASSUMPTION 5 - DIFFERING PLANT DISTRIBUTION PATTERNS BETWEEN COMPARTMENTS WILL RESULT IN DIFFERENTIAL HABITAT UTILIZATION BY FISH

Objective 3 - To determine relative habitat utilization of fish under different patterns of aquatic plant distribution (moist soil, shallow emergent, submergent, and open water) created by the three water management regimes. The interagency team gave this objective fifth priority as a fisheries objective.

Procedure - Data gathered for fisheries objectives 1 and 2 would be related to specific vegetational cover types within each lake compartment.

Products - Comparison of community and population characteristics versus vegetational cover types.

Schedule and Costs - Field sampling for fisheries objectives 1-3 is during the months of March - November for one pre-project and three post-project years. Data analysis and reports are due by end of each FY, and a final summary report at the completion of the overall analysis effort. Assuming fisheries objectives 1-3 can be accomplished for $289,000, objective 3 is estimated to cost $78,000. District recommends that this lower priority objective not be pursued, as it is not closely related to the original objectives for the project.

Implementation - Not applicable, or else funding from a non-Federal source.

ASSUMPTION 6 - AMOUNT OF LAKE-RIVER FISH MOVEMENT FOR THE OVERALL PROJECT AREA WILL CHANGE

ASSUMPTION 7 - AMOUNT OF LAKE-RIVER FISH MOVEMENT WILL DIFFER BETWEEN THE THREE LAKE COMPARTMENTS

Objective 4 - To quantify the movements of larval, juvenile, and adult fish between the three lake compartments and the river. This fisheries objective was given second priority.

Procedure - The procedure employed would be one proposed by SIU-C as part of its DJ study of overwintering riverine fishes. Three approaches would be used to determine when fish movement occurs. Radio tags will be implanted in 12 adult fish of each of three target species yet to be determined. Movements would be tracked intensively during the fall and spring and periodically during the winter. The second approach would utilize fyke nets and larval fish collecting nets at the water control structures to determine direction of movement. In addition to the fyke nets, gravel spawning sites would be constructed to attract largemouth bass and sunfish into the monitoring site. Milk cans would be used to attract channel catfish. Periodic observations of the artificial spawning sites would be used to determine when spawning movements occur. For buffalo spp., gonado-somatic indices would be calculated to determine the time of spawning. Spawning temperatures are known for other species, so river temperatures would be monitored to determine the time of spawning for these species.

Products - Information on emigration and immigration of selected fish species between each lake compartment and the river.

Schedule and Costs - Field sampling and laboratory data collection for fisheries objectives 4 and 5 would be during would be during the months of March - June and October - January for three post-project years. Data input, analysis and reports are due by end of each FY, and a final summary report is due at the completion of the overall analysis effort. Cost is estimated to be about $78,000. Recommend DJ funding be pursued by SIU-C for this item. If not funded by DJ, recommend Goal 3 work objectives be eliminated and resulting funding savings be diverted to this fisheries objective.

Implementation - SIU-C under administration of EMTC.

ASSUMPTION 8 - TYPE OF WATER CONTROL STRUCTURE WILL INFLUENCE EXTENT OF LAKE-RIVER FISH MOVEMENT

Objective 5 - To compare and contrast the movements of fishes through different water control structures (stop-log versus sluice gates). This would include not only comparing the two types of structures directly, but examination of other variables, such as open versus covered channel tops, elevation of control structures above the substratum, and the effect of an outward water flow. This fisheries objective was given first priority.

Procedure - Utilize radio tag, and mark and recapture methods to track the movement of selected fish species through the various types of water control structures. Elevations would be based on the same premises and methods of data collection used in determining fish migration. Water control structures will be manipulated to evaluate their effects on fish movement.

Products - Information on emigration and immigration of selected fish species through various water control structures.

Schedule and Costs - Field sampling and laboratory data collection for fisheries objectives 4 and 5 would be during would be during the months of March - June and October - January for three post-project years. Data input, analysis and reports are due by end of each FY, and a final summary report is due at the completion of the overall analysis effort. Cost is estimated to be about $78,000.

Implementation - Recommend SIU-C perform the work under administration of EMTC.

ASSUMPTION 9 - SUITABLE OVERWINTERING HABITAT FOR FISHES WITHIN THE OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 10 - AVAILABILITY OF OVERWINTERING HABITAT FOR FISHES WILL DIFFER BETWEEN THE LAKE COMPARTMENTS

Objective 6 - To determine the quantity and quality of overwintering habitat for fishes, and to determine the actual use of the projects deepwater habitats. While inadvertently not rated, this is a top priority objective.

Procedure - Map aerial extent of deepwater wintering habitat in the project area using depth soundings. Make qualitative measurements of current velocity, water temperature and dissolved oxygen. Literature on habitat preferences would be evaluated to define suitable habitat. Fish presence would be determined using deepwater electrofishing and trap netting techniques.

Products - Maps of winter habitat conditions, and locations of actual fish wintering based on active sampling.

Schedule and Costs - Field data and laboratory data collection during months of December through March for a total of three years of study. Data input, analysis and interpretation to be furnished at end of each FY with a final report at the completion of the overall effort. Cost for this objective is estimated to be about $40,000.

Implementation - Recommend SIU-C perform the work under administration of the EMTC.

GOAL 2: WILDLIFE RESPONSES

ASSUMPTION 11 - TOTAL NUMBERS AND SPECIES COMPOSITION OF WATERFOWL USING OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 12 - RELATIVE NUMBERS OF DABBLER VERSUS DIVING DUCKS USING EACH LAKE COMPARTMENT WILL DIFFER

Objective 1 - To compile and collect pre-project data on the distribution and abundance of waterfowl for comparison with the results of monitoring and evaluations conducted after project implementation. This wildlife objective was given first priority.

Procedure - Would utilize existing INHS aerial waterfowl flight census survey. Baseline data collection would separate counts into refuge area and upper Swan/Fuller area counts. During post-construction period, counts would be separated for lower Swan, middle Swan and upper Swan/Fuller lake compartments. Waterfowl counts would identify to the species level.

Products - Species specific waterfowl counts for each lake compartment.

Schedule and Costs - Waterfowl counts would be made for two pre-project and 3-4 post-project years. Censuses are flown twice in early September, weekly during fall migration (mid-October to mid-December), once in early January, and weekly during spring migration (late February to mid-April). Estimated cost is $16,000.

Implementation - Recommend INHS perform the work, under the administration of the EMTC. However, this element will be funded as part of the project performance evaluation under a separate agreement with the EMTC.

ASSUMPTION 13 - PRESENCE AND ABUNDANCE OF SPECIAL INTEREST WETLAND BIRD SPECIES WITHIN OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 14 - THE PRESENCE AND ABUNDANCE OF SPECIAL INTEREST WETLAND BIRD SPECIES WILL DIFFER BETWEEN LAKE COMPARTMENTS

Objective 2 - To determine the presence, relative abundance, and habitats used by special interest wetland birds (e.g., colonial nesting birds, shore birds, Federally endangered bald eagles, etc.). This wildlife objective was given second priority.

Procedure - Not determined.

Products - Not determined.

Schedule and Costs - Cost not determined. District recommends this objective not be funded, as it is not closely linked to the original project objectives.

Implementation - Not applicable, or else funding from a non-Federal source.

ASSUMPTION 15 - WATERFOWL MOVEMENTS, HABITAT USE, AND BEHAVIOR PATTERNS FOR OVERALL PROJECT AREA WILL IMPROVE

ASSUMPTION 16 - WATERFOWL MOVEMENTS, HABITAT USE, AND BEHAVIOR PATTERNS WILL DIFFER BETWEEN THE THREE LAKE COMPARTMENTS

Objective 3 - To determine effects of project implementation on movements, habitat use patterns, and time budgets of waterfowl in relation to habitat changes that occur within the overall project area, and under different water level management strategies in each of the three lake compartments. This wildlife objective was given third priority.

Procedure - Weekly ground surveys will be conducted during fall and spring migrations. Analysis of relative use and abundance of dabblers and divers in relation to vegetation and invertebrate distribution and abundance in each of the lake compartments.

Products - To determine relative use by divers and dabblers pre- and post-project, and between compartments. Habitat use and time budgets will be measured weekly.

Schedule and Costs - Two years pre- and 2 years post-construction data collection. Collection in months of October/November and March/April. Cost is estimated at $80,000.

Implementation - Combination LTRM-Field Station and SIU-C effort under administration of the EMTC.

GOAL 3: VEGETATION/INVERTEBRATES RESPONSES

ASSUMPTION 17 - AVAILABILITY AND DISTRIBUTION OF AQUATIC VEGETATION WITHIN OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 18 - AVAILABILITY AND DISTRIBUTION OF AQUATIC VEGETATION WILL DIFFER BETWEEN LAKE COMPARTMENTS

Objective 1 - To evaluate changes in the availability and distribution of aquatic vegetation (moist soil, shallow emergent/submergent) as habitat, before and after project completion, and in relation to water level manipulations in the three compartments. This vegetation/invertebrate objective was given first priority.

Procedure - Aerial photography, transect site selection, ground truthing, GIS mapping, reference collections, permanent marker placement, quality assurance will be in accordance with LTRM procedures. LTRM procedures manual for vegetation monitoring will apply. Water level fluctuations data will be made available by the District as part of the Swan Lake Project Performance Evaluation data gathering effort.

Products - Vegetation distribution maps, and records of plant availability.

Schedule and Costs - Field habitat mapping would take place during the months of July-August for one pre-project year, and for post-project years 3 and 4. Analysis and reports are due by end of FY. Estimated cost is $71,000. Cost would be covered by planned LTRM-Trend Analysis effort.

Implementation - Work would be performed by the LTRM-Field Station under the management of the EMTC.

ASSUMPTION 19 - VEGETATION COMMUNITY, IN OVERALL PROJECT AREA WILL IMPROVE

ASSUMPTION 20 - VEGETATION BIOMASS AND PRODUCTION IN OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 21 - VEGETATION COMMUNITY WILL DIFFER BETWEEN THE THREE LAKE COMPARTMENTS

ASSUMPTION 22 - VEGETATION BIOMASS AND PRODUCTION WILL DIFFER BETWEEN THE THREE LAKE COMPARTMENTS

Objective 2 - To measure differences in vegetation community, biomass, and production within wetland habitats (moist soil, shallow emergent, submergent, deepwater) before and after project completion, and in relation to water level manipulations in the three compartments. This vegetation/invertebrate objective was given second priority.

Procedure - LTRM procedures manual for vegetation monitoring would apply. Existing LTRM Swan Lake transect site for trend analysis would serve also for HREP monitoring needs. After project completion, additional transects would be included in both the middle and upper Swan/Fuller lake compartments.

Products - Measurements density, dominance, frequency, importance, value, and biomass.

Schedule and Costs - Field and laboratory work to take place during the months of August for one pre-project year, and post-project years 3 and 4. Analysis and reports are due by end of FY and a final summary report at completion of overall analysis effort. Total estimated cost is $50,000. Recommend 50 percent SLD ($24,000) and 50 percent LTRM-Trend Analysis contribution.

Implementation - Recommend LTRM-Field Station perform the work under management of the EMTC.

ASSUMPTION 23 - AQUATIC INVERTEBRATE BIOMASS WITHIN OVERALL PROJECT AREA WILL INCREASE

ASSUMPTION 24 - AQUATIC INVERTEBRATE TAXONOMIC COMPOSITION, WITHIN OVERALL PROJECT AREA WILL IMPROVE

ASSUMPTION 25 - AQUATIC INVERTEBRATE TAXONOMIC COMPOSITION, WILL DIFFER BETWEEN THE THREE LAKE COMPARTMENTS

ASSUMPTION 26 - AQUATIC INVERTEBRATE BIOMASS WILL DIFFER BETWEEN THE THREE LAKE COMPARTMENTS

Objective 3 - To measure and compare changes in biomass, taxonomic composition, and size distribution of aquatic invertebrates important to larval fishes and waterfowl (zooplankton, benthic, and other macroinvertebrates) among wetland habitats in each compartment before and after project implementation. This vegetation/invertebrates objective was given third priority.

Procedure - Standard methods for the collection of benthos, epiphytic invertebrates, and plankton would be conducted on the vegetation transects. Two collections, spring and fall.

Products - Measurements of density, distribution and biomass.

Schedule and Costs - Field and laboratory work to take place during the months of March/April - October/November for one pre-project year, and post-project years 3 and 4. Analysis and reports are due by end of FY and a final summary report at completion of overall analysis effort. Estimated cost is $71,000.

Implementation - Recommend LTRM-Field Station in coordination with SIU-C to perform the work, with administration by the EMTC.

GOAL 4: MANAGEMENT STRATEGIES

ASSUMPTION 27 - A WATER LEVEL MANAGEMENT STRATEGY CAN BE DEVELOPED FOR THE PROJECT THAT MAINTAINS ECOLOGICAL FUNCTIONS AND MAXIMIZES BENEFITS TO FISH AND WATERFOWL

Objective 1 - To formulate integrated water level management strategies that maintain ecological functions of Fuller and Swan Lakes, and optimize benefits to fish and wildlife populations. This management strategies objective was given first priority.

Procedure - With the benefit of incoming information from the fisheries, wildlife, and vegetation/invertebrate goals, interagency meetings between IDOC, USFWS and the Corps will be held annually (in conjunction with Cooperative Plan Agreement) for the purpose of fine-tuning a long-term refuge water management plan.

Products - An integrated plan will be provided as part of the final biological responses analysis report. Estimated cost is $10,000. Recommend that the funding of this item be accomplished using existing sources of funds for Cooperative Plan Agreement management.

Implementation - District will take the lead for organizing these annual meetings and for reporting the results.

ASSUMPTION 28 - PROJECT'S BIOLOGICAL RESPONSE ANALYSIS RESULTS HAS IMPLICATIONS FOR FUTURE EMP PROJECTS

Objective 2 - To develop recommendations for implementation of future EMP projects in the UMRS. This management strategies objective was given second priority.

Procedure - EMTC reviews biological response analyses output and determines the likely implications for the overall UMRS.

Products - EMTC conclusion on system-wide implications.

Schedule and Costs - Recommendations will be provided as part of the final biological responses analysis report. Estimated cost is $10,000.

Implementation - EMTC

TABLE 1 -- ESTIMATED COSTS AND SCHEDULE FOR BIOLOGICAL RESPONSE
MONITORING ACTIVITIES -- SWAN LAKE

EXISTING AUTHORIZATION

Pre-CONSTRUCTION | CONSTRUCTION | YEAR 0 (DRAWDOWN)

1991 | 1992 | 1993 | 1994 | 1995
(Quarters) 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4

TASK NO.	TASK DESCRIPTION	AGENCY	FY91 COST (x 1000) Thru FY97	TOTAL
1.	FISHERIES RESPONSE		202	330
1.1	Fish Community Data Collection	FLD STA	72	102
1.2	Fish Population Structure Data Collection	FLD STA	78	110
1.4	Lake/River Fish Movement Data Collection	SIU-C	0	0
1.5	Fish Movement vs Structure Data Collection	SIU-C	39	78
1.6	Fish Over-wintering Data Collection	SIU-C	13	40
2.	WILDLIFE RESPONSES		55	80
2.1	Waterfowl Counts	INHS	0	0
2.3	Waterfowl Habitat Utilization	FLD STA/SIU-C	55	80
3.	VEGETATION/INVERTEBRATES RESPONSES		66	95
3.1	Vegetation Mapping	FLD STA	0	0
3.2	Vegetation Sampling/ Lab Work	FLD STA	17	24
3.3	Invertebrate Sampling/ Lab Work	FLD STA/SIU-C	49	71

TABLE 1 -- ESTIMATED COSTS AND SCHEDULE FOR BIOLOGICAL RESPONSE
MONITORING ACTIVITIES -- SWAN LAKE

-----EXISTING AUTHORIZATION--------------EXTENDED AUTHORIZATION-----------------

YEAR 0 (DRAWDOWN) | YEAR +1 | YEAR +2 | YEAR +3 | YEAR +4

TASK NO.	TASK DESCRIPTION	AGENCY	FY91 COST (x 1000) Thru FY97	FY91 COST (x 1000) TOTAL	1996 1	1996 2	1996 3	1996 4	1997 1	1997 2	1997 3	1997 4	1998 1	1998 2	1998 3	1998 4	1999 1	1999 2	1999 3	1999 4
1.	FISHERIES RESPONSE		202	330																
1.1	Fish Community Data Collection	FLD STA	72	102																
1.2	Fish Population Structure Data Collection	FLD STA	78	110																
1.4	Lake/River Fish Movement Data Collection	SIU-C	0	0																
1.5	Fish Movement vs Structure Data Collection	SIU-C	39	78																
1.6	Fish Over-wintering Data Collection	SIU-C	13	40																
2.	WILDLIFE RESPONSES		55	80																
2.1	Waterfowl Counts	INHS	12	20																
2.3	Waterfowl Habitat Utilization	FLD STA/SIU-C	55	80																
3.	VEGETATION/INVERTEBRATES RESPONSES		66	95																
3.1	Vegetation Mapping	FLD STA	0	0																
3.2	Vegetation Sampling/ Lab Work	FLD STA	17	24																
3.3	Invertebrate Sampling/ Lab Work	FLD STA/SIU-C	49	71																

TABLE 1 -- ESTIMATED COSTS AND SCHEDULE FOR BIOLOGICAL RESPONSE
MONITORING ACTIVITIES -- SWAN LAKE

EXISTING AUTHORIZATION

PRE-CONSTRUCTION | CONSTRUCTION | YEAR C (DRAWDOWN)

TASK NO.	TASK DESCRIPTION	AGENCY	FY91 COST (x 1000) Thru FY97	TOTAL	1991 (Quarters) 3	4	1992 1	2	3	4	1993 1	2	3	4	1994 1	2	3	4	1995 1	2	3	4
4.	DATA ANALYSIS/REPORTING		0	10																		
4.1	Fisheries Data Analysis	USFWS-FA	See 1.																			
4.2	Waterfowl Data Analysis	INHS	See 2.																			
4.3	Vegetation Data Analysis	FLD STA	See 3.																			
4.4	Invertebrates Data Analysis	FLD STA/SIU-C	See 3.																			
4.5	Summary Data Analysis	ALL	See 1-3																			
4.6	Synthesis Report (Including Management Strategies Eval.)	EMTC/SLD	0	10																		

TABLE 1 -- ESTIMATED COSTS AND SCHEDULE FOR BIOLOGICAL RESPONSE
MONITORING ACTIVITIES -- SWAN LAKE

EXISTING AUTHORIZATION — EXTENDED AUTHORIZATION

(DRAWDOWN) | YEAR +1 | YEAR +2 | YEAR +3 | YEAR +4

1996: 1 2 3 4 | 1997: 1 2 3 4 | 1998: 1 2 3 4 | 1999: 1 2 3 4

TASK NO.	TASK DESCRIPTION	AGENCY	FY91 COST (x 1000) Thru FY97	FY91 COST (x 1000) TOTAL
4.	DATA ANALYSIS/REPORTING		0	10
4.1	Fisheries Data Analysis	USFWS-FA		See 1.
4.2	Waterfowl Data Analysis	INHS		See 2.
4.3	Vegetation Data Analysis	FLD STA		See 3.
4.4	Invertebrates Data Analysis	FLD STA/SIU-C		See 3.
4.5	Summary Data Analysis	ALL		See 1-3
4.6	Synthesis Report (Including Management Strategies Eval.)	EMTC/SLD	0	10

SWAN LAKE -

TABLE 2 - SUMMARY OF COSTS AND MANAGEMENT/IMPLEMENTATION RESPONSIBILITIES FOR THE BIOLOGICAL MONITORING

GOAL	OBJECTIVE	PRIORITY	FISCAL YEAR COSTS 1/ 92	93	94	95	96	97	98	99	ALL YEARS	MANAGEMENT	IMPLEMENTATION
1. Fish Responses	1. Community Structure	4	24	6	0	0	18	24	24	6	102	EMTC	LTRM-FLD STA
	2. Population Structure	3	26	6	0	0	20	26	26	6	110	EMTC	LTRM-FLD STA
	* 3. Habitat Utilization	5	0	0	0	0	0	0	0	0	0	N/A	N/A
	** 4. Movement Lake-River	2	0	0	0	0	0	0	0	0	0	EMTC	SIU-C
	5. Movement Thru Structures	1	0	0	0	0	13	26	26	13	78	EMTC	SIU-C
	6. Over-Wintering	Top	0	0	0	0	0	13	13	14	40	EMTC	SIU-C
2. Wildlife + Responses	1. Waterfowl Count	1	0	0	0	0	0	0	0	0	0	SLD	INHS
	* 2. Wildlife Utilization	2	0	0	0	0	0	0	0	0	0	N/A	N/A
	*** 3. Waterfowl Utilization	3	15	15	0	0	0	25	25	0	80	EMTC	LTRM-FLD STA/SIU-C
3. Veg./ Invert. Responses	**** 1. Veg. avail./ Distrib.	1	0	0	0	0	0	0	0	0	0	EMTC	LTRM-FLD STA
	***** 2. Vegetation Characteristics	2	10	0	0	0	0	7	7	0	24	EMTC	LTRM-FLD STA
	*** 3. Invertebrate Characteristics	3	13	14	0	0	0	22	22	0	71	EMTC	LTRM-FLD STA/SIU-C
	TOTAL FIELD COST		88	41	0	0	51	143	143	39	505		
	SYNTHESIS REPORT (Goal 4)								******	10	10		
	OVERHEAD (5.23%)		5	2	0	0	3	8	8	3	29		
	GRAND TOTAL		93	43	0	0	54	151	151	52	544		

FOOTNOTES:

*	Delete item--not closely tied to original project objectives
**	Proposed for DJ funding at an estimated cost of $78,000; if not approved, funding for post-construction study under objectives 3-2 and 3-3 will be eliminated
***	Objectives 2-3 and 3-3 to be accomplished together to increase cost-efficiency
****	LTRM-Trend Analysis account to cover cost for this objective
*****	LTRM-Trend analysis account to cover one-half cost for this objective
******	Objective to be accomplished using existing O&M funds for cooperative agreement work
+	To be funded by a separate funding agreement under the project performance evaluation account
1/	Based on FY 92 dollars, does not take into account the effects of inflation for post-construction years. Does include start-up costs.

ST. LOUIS DISTRICT
LIST OF CONTACTS FOR HREP MONITORING

Dave Gates	COE
Pam Thiel	EMTC
Ken Labinski	EMTC
Michael Bornstein	FWS
Jim Mattson	FWS
Chuck Davis	FWS
Chuck Suprenant	FWS
Patty Meyers	FWS
Bill Donels	IDOC
Butch Atwood	IDOC
Neal Booth	IDOC
Dave Harper	IDOC
Deck Major	IDOC
Norm Stucky	MDOC
Gordon Farabee	MDOC
David Neuswanger	MDOC
Troy LaRue	MDOC
Bob Sheehan	SIU-C
Robert Gates	SIU-C
Rip Sparks	INHS
Steve Havera	INHS
Chuck Thieling	LTRM-Pool 26 Fld Sta
Rick Wright	LTRM-Pool 26 Fld Sta

APPENDIX DPR-R

REAL ESTATE CONSIDERATIONS

FOREWORD

APPENDIX DPR-R provides the draft real estate requirements for the Swan Lake HREP. The memo recommends the acquisition of certain lands vital to the construction and operation of the proposed project.

ESTIMATED REAL ESTATE REQUIREMENTS - SWAN LAKE EMP PROJECT

1. **Purpose.** The purpose of this report is to recommend acquisition of land which will enable the construction and operation of the Swan Lake Project. This report is for planning purposes only. The final real property acquisition lines and the estimate of value are subject to minor revision after approval.

2. **Background.** The Definite Project Report (DPR) with Integrated Environmental Assessment for this project is pending approval from higher levels of Corps authority. Approval of the DPR will be pending the recommendation of HQUSACE to the Assistant Secretary of the Army (ASA) for FY 92 funding. Approval of these real estate requirements is subject to approval of the DPR requirements. This project has been formulated under the auspices of the Upper Mississippi River System - Environmental Management Program which was authorized by Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662).

3. **Description of the Project.** Swan Lake is located on 2400 acres of the Mark Twain National Wildlife Refuge along the west bank of the Illinois River between river miles 5 and 10. **Exhibit "A"** presents the location of Swan Lake.

This land was acquired by the Corps of Engineers for the Lock and Dam 26 navigation project and is currently managed by the U. S. Fish and Wildlife Service and the Illinois Department of Conservation. This was previously accomplished as part of the General Plan and Cooperative Agreement.

Sediment deposited by floods and upland erosion, and turbidity created by wind action have dramatically reduced the habitat value of this area. Between 1955 and 1985 water fowl use days declined from 21 million to 3 million concomitant with the environmental changes. Quality of the fishery has also declined as the shallower water has allowed higher temperatures and reduced dissolved oxygen concentrations during the summer months.

As addressed in the Master Plan, Design Memorandum No. 3, Navigation Pool 26 (Revised August 1977), the concept of this project would provide for three closure structures to subdivide the lake into three separate management compartments. The two upper compartments would be managed for waterfowl via water control using culverts and pumping facilities. The lower most compartment would be managed for fish and would include a large stop log or similar structure for the egress and ingress of fish to and from the river. Deep water areas would be created within the lower lake to improve water characteristics and to provide a winter fish refuge. Wing dams or islands would be constructed perpendicular to the lake shoreline at appropriate intervals to reduce wave action and to provide shelter for juvenile fish. A low-profile riverside levee would be constructed to reduce river induced sedimentation, and land or water based berms would be constructed as traps for sediments originating from the local watershed. The entire project area would be restored to prime fish and wildlife habitat.

This project has the potential of providing very significant environmental benefits over approximately 3000 acres of lake habitat (including Swan Lake, 2400 acres; and Fuller Lake, 500 acres; plus additional estimated 100 acres to be acquired and provided by FWS for this project). Under existing conditions headwater-flows from the 31-square mile watershed enter Swan Lake and immediately exit into the Illinois River at the lower end of the lake via the natural 2000 foot wide opening. However, under the proposed project, this lower opening will be closed with a rock-covered earthen dike which will separate the lake from the effects of the Illinois River, except when Illinois River stages exceed the crest of the dike. Water control structures would be included in the dike to facilitate management of the elevations in the lake. However, since intense local storms can and do occur independent of flooding events on the Illinois River, lake levels could potentially exceed the water level of the river.

Depending on the managed lake elevation before the storm began and the amount of runoff produced from the storm, the lake level can increase to elevations above which neither the Corps, the Fish and Wildlife Service, nor the Illinois Department of Conservation own in fee title or have easements. Inasmuch as the projected life for this project is 50 years, the St. Louis District has selected the 50-year storm event as the basis for determing the elevation to acquire land rights. The runoff from this event with a starting lake elevation of 421.0 feet (NGVD) produces a 424-foot (NGVD) elevation.

It is important to note that as stated in the DPR: "While there is a chance that property located between elevation 424 feet NGVD (acquisition) and 425.5 feet NGVD (top of levee) could be adversely affected by a rare flood event, these lands will more often benefit from the protection provided by the levees against Illinois River flood flow up to the 2 and 3-year events. The protection provided from both flooding and siltation could outweigh adverse effects from interior flooding. If structures are operated properly during an interior flood event, there should be no adverse effects."

The Swan Lake area is considered to be of such biological importance to the river system that the U. S. Fish and Wildlife Service (USFWS), with the approval of the Illinois Department of Conservation (IDOC), is willing to forego other planned projects in order to implement this particular top priority project.

As noted, one phase of the Swan Lake project includes closing the interior off from the river via a closure structure. This will impact certain private lands adjacent to the west shore of the project. This is true no matter how large or how many water control structures are included in such a closure. With the addition of a closure structure, drainage water retention will require expansion of the present lake impoundment limits. Thus a purchase of land is the only cost effective means of dealing with the problem. As stated above, this will require purchasing any land up to the 424-foot elevation which is lying outside of the current project boundary. Considering an alternative, the cost of constructing a west shore levee barrier would far exceed the cost of fee title purchase of this land.

4. Proposed Acquisition.

a. In order to allow meeting the 424.0 elevation contour limits required for flood purposes, approximately 92.4 cumulative acres of land will be required. Basically, land purchase would include minor sporadic increments of land adjacent to the perimeter of the project boundary, comprising approximately 16 ownerships. Comparatively speaking, this land requirement is equivalent to less than 3% of the overall project size, and is considered an incidental requirement necessary to stave off flood effects anticipated to result from the major achievement of the HREP project purpose. **Exhibit "B"** depicts an overall reflection of the incremental land effects outside the project boundary up to the 424.0 elevation.

Table 1
Increments of Fee Acreage Requirements
Outside Project Boundaries (to 424.0 elevation)

Forest Land		**Openland**
	Upper Lake	
1.5		0.5
5.1		6.8
0.1		1.0
0.2		18.8
5.5		3.0
1.4		2.1
1.7		0.4
0.8		0.5
2.7		1.7
		0.7
	Lower Lake	
2.2		4.0
18.2		11.3
1.4		
0.8		
41.6		**50.80**

ESTIMATED CUMULATIVE ACREAGE TO BE ACQUIRED: 92.4 ACRES

b. **Permanent road easements** will be needed for access to construction sites, and to provide for subsequent operation and maintenance of structures. The majority of land required for access is federally-owned land; however, approximately 4 acres of private land will need to be acquired for roadway easement purposes.

Table 2 presents information on the ownerships and associated acreage. **Exhibit "C"** depicts the general location with a detail of acreage locations.

Table 2
Proposed Acquisition-Swan Lake
Habitat Rehabilitation and Enhancement Project

No. of Tracts (Owners)	Purpose	Cumulative Acreage	Private Estate
16	Flooding	92.4	Fee
2	Access	4.0	Permanent Road Easement

c. Other Real Estate requirements:

(1) As previously stated, the actual Swan Lake area was acquired for the navigation project and is currently managed, under a General Plan Agreement, by the U. S. Fish and Wildlife Service and the Illinois Department of Conservation. Since the proposed Swan Lake EMP project is a 100 percent federal construction cost, a Memorandum of Understanding as opposed to Local Cooperation Agreement will be executed with IDOC/USFWS to include the following:

_a_. All acquisition costs for the project (including the road improvements and/or construction) will be borne by the U. S. Fish and Wildlife Service, with the understanding that total operation and maintenance responsibilities for roads and structures will be borne by IDOC/FWS.

_b_. Use of certain federal lands outside the Corps boundary which are owned by the Department of Interior will be required for permanent easements which will entail the construction and/or improvement of roads located on that land at Corps expense, with the understanding that same will be subsequently operated and maintained by IDOC/FWS.

c. That approximately 20 acres of land owned by the Department of Interior (to be specifically identified prior to agreement) are included in the requirements of outer project boundary limits to meet the 424 elevation for flood purposes.

Exhibit "D-1" contains a brief description of purpose and real estate requirements. **Exhibit "D-2"** - Map highlights required permanent easement areas required for access.

(2) **As for the Hillside areas:** This involves private ownerships to be dealt with through a cost-share agreement with Calhoun County Soil and Water Conservation District (CCSWCD) as non-Federal sponsor, to cover construction cost at the rate of 75% Federal and 25% non-Federal. Lands will be provided at no cost to the Corps via a Local Cooperation Agreement between CCSWCD and SCS.

5. **Acquisition Boundary and Estate Selection.** Land requirements are limited to the minimum amount necessary to provide access and accommodate project purposes. Due to unpredictable river stages, rainfall, and the watershed covering 31 square miles, and given the past flowage easement management-related problems, it is proposed that the perimeter acres of land be acquired in fee. If, however, a more temperate climate is produced with the landowner through acquisition of a flowage easement, this may well be the path to follow in some instances. Table 3 reflects a breakdown of fee acres to be acquired. Although the land costs are based on acquisition in fee, individual appraisal adjustments may be made to apply the value of flowage easement as opposed to the fee at the time of the actual land purchase, as required. The estates to be used are consistent with the estates prescribed in ER 405-1-12, Chapter 5; and are described as follows:

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

Road Easement. A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule "A") (Tract No. - to be assigned) for the location, construction, operation, maintenance, alteration and replacement of a road and appurtenances thereto; together with the right to trim, 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 owners, their heirs and assigns, the right to cross over or under the right-of-way as access to their adjoining land at the locations indicated in Schedule "B"; 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" designated as Tract No.___) (and to maintain mosquito control) in connection with the operation and maintenance of the (name of project), as authorized by the Act of Congress approved_____________________, together with all right, title and interest in and to the structures and improvements now situate on the land, except fencing (and also excepting____(here identify those structues not designed for human habitation which are determined may remain on the land); 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.

6. **Public Law 91-646 Requirements.** The proposed acquisition is not anticipated to displace any persons from their home, business or farm; and all acquisition activities will comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) as amended by Public Law 100-17.

7. **Compliance with the National Environmental Policy Act.** An Environmental Assessment was integrated with the DPR. It was determined that the wetland rehabilitation of Swan Lake would have no significant effects on Federally endangered species or their critical habitat. The proposed land acquisition is considered incidental to project needs; and thus should also have no significant effect.

8. **Compliance with the National Historic Preservation Act.** Again, the Environmental Assessment included with the DPR addresses historic properties. It was determined that due to dense vegetation and the presence of recent alluvial sediment on the ground surface, archeological investigations will occur coincidental with construction related earth moving activities. Construction activities are planned for the land areas proposed for acquisition.

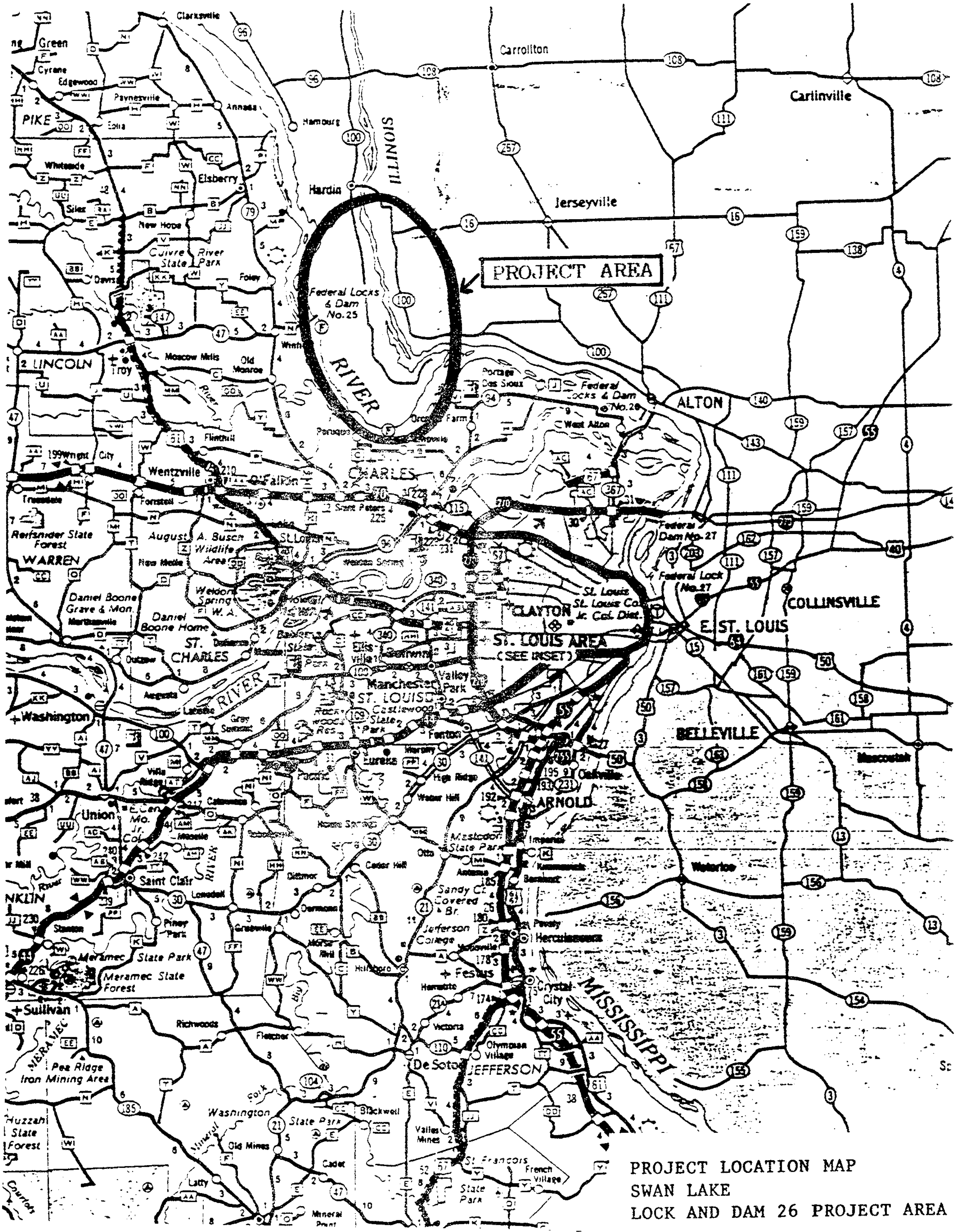
9. **Estimated Costs of Acquisition.** It is estimated that the real property interests can be acquired at a total cost of approximately $300,000. **Table 3 represents a summary of these costs.**

Table 3
Estimate of Costs
Swan Lake Project (HREP)

Lands and Damages:	Acres	Unit Value	Total	
FEE ACQUISITION:				
	92.4	$750/Ac	$69,300	
Improvements	None			
Proximity Damages	None			
Contingencies	25%		$17,325	
Acquisition Costs: (Including Post-Authorization Planning) 16 Ownerships @ $8,000/ea			128,000	
PL 91-646			1,000	
Temporary Permits			3,500	
Engineering Surveys			48,000	
ESTIMATED REAL ESTATE COST-FEE SIMPLE				$267,125
			Say	$267,000
ACCESS EASEMENT:				
Total acreage	4.0	$1000/Ac	$4,000	
Improvements: None				
Proximity Damages: None				
Contingencies 25%			1,000	
Acquisition Costs-2 ownerships x $8,000 ea			16,000	
Public Law 91-646			1,000	
ESTIMATED REAL ESTATE COST - ACCESS EASEMENT				22,000
TOTAL ESTIMATED ACQUISITION (FEE+ACCESS EASEMENT)				**= $289,000**

10. **Schedule of Acquisition.** Contract award has tentatively been scheduled for early FY 92, depending upon the submission and approval of the DPR.

11. **Funding.** Pending approval of the DPR and availability of funds, acquisition will be accomplished by Fish and Wildlife Service, in cooperation with the Corps of Engineers as required.



PROJECT LOCATION MAP
SWAN LAKE
LOCK AND DAM 26 PROJECT AREA

EXHIBIT "A"

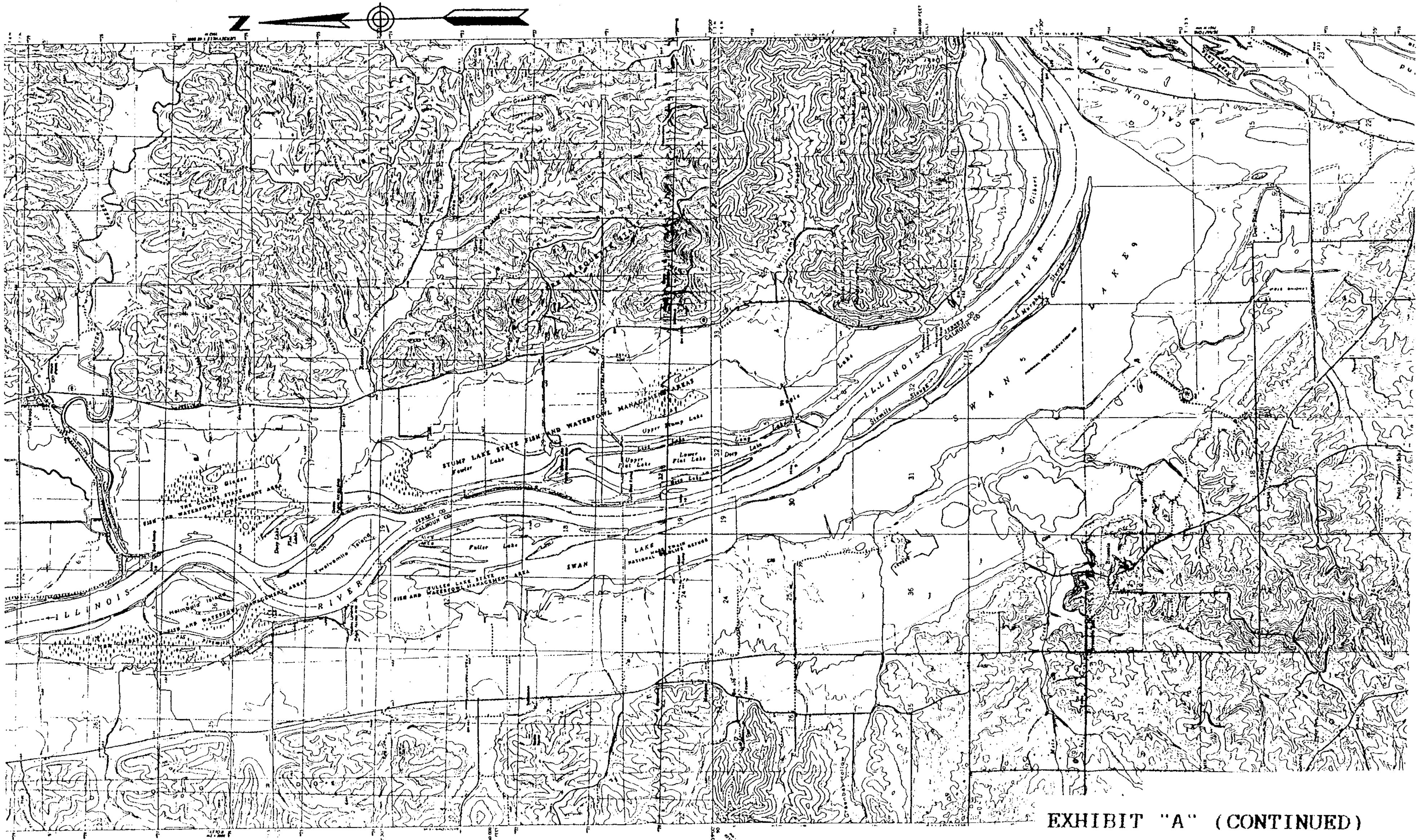


EXHIBIT "A" (CONTINUED)

R-10

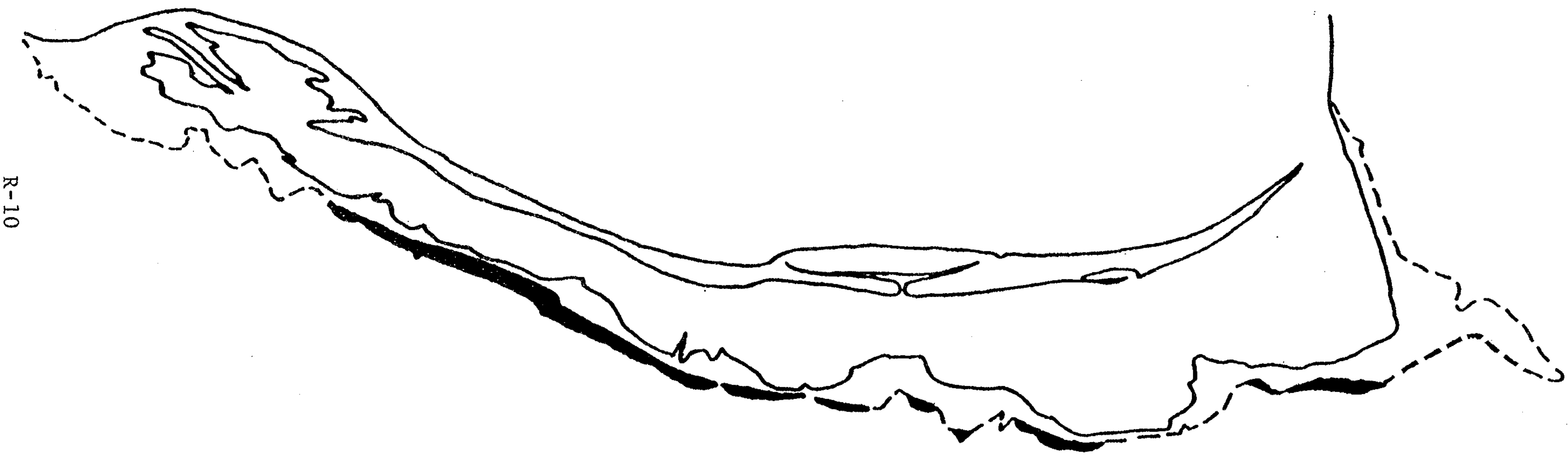


EXHIBIT "B"

PRIVATE LANDS ABOVE 424 NGVD

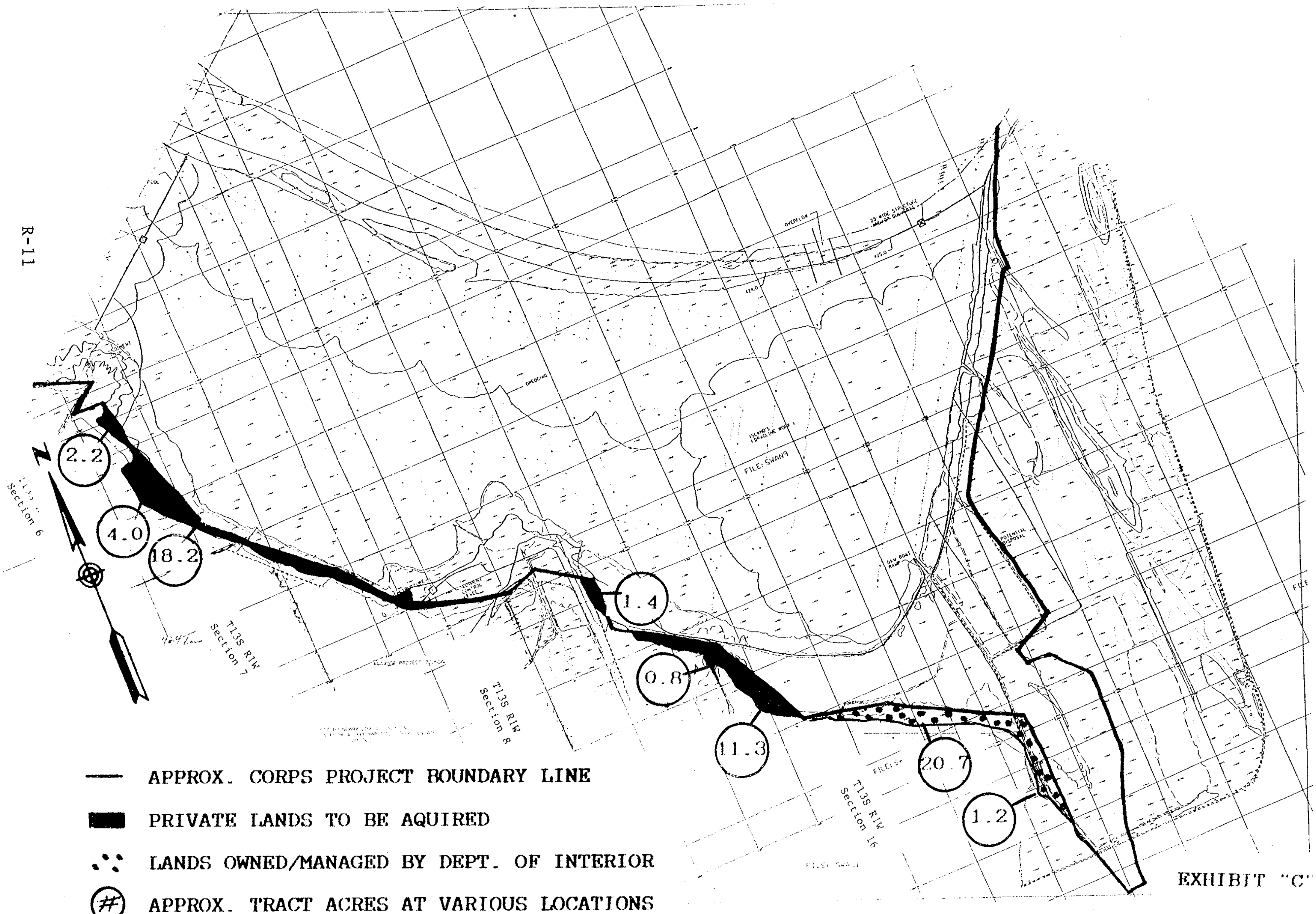
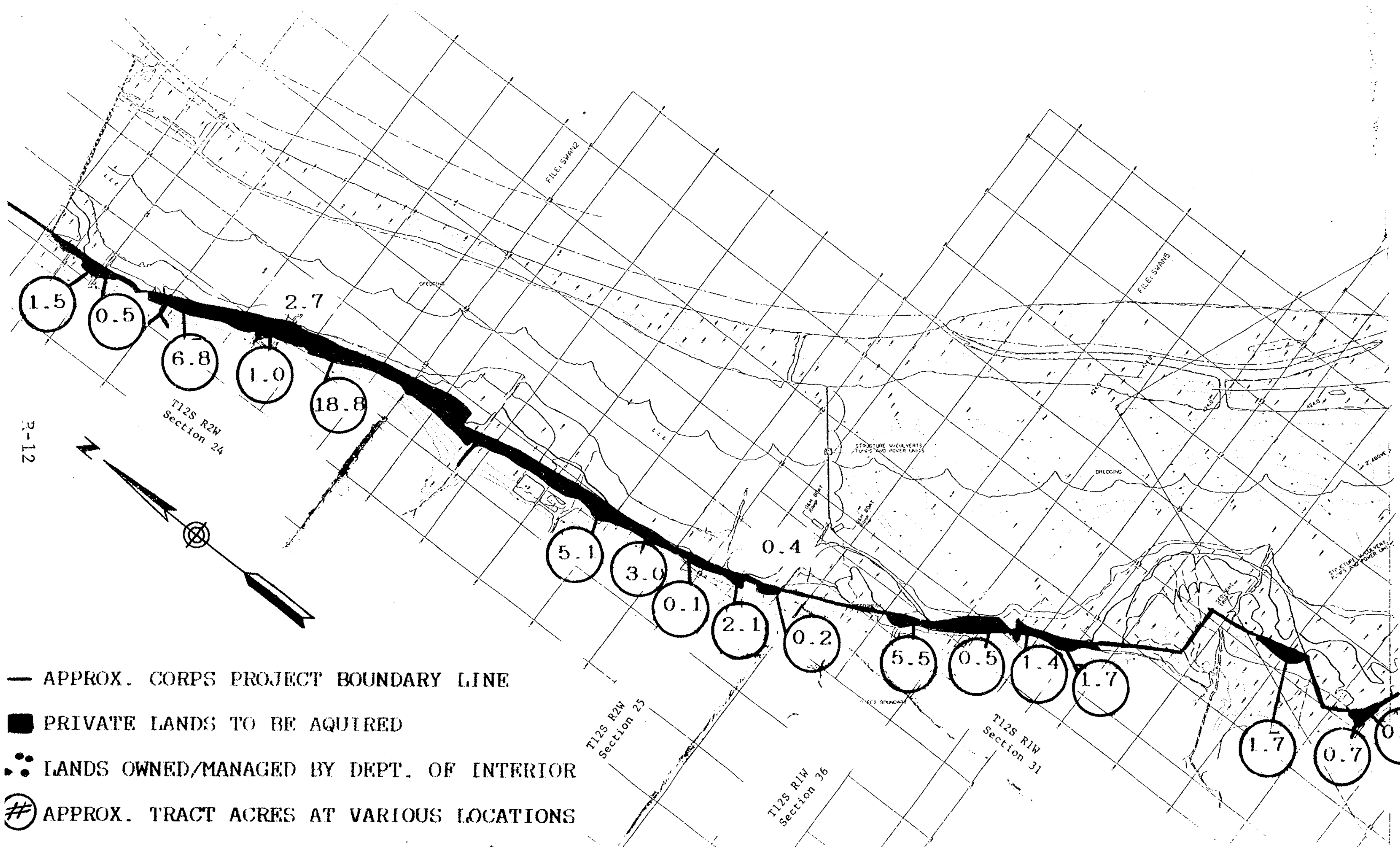

2.2
4.0
18.2
1.4
0.8
11.3
20.7
1.2
N
Section 6
T13S R1W
Section 7
T13S R1W
Section 8
T13S R1W
Section 16
DREDGING
FILE: SWAN9
OVERFLOW
POTENTIAL DISPOSAL
APPROX. CORPS PROJECT BOUNDARY LINE
PRIVATE LANDS TO BE AQUIRED
LANDS OWNED/MANAGED BY DEPT. OF INTERIOR
APPROX. TRACT ACRES AT VARIOUS LOCATIONS

EXHIBIT "C"



P-12

EXHIBIT "C" (CONTINUED)

SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT (HREP)

PERMANENT ROAD ACCESS REQUIREMENTS:

AREA #1 ON MAP:

For the purpose of building a boat ramp in the Upper Swan Lake area, approximately 4300 feet of roadway will be required in Calhoun County, Illinois, T12S R2W, as follows:

a. 2600 feet of **private** road going southeasterly off of a public road bisecting Section 25 and crossing two ownerships. Considering 50-foot width this would equal approximately 130,000 sf, or 3 acres of land interest to be acquired.

b. Thence continuing Eastwardly approximately 1000 feet on the south line of Section 25 on **private** land requiring ownership identification. Considering 50-foot width this would equal approximately 50,000 sf or 1.00 acre of land interest to be acquired.

c. Thence Eastwardly approximately 700 feet on **project land** up to the bank. This land is currently being managed by the U.S. Fish and Wildlife Service (USFWS) and would require a supplement or modification to the current General Plan/Cooperation Agreement.

Considering 50-foot road requirements, the above off-project road requirements would equal approximately 4.00 acres of private land to be acquired for permanent easement to the boat ramp area; with approximately .80 acre additional land existing on project lands.

AREA #2 ON MAP:

A new closure structure is to be built across Swan Lake southwest of Sixmile Slough. This work will be done from the river. As indicated on the map **some land will be required for tie-in purposes.** Although the land required for tie-in is **located on Corps project land, it is managed by the USFWS and will need to be included in the the modification of the General Plan/Cooperation Agreement.**

EXHIBIT "D-1"

AREA #3 ON MAP:

A proposed boat ramp is to be built further south on Swan Lake, but the access road and extention road to be built are **located on project lands**; no private ownerships are involved requiring acquisition. Approximately 2000 feet of road exists on the eastern side of the southeast quarter of Section 8 which may need improvement, and a road extention needs to be built approximately 600 feet (30,000 sf or.70 acre) to meet the ramp area. **This land is also managed by USFWS and must be included in the modification of the General Plan/Cooperation Agreement.**

AREA #4 ON MAP:

Another CLosure Structure is to be built at the lower end of Swan Lake at the area where it flows into the Illinois River. Location of the permanent easement required is in Section 10, T13S R1W, Calhoun County. A 2100 foot road must be constructed (50-foot width), equaling approximately 2.40 acres of land. Approximaely 500 feet (25,000 sf) or .60 acre of this proposed road appears to exist on Federal Corps land, but the remainder 1600 feet (80,000 sf) or 1.80 acres appear to be outside of the project boundary on land owned by the Department of Interior. **The part of the land located on project land is currently managed by USFWS and must be included in the modification of the General Plan/Cooperation Agreement; the land owned by the Department of Interior likewise must be dealt with by modification of the Agreement.** This may require a license by the Corps to use land owned by the Dept of Interior land for their project purpose, with the understanding that management of same will be the responsibility of the USFWS. Since the project has full support of USFWS this is not anticipated to create any significant problems.

AREA #2 - Work on Closure Structure to be done from the river - permits may be required for tie-in purposes

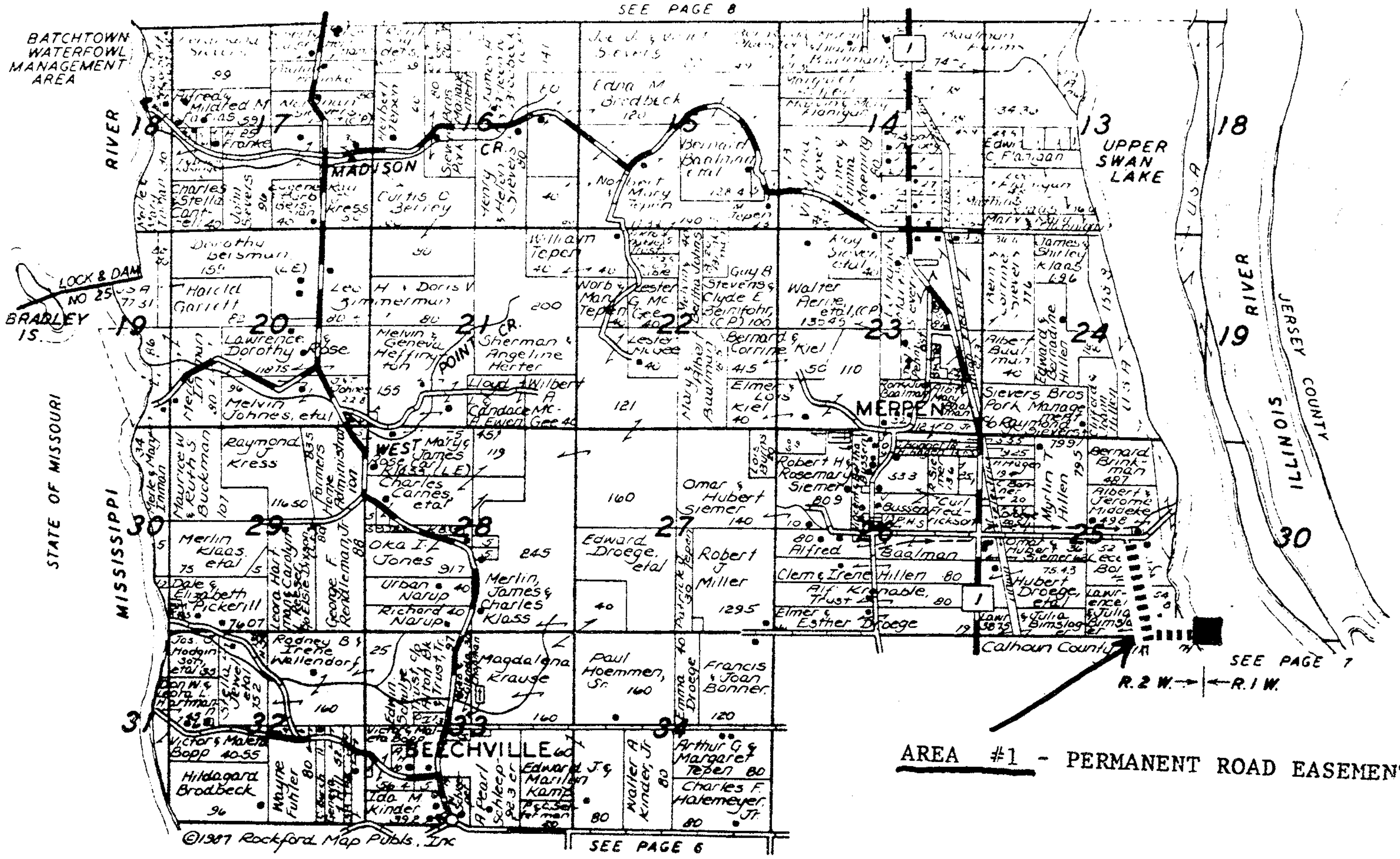
= Proposed New Closure Structu

= Proposed Boat Ramp

= Permanent Road Easement Required to meet Project Standa

EXHIBIT "D-2"

SOUTH PART **RICHWOOD** SOUTH DIVISION **T.12S.-R.2-1W.**



■ = Proposed Boat Ramp
▮▮▮▮▮ = Permanent Road Easement
Required to meet Project Standards

EXHIBIT "D-2" (CONTINUED)

APPENDIX DPR-S

DETAILED PROJECT MEASURES EVALUATION

FOREWORD

APPENDIX DPR-S provides a detailed evaluation of each of the project measures summarized and presented in the Section 5 alternatives discussion of the main DPR.

APPENDIX DPR-S

DETAILED PROJECT MEASURES EVALUATION

The following section provides a detailed description of the analysis conducted to evaluate and optimize each of the potential project measures. In doing so, various suboptions were developed for each measure. Some of the suboptions affected costs only, while others affected both costs and the physical and biological output of the project.

(a) Hillside Sediment Control.

Three different programs for hillside sediment control were considered, all including the construction of sediment traps as the primary means of sediment control. These programs were (1) a Corps' upland traps program, (2) a Corps lowlands traps program, and (3) a partnership program for land treatment.

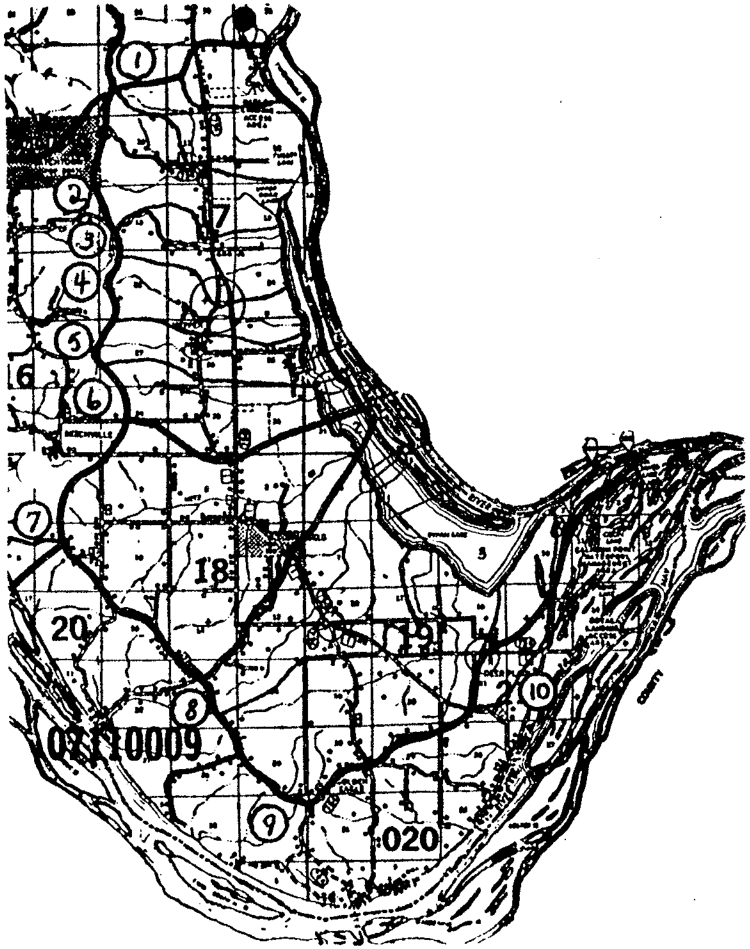
The first option, the Corps' upland traps program, would entail the construction of sediment basins in the uplands at strategic locations along the tributary drainage system. Watersheds 7, 8 and 9 would be targeted (FIGURE S-1). Under this option, the needed real estate would be purchased and then the Corps would construct the traps. Construction at each trap location would consist of building a small dam, a discharge pipe and a spillway. The traps would be periodically cleaned out to restore trap efficiency. Both large (high efficiency) and moderate (low efficiency) sized traps were looked at. The O&M costs would be incurred by the USFWS.

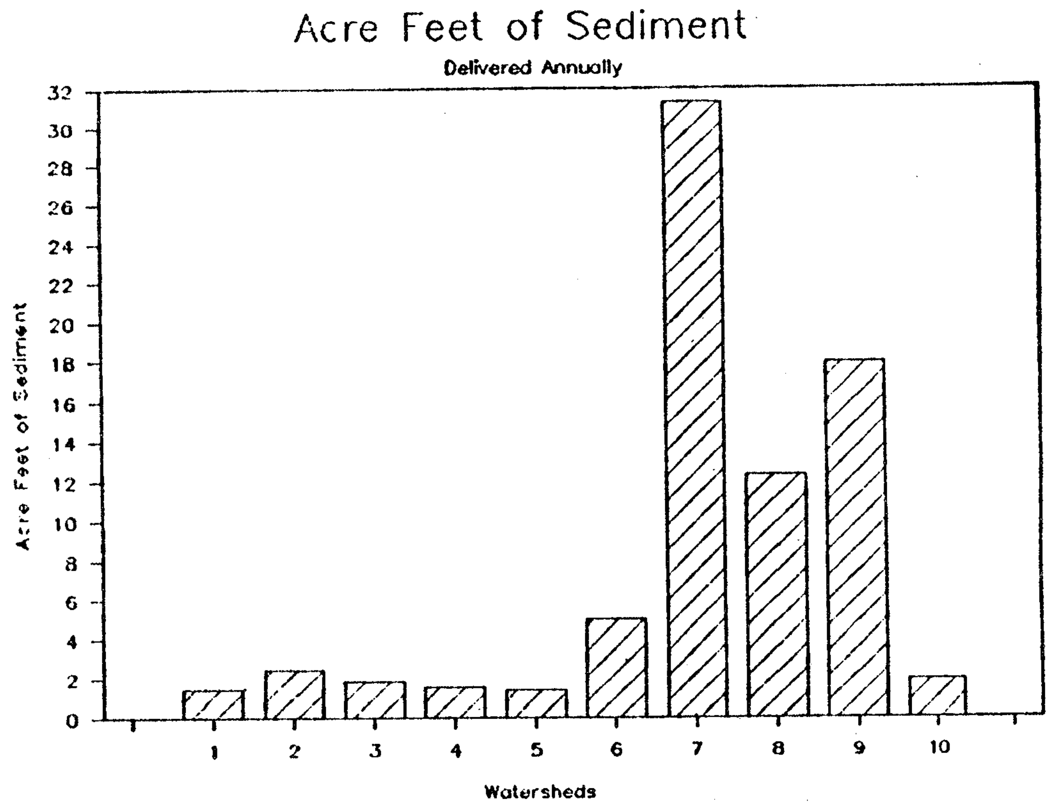
The second option, the Corps' lowland traps program, would treat sedimentation at its destination rather than its source. Under this option, stone fill dams would be developed at the lake shore and would extend some distance out into the lake itself. To implement this feature, a small acreage of private lands would have to be acquired. The O&M costs would be incurred by the USFWS. The number of traps that could be provided under this option is fairly fixed; trap efficiency is increased by increasing the total lake area consumed by the traps, larger traps being the more efficient.

The third option was the partnership Program. With this program, various Federal, State, local and private entities would pool their limited resources to achieve the mutually beneficial objectives of hillside soil erosion control, and lake habitat rehabilitation and enhancement. The overall implementation mechanism for the partnership program is depicted in FIGURE S-2. The program has two components, structural land treatment and non-structural land treatment.

The placement of numerous structures, including 95 small sediment basins, 40 terraces and 55 ponds, provides the cornerstone for an effective watershed sediment control program, and would provide a degree of reliability for sediment control not achievable through non-structural land treatment measures alone. On the other hand, the efficiency of structures could be enhanced by non-structural land treatment efforts. To complement the structural components of the project, the sediment control program would provide for an interagency cooperative planning approach to watershed land treatment. This planning effort would support and, where possible, expand existing non-structural land treatment within the watershed.

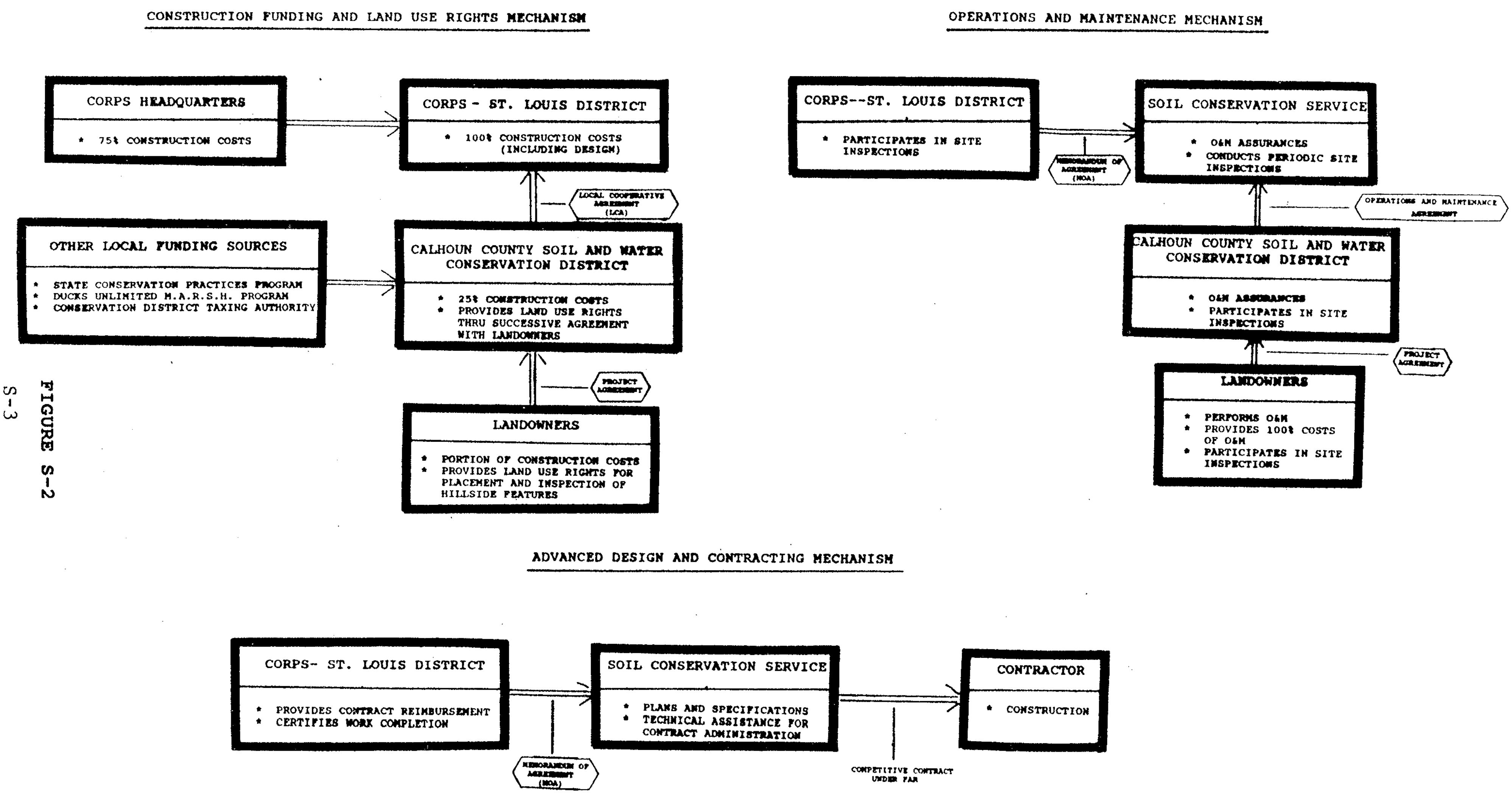
FIGURE S-1





SOIL CONSERVATION SERVICE
WATERSHED DESIGNATIONS

PARTNERSHIP PROGRAM FOR HILLSIDE SEDIMENT CONTROL--
IMPLEMENTATION MECHANISMS FOR STRUCTURAL LAND TREATMENT



NOTE: FAR = FEDERAL AQUISITION REGULATIONS

FIGURE S-2

Structural Land Treatment

Implementation of the structural component of the program involves four key agreements.

1. Local Cooperative Agreement (LCA).

An LCA would be signed between CCSWCD (as the local sponsor) and the Corps. This agreement would stipulate 75 percent Federal and 25 percent non-Federal cost-sharing for the hillside program. The LCA would also require the provision of easements, rights-of-way, and rights-of-entry as necessary for the implementation and periodic inspection of the sediment control devices.

2. Memorandum of Agreement (MOA).

An MOA would be signed between the USSCS and the Corps. This agreement would stipulate that the USSCS would provide the Corps with technical assistance during Plans and Specifications, and in the advertisement, award and monitoring of contracts for this project feature. Prior to cost reimbursement, the Corps would certify that the construction has been satisfactorily completed. The agreement would also stipulate that the USSCS will assure (thru successive agreements with the CCSWCD and the landowners) that the O&M for the project is performed as required.

3. Operations and Maintenance Cooperative Agreement.

The O&M Cooperative Agreement would be signed between the CCSWCD and the USSCS. This agreement would assure (thru successive agreement with the CCSWCD) that the O&M for the project is performed as necessary.

4. Project Agreement.

Under the project agreement, signed between the individual landowners and the CCSWCD, the landowner would agree to furnish a portion of the construction costs and 100 percent of the O&M costs (including replacements). The primary responsibility for the actual performance of the O&M lies with the landowner on whose property the sediment control practices would be installed. An O&M plan for each practice would be included as part of the project agreement signed by the landowner. This plan describes in very specific terms the operation, maintenance and inspection requirements and procedures. The landowner, CCSWCD, USSCS, and the Corps would all have roles in inspecting and assuring that the prescribed practices are adequately operated and maintained.

Non-compliance with O&M responsibilities would result in landowner reimbursement to the Corps for the original non-landowner cost-share of installation of the structure. Returned funds would be used to install a replacement practice elsewhere in the watershed. The reimbursement penalty also applies in the instance where a change of land ownership has occurred for which no provision was made for the transfer of O&M responsibilities for the practices.

Non-structural Land Treatment

This effort would include the following:

1. Steering Committee. A steering committee would be formed with representation to include, at a minimum, the CCSWCD, SCS, USFWS, Swan Lake Watershed Committee, IDOC and Corps. The SCS District Conservationist would chair the committee meetings, and the USFWS would provide the assistance of its Whitewater Watershed project manager to the Swan Lake project (the Whitewater study was a pilot project, with the goal of strengthening cooperative mechanisms for reducing erosion and sedimentation).

2. Land Treatment Plan. A report would be prepared that outlines an overall plan for land treatment within the watershed.

3. Accelerated Conservation Planning. Assistance would be provided to farmers in developing conservation plans that specify erosion control measures and implementation deadlines. For example, the retirement of marginal, erodible lands through the Conservation Reserve Program (CRP), and the increased use of conservation tillage practices.

4. Demonstrations and Workshops. Demonstrations and workshops would be included to encourage the adoption of best management practices.

5. Computer Assistance. Planning efforts could be aided with the implementation of the geographic information system (GIS) methods.

6. Cost sharing Opportunities. One goal of the interagency planning effort would be to seek out additional sources of funding for non-structural land treatment. At the present time, no additional sources of funding exist. Potential future sources of monies that could be explored include the IDOC private lands program and the Illinois Forestry Development Program. However, the amount of funding available from such programs is anticipated to be limited and highly competitive.

The partnership program would not be duplication of, but rather additive to the County's existing soil conservation efforts. At the present time, the limited Federal dollars allocated for soil conservation work are distributed evenly throughout Calhoun County. The focus of the existing program is with on-site soil loss impacts (i.e, farmland), as opposed to off-site (e.g, Swan Lake) sedimentation impacts. Table S-1 provides an analysis of potential sources of funding for soil and water conservation. From this analysis, it appears unlikely that a major non-EMP source of funding (except for that related to the 1985 Farm Bill, contributing to a 17 percent hillside sediment reduction) for soil conservation improvements (of a magnitude to cause a major sediment reduction) will occur in the Swan Lake local watershed. Accordingly, the partnership program would utilize EMP funds for the Federal cost-share.

For the funding of the local cost-share, a number of viable sources exist. EPA 319 Funds could be used in a matching grant to the CCSWCD under the state's Conservation Practices Program. Ducks Unlimited is highly supportive of the hillside feature concept, and has recommended that a funding proposal be submitted under its M.A.R.S.H. program. In addition, the CCSWCD like other state Soil and Water Conservation Districts has a taxing authority.

For the upland traps program, representative trap site locations were selected within the local watershed. Estimates were made of the sediment trapping potential of each location and the cost (i.e., cost of an earth dam, spillway and outlet works) for construction at each location. Based on average trappage and average cost rates, an extrapolation was made for the total costs required to achieve overall hillside sediment reductions within the watershed ranging from 30 to 60 percent. The cost of cleaning out traps over the life of the project for this same percentage range was also determined. TABLE S-2 provide a breakdown of costs among the three programs at a 30 percent level of reduction. It is clear from this comparison that the cost of the upland traps option is high, relative to its sediment reduction benefits. Larger high efficiency traps are somewhat better from a cost standpoint (particularly with respect to O&M costs) than are smaller, low efficiency traps. However, as TABLE S-3 shows, this option is also costly from a $/AAHU standpoint.

For the partnership program, SCS conducted a 10 percent survey of the watershed to ascertain the local interest in participating in a sediment control project. Based on this survey, potential sediment trap location were mapped and typical design profiles assigned (see Appendix DPR-S for more specific details). Extrapolating to the entire watershed affecting Swan Lake, SCS determined that, at a minimum, a 30 percent level of sediment reduction is possible within the watershed at a cost of $1.0 million. This assumes that all O&M costs are non-Federal and EMP funds are used solely as construction

TABLE S-1

SWAN LAKE ALTERNATIVE FUNDING SOURCES FOR SOIL AND WATER CONSERVATION

Alternative Programs	Description of Objectives	Future Funding Potential	Remarks
Federal			
P.L. 566 Watershed Land Treatment	Projects, establish conservation measures on public and private lands. Runoff control measures reduce erosion, siltation, and flooding.	Low	Currently slow progress - 10 years, Application Backlog, 2 mil appropriated in FY91 with 15 mil in project requests.
Agricultural Conservation Program (ACP)	Annual program, cost sharing the application of soil and water conservation practices.	Low	County allocation fully utilized - used to accomplish annual program goals.
Water Quality Special Projects (WQSP)	One year projects, designed to improve water quality and help solve problems caused by Agricultural non-point source pollution.	Low	One project funded in IL in 1990, none in 1991. Extremely Extremely competitive at Washington level.
Hydrologic Unit Areas (HUA)	Five-year projects, designed to accelerate improvement of water quality in identified agricultural areas.	Low	54 projects funded Nationally, 2 in IL. No appropriation for for FY92. Uncertain future.
Demonstration Projects (DEMO)	Five-year projects, designed to accelerate adoption of water quality technology in DEMO areas and to gain experience to extend program activities into other areas.	Low	16 projects approved to date, none in IL. No appropriation FY92, uncertain future.
Conservation Reserve Program (CRP)	Multi-year program, converts highly erodible and other cropland to perrennial vegetation.	Low	County allocation fully utilized to support program initiative.
Non-Point Source Program Grants Section 319(h)	Activities that result in demonstrated progress in achieving Congress' goal of controlling and abating non-point source pollution.	High	Wetlands and water quality High priority. Recommended to support state cost share program (CPP) and this feature.
State			
Watershed Land Treatment Program (WLTP)	Multi-year project, provides financial assistance to landusers in highly erosive land areas of selected watersheds, to install erosion control practices.	Low	Funding discontinued pending pending additional appropriation, future highly uncertain.
Conservation Practices Program (CPP)	Annual program, provides financial assistance to landusers to install erosion control practices.	High	Recommended to address water quality as priority issue - proposed to support 319 and this Feature.

TABLE S-1 (Continued)

Alternative Programs	Description of Objectives	Future Funding Potential	Remarks
<u>Local</u> Landowner Contribution	Provides cost share for technical assistance and construction, also provides lands and assumes O&M responsibility through successive agreements with the Conservation District, Soil Conservation Service and Corps of Engineers.	High	Landowner surveys demonstrates high degree of support.
<u>Private</u> Ducks Unlimited Matching Aid to Restore States Habitat (M.A.R.S.H.)	Provides for permanent protection and/or restoration of important waterfowl habitat, through funding for selected projects/proposals.	High	Highly supportive of Hillside feature concept. Requests proposal for project.

TABLE S-2

***COSTS COMPARISON -**
HILLSIDE SEDIMENT CONTROL PROGRAMS

Program	Cost (Millions) Construction	Real Estate	O&M	Total	Remarks
Corps Upland Traps - Low Efficiency	1.6	0.7	2.9	5.1	High O&M Costs
Corps Upland Traps - High Efficiency	2.7	1.2	0	3.9	High RE Costs
Corps Lowlands	1.6	0.4	1.3	3.3	Significant Loss of Lake Habitat
Partnership Program	1.0	0	0	1.0	Least Cost Option, No Federal RE or O&M Costs

* Table provides estimated costs for a 30% reduction in future hillside sediment input to lake. Provides a 47% reduction when 17% reduction from 1985 Farm Bill is considered.

costs. Of the three hillside options, this option is the most cost-effective (see TABLE S-2 comparison). It is also the most beneficial of the hillside options from a $/AAHU perspective (TABLE S-3). While higher percent reductions are possible, the degree of certainty of achieving these higher levels becomes progressively less. Based on the TABLE S-4 incremental habitat analysis, it is clear that higher levels of sediment reduction are not as cost effective as the 30 percent level of treatment. Considering the logistics involved in operating a hillside program, SCS has recommended that the program not be less than a 30 percent level of watershed treatment. In combination with the 17 percent sediment reduction anticipated from the 1985 Farm Bill, the total reduction of the existing hillside sediment input to the lake with a project in place would be 47 percent.

In addition to cost-effectiveness, the partnership program would have a number of other benefits. Habitat benefits for upland wildlife species such as deer, turkey, quail and pheasant would increase by a least 25 percent. Farmland soil losses would be reduced, and the program would include the creation of 40 jobs, and an increase of $1.3 million in local sales volume. These figures are significant in a county as small as Calhoun. Perhaps the most significant benefit to be gained by this project is the opportunity to create an important cooperative precedent. The SCS, FWS, IDOC, CCSWCD, IDOA, IEPA, EPA, DU, and the Corps would all greatly increase the efficiency of their operations by working together. Such an initiative is consistent with the conceptual direction of the National Wetlands effort underway with the Waterways Experiment Station. One of the tasks of that study is find ways of achieving inter-agency cooperative arrangements for meeting wetlands objectives.

The most cost-effective hillside treatment solution identified is the partnership program. Considering the reduced cost-effectiveness and the uncertainty of achieving sediment reduction levels greater than 30 percent, and the logistical problems of establishing a program for less than that amount, a 30 percent control level seems reasonable. Additionally, it will become clear in subsequent discussions, that the project's stated objective of substantially reducing future sediment deposition cannot be achieved without at least a 30 percent level of hillside treatment.

Discussions to date have raised a couple of concerns regarding the implementation of a partnership program. One concern has been in regard to what assurances the Corps would have that once funds had been transferred to local landowners, they would actually perform the O&M. This issue was discussed with SCS personnel. SCS indicated there are several reasons to be assured the program would be accomplished. First, spot checks are made on landowner compliance with soil erosion control programs. If a landowner has not adequately lived up to his obligations, reimbursed funds for non-compliance could be redirected to another portion of the watershed. Second, in the past, landowner compliance with the program in Calhoun County has been 100 percent. The landowners want the structures, and they are willing to implement and maintain them. Third, stringent wording has been included in the agreement between CCSWCD and the landowners (a draft copy of that agreement is included in APPENDIX DPR-D of the DPR).

Another concern has been in regard to the expenditure of EMP funds for uplands sediment control. This assertion is predicated on the fact that Congress did not fund the Master Plan recommendation for upland sediment control. That recommendation was not funded in spite of the Master Plan recognizing sedimentation as the #1 resource problem affecting the UMRS. Thus, sedimentation per se, in spite of its recognized importance, was not designated as an authorized purpose of the EMP. However, it should be noted that the uplands recommendation was by far the most costly of all the Master Plan recommendations to implement. Also, it addressed sedimentation on a system-wide, not a site-specific, level. It is the opinion of the St. Louis District that alleviating the affects of sedimentation in the name of fish and Wildlife enhancement (an approved Master Plan recommendation) is a legitimate

TABLE S-3

$/AAHU COMPARISON - HILLSIDE SEDIMENT CONTROL PROGRAMS

Program	* Total Feature Cost ($ Million)	Av. Annual Cost ($ Thousands)	$/AAHU		
			Fish	Waterfowl	Total
Corps Upland Traps - Low Efficiency	5.1	459	6,851	4,371	2,669
Corps Upland Traps - High Efficiency	3.9	351	5,239	3,343	2,041
Corps Lowland Traps	3.3	297	4,433	2,829	1,727
Partnership Program	1.0	90	1,343	857	523

* Assumes 30% hillside sediment control. Includes construction real estate and O&M costs.

TABLE S-4

INCREMENTAL HABITAT ANALYSIS
HILLSIDE SEDIMENT CONTROL - PARTNERSHIP PROGRAM

Option (percent hillside sediment reduction)	Total Estimated Feature Cost ($ Millions)	Cumulative Annual Cost ($ Millions)	Incremental Annual Cost ($ Thousands)	Av. Annual Habitat Unit Gain						Av. Annual Cost Per Av. Annual Habitat Unit Gain ($)					
				Total			Incremental			Total			Incremental		
				Fish	Waterfowl	Combined	Fish	Waterfowl	Combined	Fish	Waterfowl	Combined	Fish	Waterfowl	Combined
30	1.0	90	90	67	105	172	67	105	172	1,343	857	523	1,343	857	523
45	1.9	171	81	106	120	226	39	15	54	1,613	1,425	757	2,077	5,400	1,500
60	3.2	288	117	124	170	294	18	50	68	2,323	1,694	980	6,500	2,340	1,721

purpose, and, in fact, it has already been done. For example, sediment deflection structures have been proposed and approved as project features. In the case of Swan Lake, a site-specific (localized) treatment of hillside sediment release is needed to achieve the primary project objective of fish and wildlife enhancement. The importance of adequate sediment control at Swan Lake is compounded by the fact that this lake is geographically in a very significant location for waterfowl migration and for fisheries. In an October 4, 1990 letter to the UMRBA, the Soil Conservation Service (Iowa State Conservationist) raised this very issue, and recommended that funding through the EMP be allowed for specific project situations like Swan Lake. The Section III. Policy and Guidance Update of the Sixth Annual Addendum now provides for site-specific uplands sediment control.

(b) Dike/Levee. Since this structure would have major importance for both sediment and water control, the term dike/levee will be used to refer to the feature. Those portions of the structure that would cross major segments of lake are here referred to in the text as terminal closures.

Design optimization for this project feature included consideration of the method of construction, alignment, structure height, and other considerations.

Method of Construction for Peninsula Segments. Two major methods were considered for the construction of the peninsula portion of a dike/levee structure (FIGURE S-3). One method involves the placement of borrow material along the peninsula mid-way between the Illinois River and Swan Lake. The structure would have standard 1 on 3 side slopes, and a levee crown width of 10 feet. As an alternative construction method, sediments would be clam shelled from along the east shore of the lake and deposited on land along the edge of the peninsula. However, this second approach would be applicable to only that portion of peninsula down river of the existing IDOC closure structure. The clam shell equipment would access the site from the river at the lower end of the lake. In the preliminary analysis described below, it was assumed the dredged material would be fairly loose and 1 on 6 side slopes would result, a small lakeside retention dike would b ended to control runoff to the lake. The crown width was again assumed to be 10-foot.

ALTERNATIVE CONSTRUCTION METHODS
FOR A PENINSULA DIKE/LEVEE

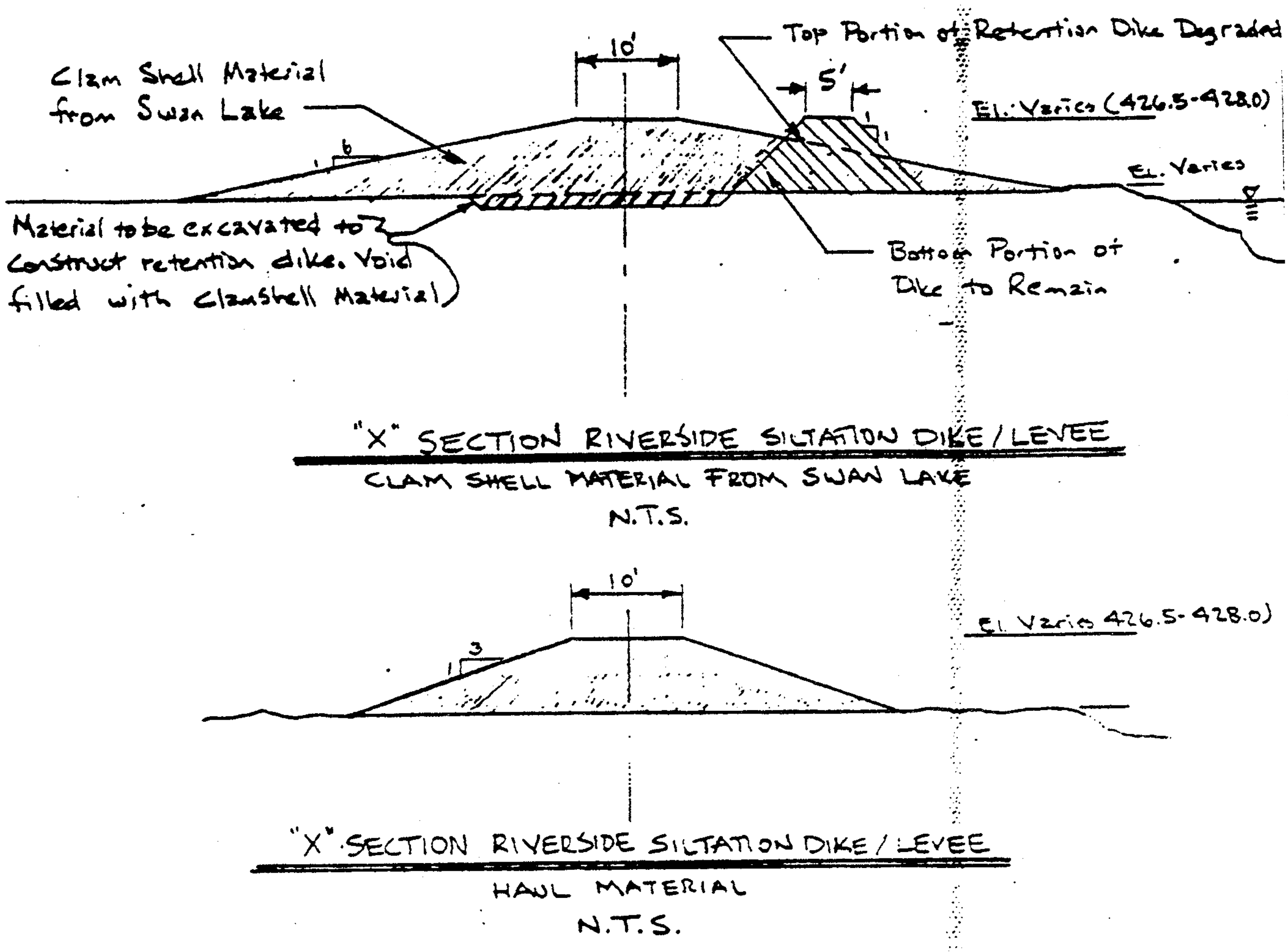


FIGURE S-3

TABLE S-5 provides the results of the District's analysis. Construction of a peninsula dike/levee per se using the clam shell method is more expensive than building the structure using borrow material. The primary reason for this difference in cost is the existence of an extensive stump field that covers nearly all of the lake bottom (FIGURE S-4). This stump field resulted from the removal or die-off of timber at the time of Pool 26 impoundment in the 1930's. Because of the stumps, a larger dredge (7 cubic yards) bucket and additional dredging time would be required, thus increasing the unit cost. However, as the table also reflects, the total cost of the construction methods must take into account the need for a drainage ditch. The presence of a ditch is vital to the management of the lake site, particularly for bottom consolidation. By the nature of the clam shell construction method, a drainage system is created at no additional cost to the project. With the borrow method construction, a ditch must still be created. An estimate of the least cost method to provide such a drainage system (using a combination of hydraulic and mechanical dredging methods) along the central axis of the lake) is $1.1 million. With this cost added to the cost of the dike/levee itself, the overall cost of this construction method is $2.3 million. However, this cost is actually greater, since it does not consider all of the costs related to dredge disposal; that is, the use of a barge to off load material at some designated river bank location, and containment requirements. In addition, the table cost for clam shell construction is high. In response to a subsequent VS Workshop suggestion (see APPENDIX DPR-U), the District is now assuming a 1 on 4 side slope with no retention dike as feasible.

Another disadvantage to using the mid-peninsula section for dike/levee development is that a greater acreage of trees, particularly older-aged trees would have to be removed. Clearing for the clam shell operation would affect primarily willows and younger-aged silver maples.

With the above points in mind, the clam shell method was judged to be the most practical and cost-efficient method of meeting the requirements for a peninsula structure in areas where this method is physically feasible (i.e., along Swan Lake proper). The inclusion of any segments of levee upriver of the IDOC closure would still require a standard 1 on 3 structure using the borrow method. Tree clearing for levee construction above the IDOC closure would be minor, since much of this area is existing roadway.

Method of Construction for Lake Segments.

(1) Lower Lake Terminal Closure. Several methods of constructing a lower lake closure were considered. Option 1 would entail the placement of a soil core closure capped with a layer of heavy stone. Under Option 1A, the core material, while under Option 1B the material would consist of clamshelled lake sediments. Option 2 would entail the placement of two parallel stone dikes with a soil wedge of clamshelled material placed between the dikes. FIGURE S-5 shows a typical cross-section for each closure type.

TABLE S-6 presents the costs associated with each construction method. The cost of constructing Option 2 was found to be considerably more than for Option 1, and for this reason Option 2 was rejected. Options 1A and 1B differed by $0.2 million. However, this estimate did not take into account the fact that, because of dredge equipment entry into the lake and drainage ditch construction, a significant amount of clamshell material would already exist and would require a disposal location. It seems only reasonable to incorporate this material into the construction of a closure. For this reason, Option 1A was selected.

TABLE S-5

**RIVERSIDE DIKE/LEVEE -
COST COMPARISON FOR ALTERNATIVE CONSTRUCTION METHODS
FOR PENINSULA SEGMENTS OF STRUCTURE**

Option	Description	Dike/Levee 1/	Drainage Ditch 2/ 3/	Total
1	Borrow material structure	1.2	1.1	2.3
2	Clam shelled material	2.0	0	2.0

1/ Levee height was held constant at 426 NGVD. Costs considers only the segment of dike/levee between the IDOC closure and the lower end of the peninsula.

2/ Cost does not include consideration of all costs related to disposal (e.g., use of a barge to offload material at river bank, nor containment requirements).

3/ While drainage ditch is vital to unit management, it also provides deep water winter habitat for fish.

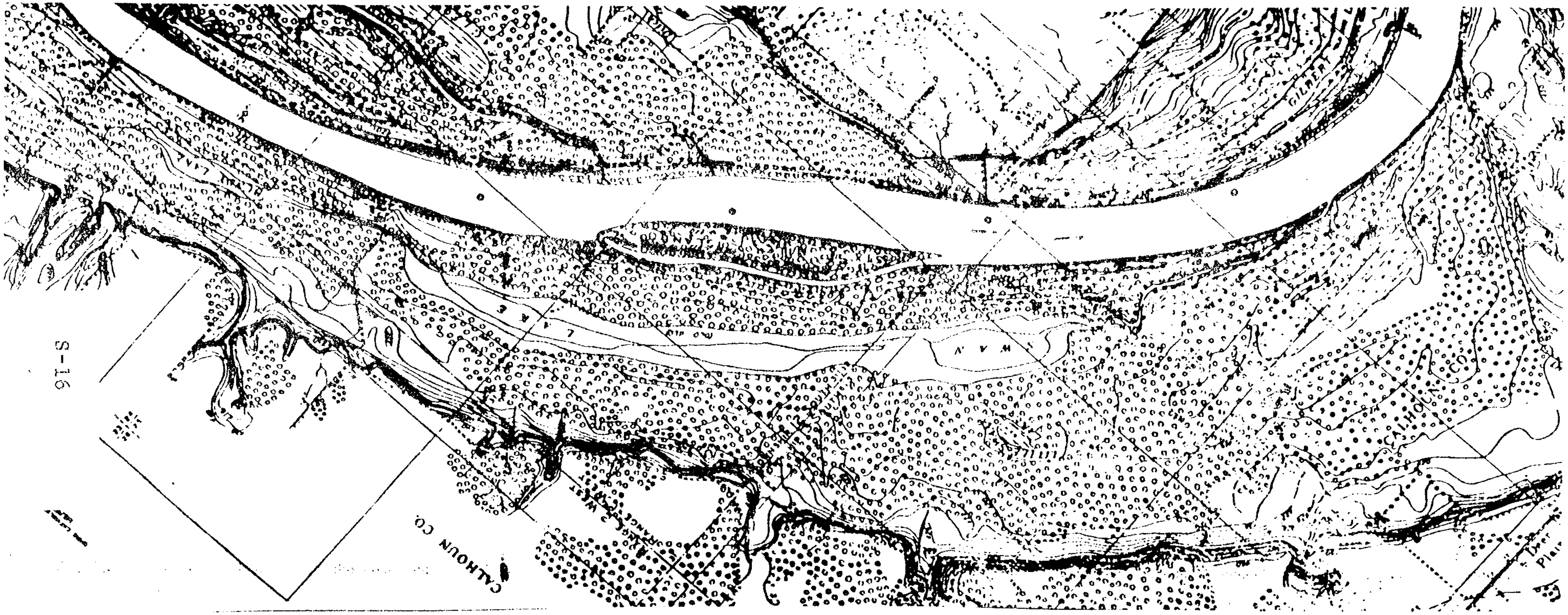
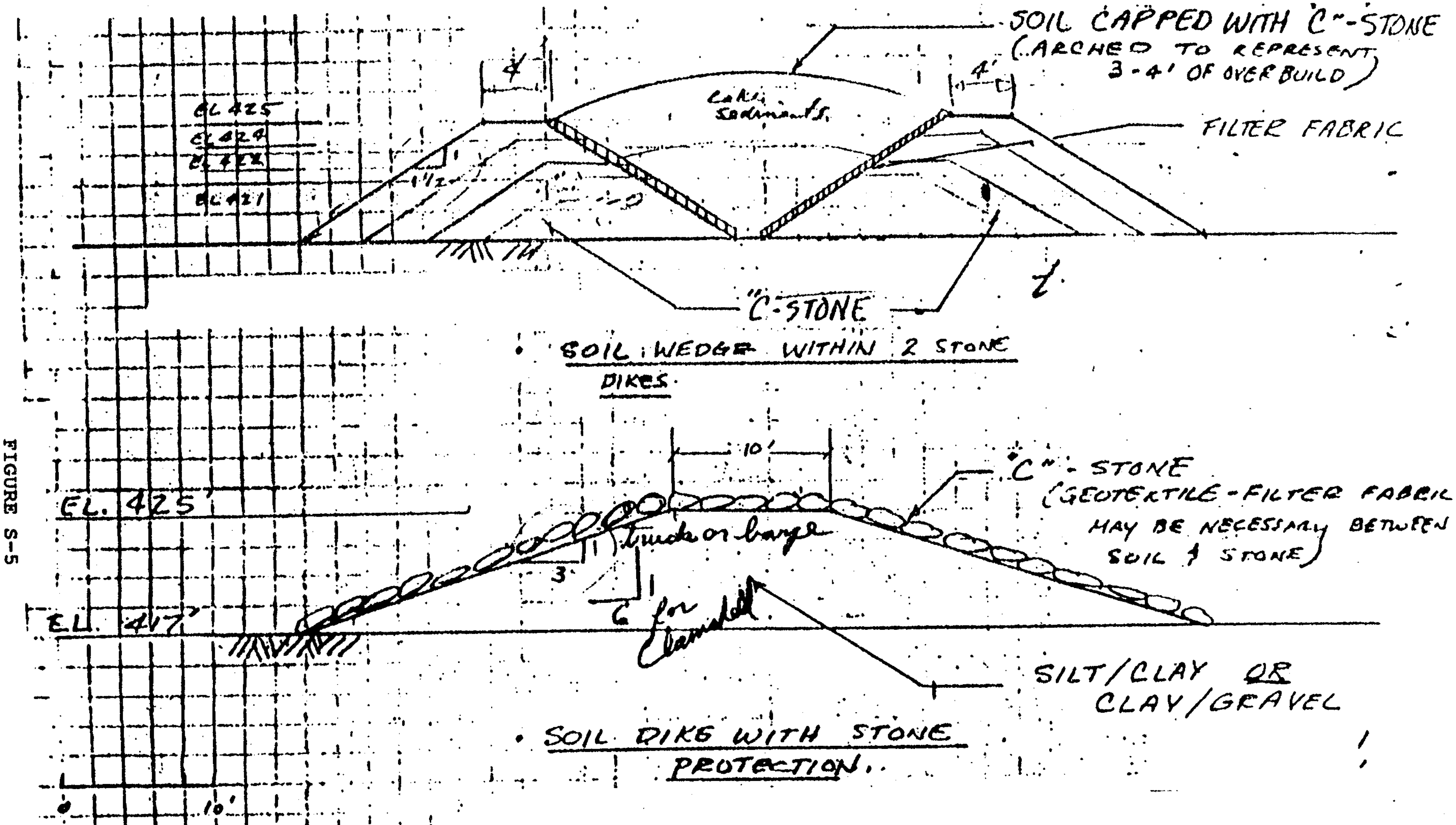


FIGURE S-4

1903 FOREST COVER INDICATING
LOCATION OF STUMP FIELD
WITHIN SWAN LAKE



TYPICAL DIKE SECTIONS
SWAN LAKE

FIGURE S-5

TABLE S-6

RIVERSIDE DIKE/LEVEE -
COST COMPARISON FOR ALTERNATIVE CONSTRUCTION METHODS
FOR LOWER LAKE CLOSURE SEGMENT

Option	Description 1/	Soil Met Source	Slope		Total Estimated Feature Cost ($ Millions)
			Soil	Stone (18-24" layer)	
1A	Soil Core - Stone Cap	Clamshell	1 on 4	1 on 4	0.4
1B	Soil Core - Stone Cap	Borrow	1 on 3	1 on 2	0.6 2/
2	Stone Dikes with Soil Wedge	Clamshell	--	1 on 15	1.1

1/ All configurations compatible with an overall 426 NGVD dike/levee design (e.g., embankment to 426.5 NGVD construction grade, stone cap to 428 NGVD).

2/ Costs do not consider the problem of dredged material disposal associated with barge entry to the lake and excavation required for the drainage ditch.

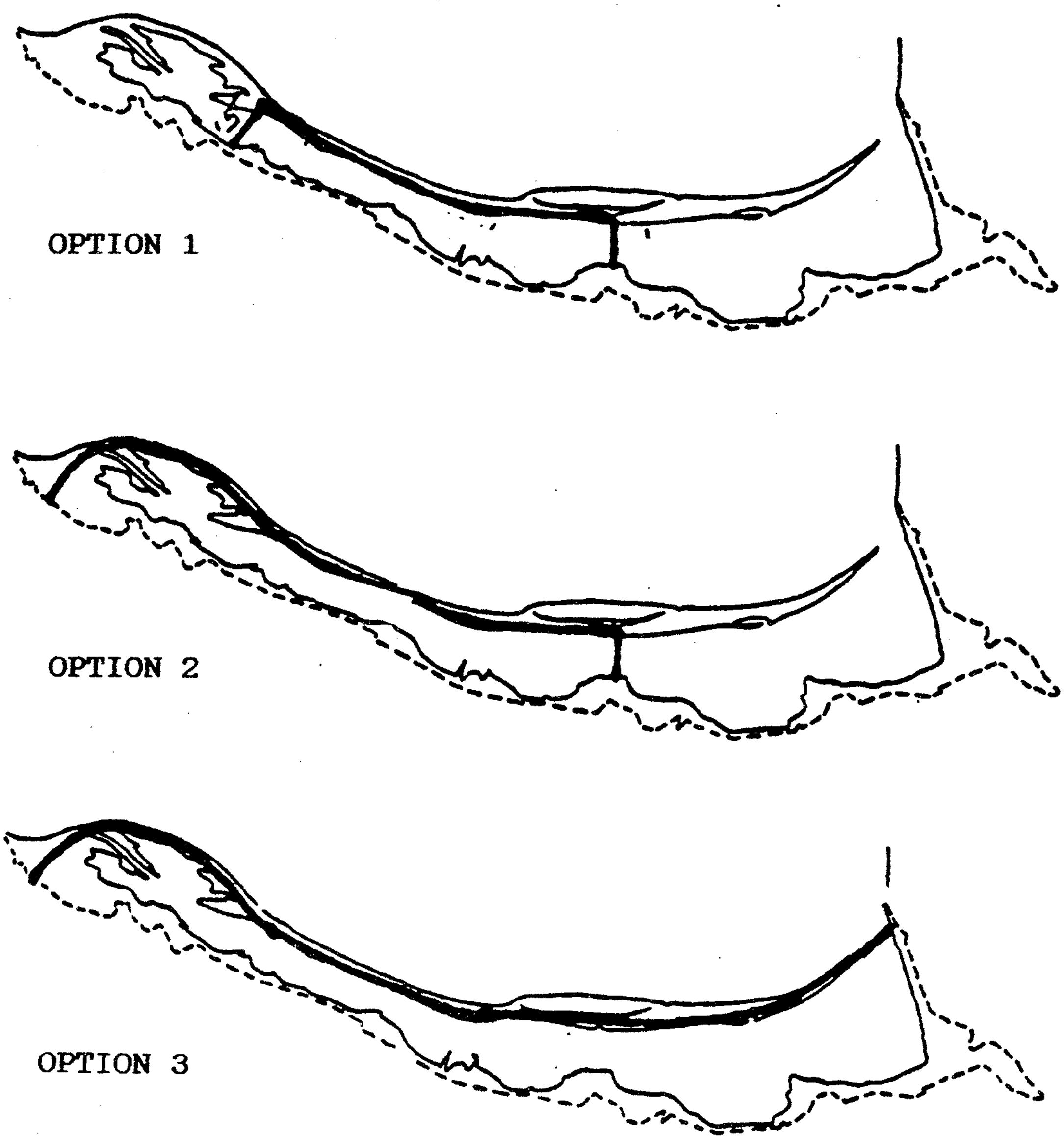
(2) Middle Lake Terminal Closure. While not looked at in detail, conceptually it was assigned that the design of structure would be very similar to that of the lower lake closure.

(3) Fuller Lake Terminal Closure. For general planning purposes, it was assumed that if any successful structure was to be built, it would be accomplished with truck hauled borrow material and stone using the Fuller Lake access road. A minor cost savings might be achieved via clamshelling.

Dike/Levee Alignment. Three major alignment configurations for a dike/levee feature considered (FIGURE S-6). Option 1 would terminate a dike/levee structure at the upper end of the project along the west lake shore at the location of the existing IDOC closure structure. At the lower end of the project, it would tie into west shore high ground as a terminal closure structure bisecting Swan Lake proper. Option 2 is similar to Option 1, except at the upper end of the project the structure would continue along the peninsula to capture the Fuller Lake unit, and would then tie to high ground in the vicinity of Hadley Landing. Option 3, the most encompassing configuration, would have a tie-in near Hadley Landing and a tie-in to Calhoun Point.

As indicated by the TABLE S-7 habitat analysis, Option 3 is the most cost-effective alignment, and it is also the configuration supported by the project sponsors. In the past, Option 2 has been suggested as a possible way of reducing the total cost of the project; however, the sponsors have repeatedly voiced the opinion that a "half-project" concept is considered unacceptable. The TABLE S-7 data indicates that regardless of the alignment applied, the relative cost is about the same. However, the number of total habitat units provided by each option vary greatly. It is, therefore, prudent to capture as much of the project area with a riverside dike/levee as possible. Truncating the structure does not decrease its cost due to the increased costs needed for the construction of terminal lake closure segments. When the closures serve merely as interior water control structures, the crown elevation and the costs of those structures can be kept much lower.

Dike/Levee Height. Three incremental structure heights were considered: 424, 426 and 428 NGVD. A number of factors were evaluated prior to selecting a given structure height, namely the estimated future rate of sediment deposition, the frequency of structure overtopping during critical periods of the year, the total cost of the feature, the total habitat units provided, and the estimated average annual dollars per habitat unit. TABLES S-8 and S-9 provide the results of the analysis. In all categories, there appeared to be a substantial incremental gain to be achieved by raising the structure as high as 426 NGVD, but there appeared to be diminishing returns in raising the structure to 428 NGVD. A dike/levee height of 426 NGVD is also compatible with the structure height selected for the adjacent Stump Lake HREP project. For the above reasons, elevation 426 NGVD was selected. Since the Illinois River slopes from the upper to the lower end of the project, the actual grade of the levee was adjusted to range from 426.5 NGVD (construction grade) at River Mile 5.2 to 428.0 NGVD at River Mile 13.0. This would also ensure the structure overtops at the downstream end of the project, before overtopping occurs at the upstream end.



RIVERSIDE DIKE/LEVEE ALIGNMENT OPTIONS

FIGURE S-6

TABLE S-7

HABITAT ANALYSIS - RIVERSIDE DIKE/LEVEE ALIGNMENTS

* Alignment Option	Total Estimated Feature Cost ($ Million)	Av. Annual Cost ($ Thousand)	Av. Annual Habitat Units Gained (AAHU's)			$ Per AAHU		
			Fish	Waterfowl	Total	Fish	Waterfowl	Total
1	2.9	261	154	226	380	1,695	1,155	687
2	2.8	252	154	380	534	1,636	663	472
3	2.7	243	320	634	954	759	383	255

* All options assume a system built to a height of 426 NGVD.

TABLE S-8

INCREMENTAL HABITAT ANALYSIS
RIVERSIDE DIKE/LEVEE HEIGHT

Option (Crown Elev. NGVD)	Feature Cost ($ Millions)	Annual Cost ($ Thousands)	Incremented Annual Cost ($ Thousands)	Av. Annual Habitat Unit Gain						Av. Annual Cost per Av. Annual Habitat Unit Gain ($)					
				Total			Incremental			Total			Incremental		
				Fish	Waterfowl	Combined	Fish	Waterfowl	Combined	Fish	Waterfowl	Combined	Fish	Waterfowl	Combined
424	2.0	180	180	252	503	755	252	503	755	714	358	238	714	358	238
426	2.7	243	63	320	634	954	68	131	199	759	383	255	926	481	317
428	5.0	450	207	344	719	1,063	24	95	109	1,308	626	423	8,625	2,435	1,899

Notes: Costs are for a dike/levee system extending from R.M. 5.2 to R.M. 13.0.
Costs for 424 NGVD structure are higher than what might be anticipated, since volume of material for a minimal clam shell cut exceeds volume of material required to construct levee to this elevation.

TABLE S-9

SUPPLEMENTAL INCREMENTAL DATA - RIVERSIDE DIKE/LEVEE HEIGHT

Option (Crown Elev. NGVD)	Sediment Deposition		Percent Decrease		Predicted Adverse Flood Events			
					Growing Season Period		Coldwater/Ice Period	
	Inches/yr	Inches/50 yr	River Sediment Input	Overall Lake Sedimentation	# Events In 50 Years	One Event Per "X" Years	# Events In 50 Years	One Event Per "X" Years
424	.20	10	70	33	14	1 in 4	45	1 in 1
426	.17	8.5	85	43	6	1 in 8	33	1 in 2
428	.16	8	91	47	5	1 in 10	20	1 in 3

Other Dike/Levee Considerations.

Road. The crown of the dike/levee was initially designed for a 10-foot width so the levee could serve as a post-project road for O&M traffic. A VE suggestion that this width could be reduced to 8-feet and still support traffic was accepted. Sections of the levee that are not frequently traveled by O&M vehicles will not be topped with a layer of stone. Areas leading to water control and pump units will be covered with stone. An 18-foot wide road presently exists at the Fuller Lake site for hunter access to a parking lot near the middle lake shore of Fuller Lake. To provide an 18-foot wide levee top road would require considerable additional material for levee construction. Instead, an 8-foot crown with no stone covering would serve as an occasional maintenance road, and a second road 18-feet wide with stone, would be constructed on the inside of the dike/levee.

Slope. As indicated above, it was suggested at the VE workshop that dredged lake sediments could be placed steeper than 1 on 6. Subsequent District geotechnical analysis confirmed the likelihood that this material can be placed with 1 on 4 side slopes. Consistent with this recommendation, there appeared to be no need to construct a retention dike prior to construction. Instead, and IEPA has agreed, a line of straw bales will be placed at the toe of the structure during construction.

Stone. The initial design of the lower lake closure called for a stone covering (B-stone) on both sides and the top of the lower lake closure. A VE workshop suggestion was to eliminate rock from the structure on the top and lakeside, and flatten the embankment slope lakeside. This suggestion was only partially incorporated. The soil embankment slope was changed to 1 on 4 due to a desire to use clamshell rather than truck haul material for construction. Considering the vulnerability of the lower lake closure (direct exposure to river forces) and its importance (includes lower lake water control gates and pump facility), the IPT did not feel the structure should be left without rock protection. B-stone was still felt to be necessary riverside of the structure, however, C-stone was considered acceptable for the structure top and lakeside.

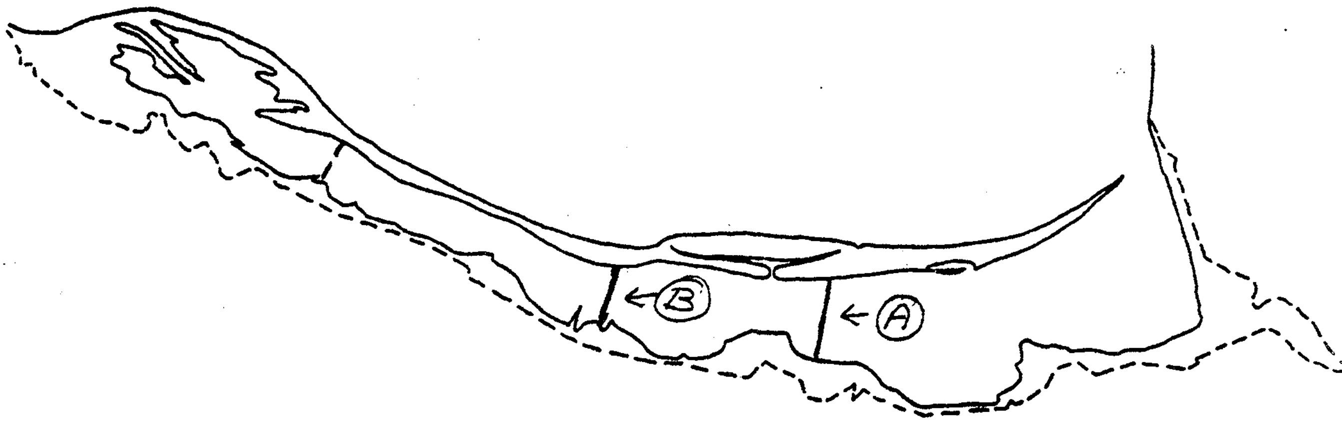
3. Interior Lake Closures.

Design optimization for this feature included consideration of the number of closures, method of construction, alignment, and structure height.

Number of Closures. In addition to the use of the existing IDOC closure, the project initially considered two new locations for the placement of interior closures. FIGURE S-7 shows these locations. However, at the request of the project sponsor, closure location B was subsequently dropped. The sponsor felt one closure would provide considerable management flexibility on the lake; however, a third unit would be costly (considering the cost of the structure and its associated features, including a pump and water/fish passage structures) with diminishing benefits for the dollar costs incurred. In view of the growing total cost of the project, this second closure was not pursued further.

Method of Construction. Similar to the lower lake closure discussed earlier, soil core/stone cap and stone dike/soil wedge design configurations were considered. TABLE S-10 provides a cost comparison analysis for these alternative construction methods. A soil core-stone cap structure with 1 on 3

INTERIOR ALTERNATIVE CLOSURE LOCATIONS



EXISTING IDOC CLOSURE

PROPOSED INTERIOR CLOSURES

FIGURE S-7

TABLE S-10

COST COMPARISON ANALYSIS FOR ALTERNATIVE CONSTRUCTION METHODS - INTERIOR SWAN LAKE CLOSURE

	Configuration											
			Slope Material Source				(AAHU's)			$/AAHU		
Option	Description	Soil Mat. Source	Soil	Stone	Feature Estimated Cost ($ Million)	Av. Annual Cost ($ Thousands)	Fish	Waterfowl	Total	Fish	Waterfowl	Total
1	Soil Core - Stone Cap	Clamshell	1 on 3	1 on 3	0.3	27	164	235	399	165	115	68
2	Soil Core - Stone Cap	Borrow	1 on 3	1 on 2	0.6	54	164	235	399	329	230	135
3	Stone Dike - Soil Wedge	Clamshell	---	1 on 1.5	0.8	72	164	235	399	439	306	180

Assumes: 421 top elevation for soil core
423 crown elevation for stone
C-stone covering

* Includes costs for road easements to access site.

side slopes for soil placement and 1 on 2 side slopes for C-stone placement was found to be the most cost effective method and was, therefore, selected as the optimal method of construction.

At the VE workshop, a suggestion was made that a closure could be constructed with soil embankment along with flattened side slopes. The IPT and sponsor rejected this suggestion. The sponsor was aware of a similar structure that had failed at Lake Chautauqua. Additionally, the IPT was concerned about the orientation of the structure to flood currents and tributary inflow.

Alignment. In the initial study stage, closure A was situated such that it equally subdivided that portion of the lake below the IDOC closure into two equal acreage compartments. As a value engineering initiative, it was later proposed that if closure A was moved uplake one-half mile, to a more constricted location, the total materials needed to construct a closure could be reduced by about 15 percent. This proposal was rejected by the USFWS. The Service found the redistribution in the management acreage this would cause between the compartments as unacceptable. Accordingly, the closure was returned to its original alignment.

Height. The sponsor has indicated the desired upper water level for site management to be 420.5 NGVD. Thus, an impervious core for the interior closure must reach at least that elevation, if water control between the compartments is to be truly independent. However, since the project will not prevent all sediment input into the lake, it would seem beneficial to incorporate additional elevation to the core to permit water level compensation during the latter part of the project life. It is estimated that approximately 0.5 feet of sedimentation will occur over the next 50 years (this estimate assumes 15 inches of lake sedimentation without a project and 9 inches of sediment reduction with a project); for this reason, an additional 0.5 feet of elevation should be added to the core of the structure (this does not include any additional elevation that may also be required to offset structure settlement after construction).

C-stone would form a layer on top of the structure approximately 18 inches deep, bringing the crown elevation to approximately 423 NGVD. This elevation would be sufficient to deal with incoming waves. In addition, the dredging and fill placement associated with the structure could assist in dampening waves due to increased water depth, and a resulting mud wave.

Other Considerations.

Overtopping. No special structure alterations were deemed necessary to handle overtopping during floods. The interior closure is at an elevation lower than that for the dike/levee overflow structure. Water should move as a sheet flow over the rock surface of the structure without impairing the stability of the structure.

IDOC Closure. Except for some minor vegetation removal and stone repair, this IDOC closure already meets the design requirements for an interior lake closure. The structure has an impervious core above 421 NGVD, and the entire structure is covered with stone.

4. Islands. Design optimization considered construction material, wave protection, island placement, and island size.

Construction Material. For several reasons, soil was the construction material of choice. Soil is more economical than rock as a construction material. A partial failure of a soil constructed island would not have a catastrophic effect on the performance of the project. Soil also provides a suitable substrate for the establishment of a vegetative cover. In addition, to its habitat value, a vegetated island is aesthetically pleasing.

The obvious source for soil material is clam shelling. The material is fairly inexpensive, its excavation results in additional deep water habitat for wintering fish at no additional cost, and the resulting deep water would link the main drainage system with the west shore boat ramps for enhanced boat passage.

Wave Protection. To protect the islands against wave action, a 1 on 6 slope was judged appropriate. Such a gentle slope would also enhance habitat conditions for shorebirds. A minimum top elevation for the islands of 423 NGVD was considered adequate for wave dissipation. To further stabilize the islands, these structures would be vegetated. Initially, the islands would be seeded to grass cover. In the absence of special management controls (such as burning), the islands would eventually become forested. The shoreline of selected islands would also be protected with willow plantings (wattling and cuttings).

Island Placement. To achieve maximal wave dissipation, the islands would be oriented along a plane perpendicular to the direction of the prevailing southeast winds. To further enhance wave reduction, the structures would be placed so as to subdivide wind exposed surface lake acres into units of near equal size. Two increments of combined island's length were considered, 4,000 and 12,000 feet. The 4,000 foot length was found to be considerably more cost effective than the 12,000 foot option (TABLE S-11).

Islands would be placed no closer than 500 feet from shore to protect against mammalian predation. To reduce the potential for post-project sedimentation joining together individual islands, the islands would be placed no closer together than 100 feet. To eliminate the potential for wave movement in between islands, islands would be staggered in two rows.

Island Size. Island size was based on prior experimental evidence that very small islands (i.e., <0.5 acres) support higher numbers of nesting mallards than do larger islands. Because habitat diversity was also a concern to the sponsor, island size, shape, spacing, width, and height would be varied. Island size would be varied from 0.1 to 0.5 acres. Islands would be spaced 100 to 300 feet apart. Island width (i.e., land mass above a 419 NGVD water line) would vary from 60 feet to 80 feet). Island height would vary from 423 to 426 NGVD.

5. Dredging. Two types of lake dredging was considered, minor dredging as by-product of constructing other project features, and major dredging as a project feature in itself.

Minor dredging associated with the dike/levee, closures, an islands development was found to be not only the most cost effective way of constructing those features, but it also provided deep water fish habitat at no additional cost to the project. On the other hand, dredging per as a project feature was found to be extremely costly to the extent that the gain in biological benefits were not considered to be worth the cost. A 6-foot deep sediment cut over a one acre area would cost in excess of $30,000 regardless of the type of dredging method employed.

TABLE S-11

**INCREMENTAL HABITAT ANALYSIS -
COMBINED ISLANDS LENGTH 1/**

Option (Ln Ft Island)	Total Estimated Feature Cost ($ Millions)	Cumulative Annual Cost ($ Thousands)	Incremental Annual Cost ($ Thousands)	Av. Annual Habitat Unit Gain						Av. Annual Cost per Av. Annual Habitat Unit Gain ($)					
				Total			Incremental			Total			Incremental		
				Fish	Waterfowl	Combined	Fish	Waterfowl	Combined	Fish	Waterfowl	Combined	Fish	Waterfowl	Combined
4,000	0.3	27	27	71	47	118	71	47	118	380	574	229	380	574	229
12,000	0.9	81	54	94	70	164	23	23	46	862	1,157	494	2,348	2,348	1,174

1/ Based on Preliminary Costs.

6. Water Control Structures. Design optimization for the water control structures included gate type, gate distribution, gate sizing, pump number/sizing, pump type, pump site locations, and other considerations.

Gate Type. There was an agreement from the inter-agency meetings that closed system gated structures (i.e., gated CMP) are acceptable in project locations where fish movement is not critical. On the other hand, an open system (i.e., sluice gate and/or stop-log gated structures with an open topped concrete channel) should be used in locations where both water passage and fish movement is critical. The preference for open top structures has to do with concern among fisheries biologists that dark closed structures may not be adequate for effective fish movement. Little information exists in the scientific literature regarding this concern. SIU-C has expressed an interest in studying fish movement at post-project Swan Lake, in an effort to determine the actual role that structures may plan on fish movement.

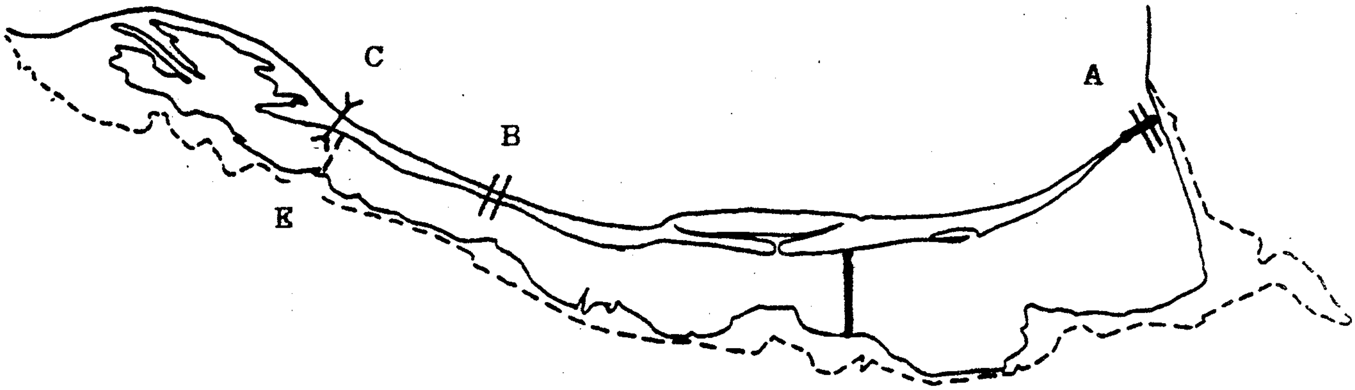
Four types of gate designs for use with an open system were considered. These were stop-log, staggered sluice gates, combination sluice gates/stop-log structures, and radial arm gates. An all stop-log structure, while being the least expensive gate device, was not considered acceptable to the sponsor. For making gross adjustments to lake water elevation following interior storm events, stop-logs can be time consuming and difficult to remove when there is a head differential. At the other extreme, in terms of cost is an all sluice gate operated system. The gates could be staggered so one gate would have its invert at the lake bottom for efficient water removal from the site when a gross water level adjustment is required. Other sluice gates could be placed with higher inverts to essentially provide an overflow capability for minor lake adjustments. However, since such use of a gate for overflow purposes is not flow efficient, it would take a number of these expensive gates (4 additional gates). This option was rejected by the sponsor in the interest of reducing overall project costs.

A compromise between the ease of operation of the sluice gate and the cost-efficiency of the stop-log system is a structure combining the two. Under this configuration, 1-72 inch sluice gate and a 20 foot span concrete channel with 4-5 foot wide stop-log bays would accomplish the same task. The structure can be operated in such a manner that a head pressure does not exist when there is an infrequent need to move the stop-logs. The short width of the stop-logs also facilitates their removal from the structure. The stop-log structure would serve as an overflow for minor lake adjustments, and the sluice gate would be used when a need for gross water level adjustments is required. In addition, at times when the river and lake levels are roughly equal, the stop-logs could be completely removed to facilitate fish movement. The large sluice gate may also serve to facilitate fish movement at certain times of the year. This configuration was acceptable to the project sponsor. SIU-C has indicated this configuration appears to suitable for a post-project fish movement study they would like to conduct.

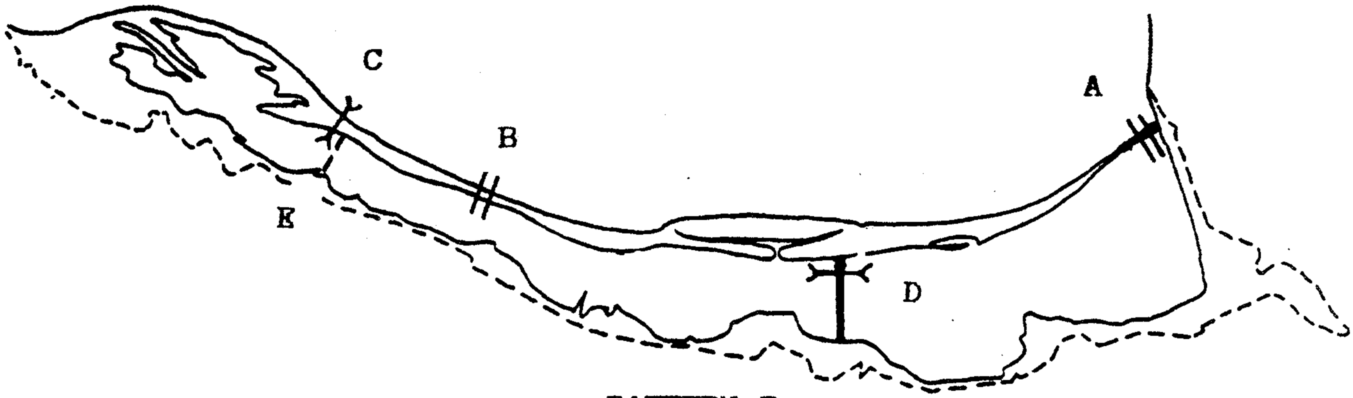
The use of a radial gate concept was suggested but was subsequently dropped. Radial gates work with a head differential in one direction. Since the project area head differential is bidirectional, this option was not considered further.

Gate Distribution. FIGURE S-8 shows two alternative gate distribution patterns considered for the project. The only real difference in distribution is whether a gated culvert is placed at location D. These structures, in concert with the operation of other lake water control structures, would

ALTERNATIVE GATE DISTRIBUTION PATTERNS



PATTERN A



PATTERN B

GATED CMP (CLOSED SYSTEM)

GATED CONCRETE CHANNEL (OPEN SYSTEM)

FIGURE S-8

permit the introduction of additional amounts of water (due to the effect of river slope) into the lake compartments prior to pump activation. At location D, fish movement is not critical, so the structure is a closed CMP.

At the present time, water is controlled at the upper Swan/Fuller Lake site via a 36" CMP through the IDOC closure structure (FIGURE S-8, location E). The HREP project would diminish the utility of this structure, since Swan Lake would no longer be a simple hydrological extension of the Illinois River. Accordingly, a new water control structure, and a drainage ditch, would be necessary to drain the lower end of this management unit to the river. Since this area is almost totally drained each year for water food production, its utility to fish is minimal, and thus the less expensive option of a gated CMP was applied.

Middle and lower Swan Lake will remain as watered compartments all year (except on bottom solidification years) and thus have a potential fisheries value. Consistent with the need for direct access between the lake and river to these compartments, both distribution patterns incorporate open system structures. To minimize the cost of ditch dredging, structure B would be placed along the narrowest segment of peninsula adjacent to the middle compartment. Likewise, the narrowest location for the placement of structure A is through the lower lake closure. Structure A was also placed on the Calhoun Point side of the closure to take advantage of the adjacent river bank for reducing cofferdam associated costs.

Due to the perceived economy of structure D, the USFWS opted for distribution pattern B.

Gate Sizing. The maximum frequency and duration storm event that the sponsors considered reasonable to contend with during routine project management is a 2-year, 24-hour storm event of a 10-day duration. Accordingly, all water control structures were sized to meet this condition. The acre-feet of water in each compartment associated with this magnitude event is presented in TABLE S-12. The corresponding gate number/size and preliminary costs for individual structures is presented in TABLE S-13.

Structures were not sized, in an attempt to reduce the possibility for damages to adjacent west shore private properties. The reason for this is that the mere act of sealing off the large existing connection between the lake and river significantly alters the lake's future hydrology. Even with the placement of numerous large (and costly) gates across the closure, the same problem remains, eventually interior effects will be caused that did not exist in the absence of a project. Real estate acquisition appears to be the only reasonable mechanism for addressing the situation.

The gates were not sized to achieve the desirable 1-foot head differential needed, prior to river overtopping of the dike/levee. The need for such backwater flooding is to be accommodated by a 2,000 foot long rip-rapped overflow section in the lower dike/levee structure.

Pump Number/Sizing. Within both the middle and lower Swan Lake compartments, separate pumping facilities would be needed. Four types of pumping situations could exist. Each of the pumping situations and the pumping capacity needed are given in TABLE S-14. The direction of pumping is, at times, to the river, and, at times, to the lake.

TABLE S-12

ACRE FEET OF WATER ASSOCIATED WITH 2-YEAR, 24-HOUR INTERIOR STORM EVENT

Segment	24-Hour Event (Ac-Ft)
Lower Swan Lake	1,688
Middle Lake	1,799
Upper Swan/Fuller Lakes	462

TABLE S-13

GATE NUMBER/SIZE AND PRELIMINARY COSTS (THOUSANDS)

Structure			Location			
			Interior Closure	Peninsula		
System	Gate Type	Channel Type		Lower Swan Lake	Middle Swan Lake	Upper Swan Lake
Closed	Sluice	CMP	1-48" Sluice (21)	--	--	1-48" Sluice (21)
Open	Sluice	20′ Wide Concrete		1-72" Sluice	1-72" Sluice	
		20′ Wide, Concrete		4-SL 5′ W	4-SL 5′ W	
				(107)	(107)	

(#) = Associated costs; no contingencies, S&A, E&D

TABLE S-14

Situation	Pumping Requirements for Middle or Lower Compartments
Recharge	13,000 GPM
Dewater-Plant Production	6,000 GPM
Dewater-Bottom Solidification	10,000 GPM
Discharge Watershed Runoff	20,000 GPM (20-Day Release)

Based on the above data, the District recommends 20,000 GPM's of pumping capacity for each of the two compartments. Considering the bi-directional need for pumping, this capacity could be met with either 2-20,000 GPM pumps installed at both the middle and lower Swan Lake closures (one placed riverside and the other lakeside), or with single but reversible 20,000 GPM reversible pumps. This latter option was selected for reasons of cost-effectiveness.

In Draft DPR, no pumps were proposed for the upper Swan/Fuller Lake compartment, the district assumed that this area was already adequately equipped for pumping. IDOC strongly disagreed with that position, stating that the present capabilities (4 portable pumps for managing 11 river sites) are insufficient to provide reliable habitat management at this site. IDOC believes that with a dedicated pump, the certainty of habitat benefits would be assured. Having reassessed this matter, the District now concurs with IDOC, and a pump at the site is now included in the recommended plan for the project.

Pump sizing desired by IDOC for upper Swan/Fuller Lake is a delivery of 3 feet of water in 10 - days, a rate that IDOC says is consistent with IDOC operations elsewhere. The District's hydraulic analysis indicates that a 20,000 GPM unit would be needed to achieve this capability.

Pump Type. Several types of pumps were considered: portable Crisafulli, fixed Couch, and fixed submersible. Of these, only the belt driven couch pump was found to be acceptable to the sponsors. This preference was primarily because of the known long-term reliability of the couch pump in river management. Also, an important consideration was the fact that the couch pump can be made reversible to cut down on the total cost for pumps. Sponsor stated drawbacks to the Crisafulli pump were the fact that it requires specially designed ramps to set the pump at a required angle, and the fact that it is a difficult piece of equipment to move around. A major drawback to the submersible pump is that it could become ice damaged if not raised up out of the water prior to winter.

Pump Site Locations. The siting of the pumps is related to two factors, (1) separate pumps are needed for each of the independently managed compartments, and (2) a couch pump should not be used to transport water more than 150 feet. With these two constraints, the locations of the water control structures are the logical places for the pumps. To achieve its reversible capability, each pump would be permanently mounted within the sluice gate chamber. With the lake side sluice gate, and a riverside sliding gate, the source of water input to the pump could be altered between the river and lake. With a T-pipe and two butterfly valves, the pump discharge could also be directed to either the river or lake. The couch pump would be of the vertical, rather than angular, mounting type.

<u>Other Considerations</u>.

Vehicle Traffic. Water control units would be provided with a concrete slab over the channel to allow for the movement of vehicles.

Stop-Logs. During the Plans and Specifications phase of the project, an attempt would be made to design stop-logs that are light weight and provide a fairly tight seal.

Vandal Proofing. P&S phase would consider the application of stop-log storage racks, pump and gate locking devices to help reduce the potential for vandalism.

Sluice Gate Operation. The sluice gates would be of a design that would allow for both manual and powered gate operation.

Gauges. Both staff gauges and automatic water level gauges would be provided in the vicinity of the water control structures. Staff gauges would be placed riverside of all 3 compartments, and lakeside of the middle and lower Swan Lake compartments. Automatic gauges would also be placed lakeside of the middle and lower compartments, but only riverside of the upper compartment. The staff gauges would be used as a calibration and a back-up to the automatic gauges, and would also provide a direct readout of water level conditions to operations personnel. The automatic gauges would transmit water level information on a continuous basis to a St. Louis District data bank. With the use of a standard PC and modem, refuge personnel would be able to tap this data at any time of the day for an instantaneous reading on management unit conditions. This system should dramatically reduce the time required to check the site by refuge personnel.

Ditches. The major portion of the site water conveyance system would consist of the main drainage ditch and lateral drainage ditches created during dike/levee and island construction. However, in addition, ditches would need to be cut between the main ditch, and the water control structures, in the middle Swan Lake and Upper Swan Lake compartments.

Emergency Repair Provisions. The concrete channels would be equipped with grooves on either side of the control gates for the insertion of stop-logs, in the event the gate chamber must be drained and the gates serviced.

Fish Screens. The need for fish screens at the project site is difficult to assess. While in actual river management practice, the need for fish screens has been ignored, power plant studies indicate increased entrainment mortality at water velocities greater than 0.3 to 0.5 ft/sec. The water velocities at the Swan Lake project pump units would be about 1.25 ft/sec suggesting that at least some mortality may be possible. Project pump units would operate with water velocities of about 1.25 ft/sec. suggesting at least some mortality may be possible.

Fish screens have been included in the project design, since (1) a potential for entertainment mortality exists, (2) fish screens can be included at low cost, and (3) they provide a unique opportunity to evaluate the potential effectiveness of such structures.

In evaluating the design for this feature, two factors were considered: (1) the location of the screen and (2) the sizing of the screen.

The most obvious location to place a fish screen is at the entrance to the pump chamber. Using a chain hoist, a gate (10 feet wide) placed at this location, would still be manageable from a maintenance standpoint. The water velocity at this location would be 0.75 ft/sec. To achieve a velocity of 0.5 ft/sec. would require wall modifications and a chamber opening of 15 feet. While possible to create such an opening, the design of a screen with a mesh small enough to exclude very small fish, while at the same time not creating a water flow capacity problem, does not appear to be feasible. The District believes that the screen mesh should not be less than 1.5 in X 1.5 in, or else significant amounts of debris would collect and this would impede water flow to the pump.

Since fish not able to pass through a 1.5 inch opening would likely be able to withstand a water velocity of at least 0.75 ft/sec, the most cost-efficient screen would be one placed at the 10-foot wide chamber opening. While unlikely, to totally eliminate fish entrainment, it would be hoped that this device would at least lessen the severity of the problem.

Pump Pads. A flat concrete pad would be placed alongside each pump location to park the power unit for each pump during use periods.

Power Units/Fuel Tanks. One portable diesel power unit would be provided for each couch pump. Two 1,000 gallon mobile fuel tanks units would also provided

APPENDIX DPR-T

DETAILED PROJECT COST ESTIMATE

FOREWORD

APPENDIX DPR-T provides a detailed display of project associated costs for each of the construction cost categories presented in Section 6 of the main DPR.

BASELINE COST ESTIMATE

SWAN LAKE - REVISED PER COMMENTS

S U M M A R Y

22 DECEMBER 1992

ACCOUNT NO.	DESCRIPTION OF ITEM	ESTIMATED COST
04.-.-.-	DAMS ----------------------------------	$ 882,000
06.-.-.-	FISH AND WILDLIFE FACILITIES ---------	47,000
08.-.-.-	ROADS, RAILROADS AND BRIDGES ---------	39,000
11.-.-.-	LEVEES AND FLOODWALLS ----------------	3,248,000
13.-.-.-	PUMPING PLANT -----------------------	1,493,000
18.-.-.-	CULTURAL RESOURCE PRESERVATION -------	142,000
	SUBTOTAL ----------------------------	$ 5,851,000
30.-.-.-	PLANNING, ENGINEERING AND DESIGN -----	1,196,000
31.-.-.-	CONSTRUCTION MANAGEMENT -------------	807,000
	TOTAL PROJECT COST ------------------	$ 7,854,000

John W. Dierker, P.E.
Chief, Cost Engineering Branch

Sharon Cotner
Project Manager

Jack R. Niemi, P.E.
Deputy District Engineer
For Project Management

SECTION I - BASIS OF ESTIMATE
SWAN LAKE - REHABILITATION AND ENHANCEMENT

1-01. GENERAL

The major components of the project consist of a riverside levee, water control structures, hillside sediment control structure, interior closures, and island groups. This cost estimate has been developed using previous cost estimates, current designs and quantity take-offs, recent bid abstracts for projects in the area, field investigations and estimator judgement. The initial MCACES baseline cost estimate was prepared using the Code of Accounts format. During the review process the Work Breakdown Structure(WBS) was issued for new estimates. Since the MCACES program does not allow the account numbers to be changed, a new estimate would be required in order to show the WBS accounts. This would create additional project costs and not enchance the accuracy of the estimate. Hence, the revised estimate remains in the Code of Accounts format. Item totals were rounded to the nearest thousand and transfered to a summary sheet. An appropriate contingency was applied to each line item of cost. The Price Level for this estimate is October 1991.

1-02. DISCUSSION OF RELIABILITY OF DESIGNS, QUANTITIES, AND UNIT PRICES.

a. Sediment Control Devices. The costs for this item were provided by the Soil Conservation Service(SCS). These costs were put into the MCACES estimate as lump sum items. Contingencies were included with the estimate from SCS.

b. Semi-Compacted Fill. Approximately 70,000 CY of borrow material to be used for the boat ramps, levee ramps, and earthen levee will be transported by scrapers from a borrow area located a maximum of two miles from the fill areas. Field investigations indicate it is reasonable to expect borrow excavation by scrapers with some assistance from dozers. A higher contingency of 25% was assigned to this item due to uncertainty of soil moisture during the construction period, and approximate haul distance to fill sites.

c. Excavation. Approximately 250,000 CY of channel material to be used for the construction of the levee, interior closure, and middle island will be excavated using a clamshell dragline mounted on a spud barge. This material will be placed on the levee alignment and shaped after the material dries. A contingency of 25% was assigned to this item due to uncertainty in predicting the angle of repose of the material and the production rates associated with the clamshell operations.

d. <u>Seeding (Main Levee).</u> After the main levee is constructed and shaped to grade the slopes will be hydroseeded. The quantity was determined by making assumptions as to the final location of the clamshelled material. A contingency of 25% was assigned to cover costs for additional seeding if the spread area of the material is greater than anticipated.

e. <u>Willow Wattlings/Cuttings.</u> This new innovative technique of erosion control for shoreline protection is being proposed for the first time in this district. A contingency of 30% was assigned to cover uncertainties associated with a new erosion control idea and the difficulty of quantifying the amount of wattlings and cuttings to be placed on the shoreline.

f. <u>Gates & Stop Logs.</u> A higher contingency of 25% was assigned to account for uncertainties in material price escalation for these items.

g. <u>Dewatering.</u> A contingency of 25% was assigned to this item due to the difficulty in developing a cost, because of the uncertainty of the project construction date which will affect the amount of water which will need to be removed.

h. <u>Fish Screens.</u> Even though a preliminary design has been accomplished for this item, it is the type of feature that is subject to numerous changes in further stages of project development. A contingency of 35% was assigned to this item due to design uncertainty as to what is best suited for this project.

1-03. DISCUSSION OF SENSITIVE ITEMS.

These items include excavating and transporting semi-compacted fill by scrapers, excavating by clamshell, hydroseeding, bankline protection dewatering, and fish screens. We believe these are the items which will have the greatest impact on the costs of this project. Reasonable prices have been established for these items, but due to uncertainties the contingencies were assigned at 25% or greater.

1-04. DISCUSSION OF VARIABLE CONTINGENCIES.

The cost estimate on this project includes contingencies ranging in value from 15% to 35%. Assigned contingencies are based on the inherent difficulties in visualizing and quantifying certain types of work; such as levee embankment, excavation, seeding, dewatering and fish screens. Generally, a contingency of 15 to 20 percent was utilized for this project which was felt to be reasonable at this stage of development.

1-05. <u>DISCUSSION OF UNCERTAINTIES ASSOCIATED WITH MAJOR ITEMS.</u>

A major part of this project is the excavation of channel material by clamshell mounted on a spud barge and material placed on the levee alignment for drying and shaping. A review of similar work for other districts and an analysis of the required work indicated that the excavation unit prices used are reasonable. Pumps and accessories associated with the pump station is another significant item that has been priced using previous bid prices and estimators judgement to arrive at a reasonable cost.

1-06. <u>DISCUSSION OF REDUCTION OF UNCERTAINTIES DURING FUTURE DESIGN.</u>

It is assumed that project features will be further refined during subsequent design efforts. Project features that show opportunities for reduction of uncertainty are, the earthen levee, clamshell excavation, pump station/control structure, shoreline protection, dewatering and fish screens.

John W. Dierker
Chief, Cost Engineering Branch

SWAN LAKE - REVISED PER COMMENTS
REHABILITATION AND ENHANCEMENT
POOL 26, ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS
DEFINITE PROJECT REPORT, DEC 91

Designed By: CORPS OF ENGINEERS,ST.LOUIS DIST
Estimated By: CELMS-ED-C, COST ENG. BRANCH

Prepared By: G. DYN, C. RHOADS, & S. DOMBI
REVIEWED BY: JOHN W. DIERKER

Date: 12/22/92
Est Construction Time: 720 Days

M C A C E S G O L D E D I T I O N

Release 5.20J

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** PROJECT OWNER SUMMARY - LEVEL 1 **

		QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
04	DAMS		882,200	0	882,200	
06	FISH AND WILDLIFE FACILITIES		39,663	7,411	47,074	
08	ROADS,RAILROADS, AND BRIDGES		34,323	4,803	39,126	
11	LEVEES AND FLOODWALLS		2,684,678	563,508	3,248,186	
13	PUMPING PLANT		1,252,927	240,329	1,493,256	
18	CULTURAL RESOURCE PRESERVATION		128,664	12,866	141,530	
30	PLANNING, ENGINEERING,AND DESIGN		1,109,700	86,501	1,196,201	
31	CONSTRUCTION MANAGEMENT		697,000	109,860	806,860	
	SWAN LAKE - REVISED PER COMMENTS	1.00 EA	6,829,155	1,025,278	7,854,432	7854432

** PROJECT OWNER SUMMARY - LEVEL 2 **

	QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
04 DAMS					
04.-.-.- HILLSIDE SEDIMENT CONTROL STRUCT		749,980	0	749,980	
04.-.-.A ADMINISTRATIVE COST-SOIL CONSER-		132,220	0	132,220	
DAMS		882,200	0	882,200	
06 FISH AND WILDLIFE FACILITIES					
06. 3.A PARKING LOT & BOAT RAMP (MIDDLE)		20,783	3,918	24,700	
06. 3.B PARKING LOT & BOAT RAMP (LOWER)		18,880	3,493	22,373	
FISH AND WILDLIFE FACILITIES		39,663	7,411	47,074	
08 ROADS,RAILROADS, AND BRIDGES					
08.2.-.A ROADS-RELOCATED GRAVEL RD		26,520	3,287	29,807	
08.2.-.B ROADS-LEVEE CROSSING RAMPS, 2EA		6,710	1,321	8,032	
08.2.-.C ROADS-ACCESS RAMP		1,092	195	1,287	
ROADS,RAILROADS, AND BRIDGES		34,323	4,803	39,126	
11 LEVEES AND FLOODWALLS					
11.0.1 A EARTHEN LEVEE		1,872,984	404,766	2,277,750	
11.0.1 B 48" GRAVITY DRAIN (MIDDLE&LOWER)		31,766	5,010	36,776	
11.0.1 C COFFERDAM FOR GRAVITY DRAIN		107,139	17,040	124,179	
11.0.1 E INTERIOR CLOSURE		248,341	42,907	291,248	
11.0.1 F ISLAND CONSTRUCTION (MIDDLE)		208,338	50,819	259,157	
11.0.1 G EXISTING ROCK CLOSURE		35,997	5,400	41,397	
11.0.1 H SHORELINE & BANKLINE PROTECTION		70,336	21,101	91,437	
11.0.1 I MISCELLANEOUS		109,776	16,466	126,243	
LEVEES AND FLOODWALLS		2,684,678	563,508	3,248,186	
13 PUMPING PLANT					
13.0.-.A PUMP STATION/CONTROL STRUCTURE		561,791	107,600	669,391	
13.0.-.B PUMP STATION/CONTROL STRUCTURE		411,162	79,129	490,291	
13.0.-.C PUMP STATION/CONTROL STRUCTURE		279,975	53,600	333,575	
PUMPING PLANT		1,252,927	240,329	1,493,256	
18 CULTURAL RESOURCE PRESERVATION					
18.-.-.- DISTRICT LABOR (CELMS)		33,766	3,377	37,143	

	QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
18.0.1.- FIELD WORK		57,179	5,718	62,897	
18.0.2.- DATA ANAYLISIS/REPORT PREP.		31,089	3,109	34,198	
18.0.3.- CURATION		6,630	663	7,293	
CULTURAL RESOURCE PRESERVATION		128,664	12,866	141,530	
30 PLANNING, ENGINEERING,AND DESIGN					
30.A.-.- PLANNING (Preparation of DPR)		677,000	0	677,000	
30.C.-.- MEMORANDUM OF AGREEMENT		5,000	0	5,000	
30.D.2.- ENVIRONMENTAL AND REGULATORY		4,500	900	5,400	
30.H.-.- PLANS AND SPECIFICATIONS		295,000	61,001	356,001	
30.J.-.- ENGINEERING DURING CONSTRUCTION		65,200	13,600	78,800	
30.M.-.- COST ENGINEERING		20,000	4,000	24,000	
30.N.-.- CONSTRUCTION AND SUPPLY CONTRACT		15,000	3,000	18,000	
30.P.-.- PROJECT MANAGEMENT		20,000	4,000	24,000	
30.Z.-.- MISCELLANEOUS ACTIVITIES		8,000	0	8,000	
PLANNING, ENGINEERING,AND DESIGN		1,109,700	86,501	1,196,201	
31 CONSTRUCTION MANAGEMENT					
31.B.-.- CONTRACT ADMINISTRATION		100,000	17,003	117,003	
31.C.-.- BENCHMARKS AND BASELINES		5,000	834	5,834	
31.D.-.- REVIEW OF SHOP DRAWINGS		53,700	10,301	64,001	
31.E.-.- INSPECTION AND QUALITY ASSURANCE		59,700	10,302	70,002	
31.F.-.- PROJECT OFFICE OPERATION		449,000	49,021	498,021	
31.H.-.- CONTRACTOR INITIATED CLAIMS AND		18,000	18,000	36,000	
31.P.-.- PROJECT MANAGEMENT		11,600	4,400	16,000	
CONSTRUCTION MANAGEMENT		697,000	109,860	806,860	
SWAN LAKE - REVISED PER COMMENTS	1.00 EA	6,829,155	1,025,278	7,854,432	7854432

		QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
04 DAMS							
04.-.-.- HILLSIDE SEDIMENT CONTROL STRUCT							
04.-.-.-	A PONDS	55.00	EA	412,610	0	412,610	7502.00
04.-.-.-	B TERRACES	40.00	EA	100,004	0	100,004	2500.10
04.-.-.-	C BASINS	95.00	EA	237,366	0	237,366	2498.58
	HILLSIDE SEDIMENT CONTROL STRUCT			749,980	0	749,980	
04.-.-.A ADMINISTRATIVE COST-SOIL CONSER-							
	ADMINISTRATIVE COST-SOIL CONSER-			132,220	0	132,220	
	DAMS			882,200	0	882,200	
06 FISH AND WILDLIFE FACILITIES							
06. 3.A PARKING LOT & BOAT RAMP (MIDDLE)							
06. 3.A	2 CA-10 CRUSHED STONE	690.00	TON	8,935	1,340	10,276	14.89
06. 3.A	3 QUARRY RUN STONE-BOAT RAMP	145.00	TON	2,243	449	2,691	18.56
06. 3.A	4 SEMI-COMPACTED EMBANKMENT	1485.00	CY	5,196	1,299	6,495	4.37
06. 3.A	5 STRIPPING	470.00	CY	1,042	156	1,198	2.55
06. 3.A	6 SEEDING	0.20	ACR	257	51	308	1542.07
06. 3.A	7 CLEARING	0.30	ACR	471	94	565	1883.13
06. 3.A	8 14 FT. ACCESS GATE	1.00	EA	2,639	528	3,167	3166.63
	PARKING LOT & BOAT RAMP (MIDDLE)			20,783	3,918	24,700	
06. 3.B PARKING LOT & BOAT RAMP (LOWER)							
06. 3.B	1 CA-10 CRUSHED STONE	660.00	TON	8,547	1,282	9,829	14.89
06. 3.B	2 QUARRY RUN STONE-BOAT RAMP	145.00	TON	2,243	449	2,691	18.56
06. 3.B	3 SEMI-COMPACTED EMBANKMENT	1465.00	CY	5,126	1,282	6,408	4.37
06. 3.B	4 STRIPPING	470.00	CY	1,042	156	1,198	2.55
06. 3.B	5 SEEDING	0.20	ACR	257	51	308	1542.07
06. 3.B	6 CLEARING	0.30	ACR	471	94	565	1883.13
06. 3.B	7 CMP - 18 INCH DIA.	30.00	LF	697	105	801	26.71
06. 3.B	8 CMP END SECTION-18 IN.	2.00	EA	460	69	529	264.48
06. 3.B	9 CRUSHED STONE-1 IN. MINUS	3.00	TON	38	6	44	14.57
	PARKING LOT & BOAT RAMP (LOWER)			18,880	3,493	22,373	
	FISH AND WILDLIFE FACILITIES			39,663	7,411	47,074	

			QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
08 ROADS,RAILROADS, AND BRIDGES								
08.2.-.A ROADS-RELOCATED GRAVEL RD								
08.2.-.A	2	CRUSHED STONE CA-10	1780.00	TON	23,050	2,766	25,816	14.50
08.2.-.A	3	STRIPPING	1565.00	CY	3,470	521	3,991	2.55
		ROADS-RELOCATED GRAVEL RD			26,520	3,287	29,807	
08.2.-.B ROADS-LEVEE CROSSING RAMPS, 2EA								
08.2.-.B	1	SEMI-COMPACTED EMBANKMENT	900.00	CY	3,149	787	3,937	4.37
08.2.-.B	2	CRUSHED STONE CA-10	275.00	TON	3,561	534	4,095	14.89
		ROADS-LEVEE CROSSING RAMPS, 2EA			6,710	1,321	8,032	
08.2.-.C ROADS-ACCESS RAMP								
08.2.-.C	1	SEMI-COMPACTED EMBANKMENT	90.00	CY	315	79	394	4.37
08.2.-.C	2	CRUSHED STONE CA-10	60.00	TON	777	117	894	14.89
		ROADS-ACCESS RAMP			1,092	195	1,287	
		ROADS,RAILROADS, AND BRIDGES			34,323	4,803	39,126	
11 LEVEES AND FLOODWALLS								
11.0.1 A EARTHEN LEVEE								
11.0.1 A	2	SEMI-COMPACTED EMBANKMENT (1on3)	64800.00	CY	228,564	57,141	285,705	4.41
11.0.1 A	3	EXCAVATION (1on4)	195000.00	CY	903,983	225,996	1,129,979	5.79
11.0.1 A	4	CLEARING	90.00	ACR	147,400	22,110	169,509	1883.44
11.0.1 A	5	CRUSHED STONE (CA-10)	12000.00	TON	155,396	23,309	178,705	14.89
11.0.1 A	6	"C" STONE	10550.00	TON	177,468	26,620	204,089	19.34
11.0.1 A	7	"B" STONE	5840.00	TON	98,238	14,736	112,974	19.34
11.0.1 A	8	CMP-18" DIA.	70.00	LF	1,626	244	1,869	26.71
11.0.1 A	9	CMP END SECTION-18"	2.00	EA	460	69	529	264.48
11.0.1 A	10	CRUSHED STONE-1" MINUS	7.00	TON	89	13	102	14.57
11.0.1 A	11	ASPHALTIC CONCRETE	13.00	TON	704	141	845	64.99
11.0.1 A	12	AGGREGATE BASE COURSE-8"	34.00	TON	440	66	506	14.89
11.0.1 A	13	BARRICADE - 10 FT	2.00	EA	528	106	633	316.66
11.0.1 A	14	ACCESS GATE - 14 FT	2.00	EA	5,278	792	6,069	3034.68
11.0.1 A	15	STRIPPING (BORROW AREA)	8365.00	CY	18,548	2,782	21,330	2.55
11.0.1 A	16	CLEARING (BORROW AREA)	3.00	ACR	4,708	706	5,414	1804.67
11.0.1 A	17	SEEDING (BORROW AREA)	3.00	ACR	3,855	771	4,626	1542.07
11.0.1 A	18	SEEDING (MAIN LEVEE)	81.00	ACR	103,090	25,773	128,863	1590.90
11.0.1 A	19	HAY BAILS	30600.00	LF	22,610	3,391	26,001	0.85

			QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
		EARTHEN LEVEE			1,872,984	404,766	2,277,750	
11.0.1 B		48" GRAVITY DRAIN (MIDDLE&LOWER)						
11.0.1 B	6	SLUICE GATE & OPER-48" DIA	1.00	EA	12,667	1,900	14,566	14566
11.0.1 B	7	CMP - 48" DIA	31.00	LF	1,983	297	2,280	73.56
11.0.1 B	8	END SECTIONS - 48"	2.00	EA	1,559	234	1,792	896.16
11.0.1 B	9	RISER PIPE - 72" DIA	8.50	LF	1,346	202	1,548	182.08
11.0.1 B	10	CONCRETE BASE	8.00	CY	1,689	338	2,027	253.33
11.0.1 B	11	CRUSHED STONE-3" MINUS	400.00	TON	6,318	948	7,266	18.17
11.0.1 B	12	CRUSHED STONE-6" MINUS	190.00	TON	3,001	450	3,451	18.17
11.0.1 B	13	GEOGRID	200.00	SY	2,111	422	2,533	12.67
11.0.1 B	14	GEOTEXTILE	460.00	SY	1,092	218	1,311	2.85
		48" GRAVITY DRAIN (MIDDLE&LOWER)			31,766	5,010	36,776	
11.0.1 C		COFFERDAM FOR GRAVITY DRAIN						
11.0.1 C	1	"C" STONE	5040.00	TON	84,781	12,717	97,498	19.34
11.0.1 C	2	CRUSHED STONE	230.00	TON	2,978	447	3,425	14.89
11.0.1 C	3	PLASTIC LINER	1360.00	SY	19,380	3,876	23,256	17.10
		COFFERDAM FOR GRAVITY DRAIN			107,139	17,040	124,179	
11.0.1 E		INTERIOR CLOSURE						
11.0.1 E	1	EXCAVATION	12200.00	CY	56,557	14,139	70,696	5.79
11.0.1 E	2	CLEARING	1.00	ACR	1,569	235	1,805	1804.67
11.0.1 E	3	"C" STONE REVETMENT	11250.00	TON	189,244	28,387	217,630	19.34
11.0.1 E	4	CRUSHED STONE (CA-10)	75.00	TON	971	146	1,117	14.89
		INTERIOR CLOSURE			248,341	42,907	291,248	
11.0.1 F		ISLAND CONSTRUCTION (MIDDLE)						
11.0.1 F	1	EXCAVATION (MIDDLE)	15900.00	CY	73,709	18,427	92,137	5.79
11.0.1 F	2	EXCAVATION (LOWER)	25350.00	CY	117,518	29,379	146,897	5.79
11.0.1 F	3	SEEDING	7.00	ACR	8,909	1,782	10,691	1527.26
11.0.1 F	4	HAY BAILS	11100.00	LF	8,202	1,230	9,432	0.85
		ISLAND CONSTRUCTION (MIDDLE)			208,338	50,819	259,157	
11.0.1 G		EXISTING ROCK CLOSURE						
11.0.1 G	1	CLEARING	1.50	ACR	2,354	353	2,707	1804.67

			QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
11.0.1 G	2	"C" STONE REPAIR	2000.00 TON	33,643	5,046	38,690	19.34
		EXISTING ROCK CLOSURE		35,997	5,400	41,397	
11.0.1 H		SHORELINE & BANKLINE PROTECTION					
11.0.1 H	1	WILLOW WATTLINGS(MIDDLE/ISLANDS)	2700.00 LF	11,400	3,420	14,820	5.49
11.0.1 H	2	WILLOW CUTTINGS(MIDDLE/ISLANDS)	15200.00 SF	2,407	722	3,129	0.21
11.0.1 H	3	WILLOW WATTLINGS(LOWER/ISLANDS)	4700.00 LF	19,844	5,953	25,797	5.49
11.0.1 H	4	WILLOW CUTTINGS(LOWER/ISLANDS)	26700.00 SF	4,227	1,268	5,496	0.21
11.0.1 H	5	WILLOW CUTTINGS(UPPER/LEVEE)	205000.00 SF	32,458	9,737	42,195	0.21
		SHORELINE & BANKLINE PROTECTION		70,336	21,101	91,437	
11.0.1 I		MISCELLANEOUS					
11.0.1 I	1	AUTOMATIC GAGING STATION	3.00 EA	31,666	4,750	36,416	12139
11.0.1 I	2	STAFF GAGE	6.00 EA	6,333	950	7,283	1213.87
11.0.1 I	3	SILT SCREEN	12000.00 SF	63,333	9,500	72,832	6.07
11.0.1 I	4	WATER QUALITY TESTS	160.00 EA	8,444	1,267	9,711	60.69
		MISCELLANEOUS		109,776	16,466	126,243	
		LEVEES AND FLOODWALLS		2,684,678	563,508	3,248,186	
13		PUMPING PLANT					
13.0.-.A		PUMP STATION/CONTROL STRUCTURE					
13.0.-.A	2	REINFORCED CONCRETE	400.00 CY	105,554	21,111	126,665	316.66
13.0.-.A	3	STRUCTURAL STEEL	26400.00 LB	48,766	9,753	58,519	2.22
13.0.-.A	4	SLUICE GATE W/OPERATOR-72"x72"	2.00 EA	46,444	11,611	58,055	29027
13.0.-.A	5	SLIDE GATE W/HARDWARE-72"x72"	2.00 EA	25,333	6,333	31,666	15833
13.0.-.A	6	GUARD RAIL	200.00 LF	3,705	556	4,260	21.30
13.0.-.A	7	GEOTEXTILE	1070.00 SY	2,541	381	2,922	2.73
13.0.-.A	8	STOP LOGS (4x6 OAK TIMBERS)	1280.00 SF	4,053	1,013	5,067	3.96
13.0.-.A	9	CONCRETE PARKING BLOCKS	4.00 EA	120	24	144	36.10
13.0.-.A	10	CRUSHED STONE CA-10	30.00 TON	388	58	447	14.89
13.0.-.A	11	PUMP AND ACCESSORIES	2.00 EA	141,179	21,177	162,356	81178
13.0.-.A	12	GENTRY CRANE W/HOIST	2.00 EA	1,647	329	1,976	987.99
13.0.-.A	13	STRUCTURAL EXCAVATION	6000.00 CY	13,536	2,707	16,243	2.71
13.0.-.A	14	EXCAVATED EMBANKMENT	6000.00 CY	13,304	2,661	15,965	2.66
13.0.-.A	15	EMBANKMENT, BORROW	3200.00 CY	15,807	2,371	18,178	5.68
13.0.-.A	16	DEWATERING		63,758	15,939	79,697	
13.0.-.A	17	DITCH EXCAVATION	14350.00 CY	44,330	6,649	50,979	3.55
13.0.-.A	18	CLEARING FOR DITCH EXCAVATION	1.00 ACR	1,569	314	1,883	1883.13
13.0.-.A	19	"C" STONE FOR DITCH EMBANKMENT	1725.00 TON	29,017	4,353	33,370	19.34
13.0.-.A	20	FISH SCREENS	2.00 EA	739	259	997	498.74

			QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
		PUMP STATION/CONTROL STRUCTURE			561,791	107,600	669,391	
13.0.-.B		PUMP STATION/CONTROL STRUCTURE						
13.0.-.B	2	REINFORCED CONCRETE	330.00	CY	87,082	17,416	104,499	316.66
13.0.-.B	3	STRUCTURAL STEEL	14300.00	LB	26,415	5,283	31,698	2.22
13.0.-.B	4	SLUICE GATE W/OPERATOR-72"x72"	1.00	EA	23,222	5,805	29,027	29027
13.0.-.B	5	SLIDE GATE W/HARDWARE-72"x72"	1.00	EA	12,667	3,167	15,833	15833
13.0.-.B	6	GUARD RAIL	100.00	LF	1,852	278	2,130	21.30
13.0.-.B	7	GEOTEXTILE	4800.00	SF	11,400	1,710	13,110	2.73
13.0.-.B	8	STOP LOGS (4x6 OAK TIMBERS)	640.00	SF	2,027	507	2,533	3.96
13.0.-.B	9	CONCRETE PARKING BLOCKS	2.00	EA	60	12	72	36.10
13.0.-.B	10	CRUSHED STONE CA-10	15.00	TON	224	34	258	17.18
13.0.-.B	11	PUMP AND ACCESSORIES	1.00	EA	70,589	10,588	81,178	81178
13.0.-.B	12	GENTRY CRANE W/HOIST	1.00	EA	823	165	988	987.99
13.0.-.B	13	STRUCTUARL EXCAVATION	6000.00	CY	13,536	2,707	16,243	2.71
13.0.-.B	14	EXCAVATED EMBANKMENT -	6000.00	CY	13,304	2,661	15,965	2.66
13.0.-.B	15	EMBANKMENT, BORROW	3200.00	CY	15,807	2,371	18,178	5.68
13.0.-.B	16	DEWATERING			63,758	15,939	79,697	
13.0.-.B	17	DITCH EXCAVATION	12000.00	CY	37,070	5,561	42,631	3.55
13.0.-.B	18	CLEARING FOR DITCH EXCAVATION	1.00	ACR	1,569	314	1,883	1883.13
13.0.-.B	19	"C" STONE FOR DITCH EMBANKMENT	1725.00	TON	29,017	4,353	33,370	19.34
13.0.-.B	20	FISH SCREENS	2.00	EA	739	259	997	498.74
		PUMP STATION/CONTROL STRUCTURE			411,162	79,129	490,291	
13.0.-.C		PUMP STATION/CONTROL STRUCTURE						
13.0.-.C	2	REINFORCED CONCRETE	200.00	CY	52,777	10,555	63,333	316.66
13.0.-.C	3	STRUCTURAL STEEL	800.00	LB	1,478	296	1,773	2.22
13.0.-.C	4	SLUICE GATE W/OPERATOR-72"x72"	1.00	EA	23,222	5,805	29,027	29027
13.0.-.C	5	SLIDE GATE W/HARDWARE-72"x72"	1.00	EA	12,667	3,167	15,833	15833
13.0.-.C	7	GEOTEXTILE	2500.00	SF	5,937	891	6,828	2.73
13.0.-.C	9	CONCRETE PARKING BLOCKS	2.00	EA	60	12	72	36.10
13.0.-.C	10	CRUSHED STONE CA-10	16.00	TON	239	36	275	17.18
13.0.-.C	11	PUMP AND ACCESSORIES	1.00	EA	70,589	10,588	81,178	81178
13.0.-.C	13	STRUCTUARL EXCAVATION	3500.00	CY	7,896	1,579	9,475	2.71
13.0.-.C	14	EXCAVATED EMBANKMENT	3500.00	CY	7,761	1,552	9,313	2.66
13.0.-.C	15	EMBANKMENT, BORROW	2200.00	CY	10,868	1,630	12,498	5.68
13.0.-.C	16	DEWATERING			42,508	10,627	53,135	
13.0.-.C	17	DITCH EXCAVATION	11600.00	CY	35,834	5,375	41,210	3.55
13.0.-.C	18	CLEARING FOR DITCH EXCAVATION	1.50	ACR	2,354	471	2,825	1883.13
13.0.-.C	19	"C" STONE FOR DITCH EMBANKMENT	300.00	TON	5,046	757	5,803	19.34
13.0.-.C	20	FISH SCREENS	2.00	EA	739	259	997	498.74
		PUMP STATION/CONTROL STRUCTURE			279,975	53,600	333,575	
		PUMPING PLANT			1,252,927	240,329	1,493,256	

	QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
18 CULTURAL RESOURCE PRESERVATION					
18.-.-.- DISTRICT LABOR (CELMS)					
DISTRICT LABOR (CELMS)		33,766	3,377	37,143	
18.0.1.- FIELD WORK					
FIELD WORK		57,179	5,718	62,897	
18.0.2.- DATA ANAYLISIS/REPORT PREP.					
DATA ANAYLISIS/REPORT PREP.		31,089	3,109	34,198	
18.0.3.- CURATION					
CURATION		6,630	663	7,293	
CULTURAL RESOURCE PRESERVATION		128,664	12,866	141,530	
30 PLANNING, ENGINEERING, AND DESIGN					
30.A.-.- PLANNING (Preparation of DPR)					
PLANNING (Preparation of DPR)		677,000	0	677,000	
30.C.-.- MEMORANDUM OF AGREEMENT					
MEMORANDUM OF AGREEMENT		5,000	0	5,000	
30.D.2.- ENVIRONMENTAL AND REGULATORY					
ENVIRONMENTAL AND REGULATORY		4,500	900	5,400	
30.H.-.- PLANS AND SPECIFICATIONS					

	QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
30.H.-.-H.1.- PLANS & SPECS - SWAN LAKE		290,000	60,001	350,001	
30.H.-.-H.2.- PLANS & SPECS - DAMS, SEDIMENT		5,000	1,000	6,000	
PLANS AND SPECIFICATIONS		295,000	61,001	356,001	
30.J.-.- ENGINEERING DURING CONSTRUCTION					
30.J.-.-J.H.- VECP's		11,000	2,200	13,200	
30.J.-.-J.H.2 PERIODIC INSPECTIONS		12,000	2,400	14,400	
30.J.-.-J.H.8 EDC - DAMS, SEDIMENT CONTROL		11,200	2,800	14,000	
30.J.-.-J.H.9 ALL OTHER EDC		31,000	6,200	37,200	
ENGINEERING DURING CONSTRUCTION		65,200	13,600	78,800	
30.M.-.- COST ENGINEERING					
COST ENGINEERING		20,000	4,000	24,000	
30.N.-.- CONSTRUCTION AND SUPPLY CONTRACT					
CONSTRUCTION AND SUPPLY CONTRACT		15,000	3,000	18,000	
30.P.-.- PROJECT MANAGEMENT					
PROJECT MANAGEMENT		20,000	4,000	24,000	
30.Z.-.- MISCELLANEOUS ACTIVITIES					
MISCELLANEOUS ACTIVITIES		8,000	0	8,000	
PLANNING, ENGINEERING,AND DESIGN		1,109,700	86,501	1,196,201	
31 CONSTRUCTION MANAGEMENT					
31.B.-.- CONTRACT ADMINISTRATION					
31.B.-.-B.-.1 CONTRACT ADMIN - SWAN		90,000	15,003	105,003	
31.B.-.-B.-.2 CONTRACT ADMIN - DAMS, SEDIMENT		10,000	2,000	12,000	
CONTRACT ADMINISTRATION		100,000	17,003	117,003	

		QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST	UNI
31.C.-.-	BENCHMARKS AND BASELINES					
	BENCHMARKS AND BASELINES		5,000	834	5,834	
31.D.-.-	REVIEW OF SHOP DRAWINGS					
31.D.-.-D.-.1	REVIEW OF SHOP DRAWINGS-SWAN		42,000	8,001	50,001	
31.D.-.-D.-.2	REVIEW OF SHOP DRAWINGS-DAMS,		11,700	2,300	14,000	
	REVIEW OF SHOP DRAWINGS		53,700	10,301	64,001	
31.E.-.-	INSPECTION AND QUALITY ASSURANCE					
31.E.-.-E.-.1	INSPECTION & QA-SWAN		48,000	8,002	56,002	
31.E.-.-E.-.2	INSPECTION & QA-DAMS, SEDIMENT		11,700	2,300	14,000	
	INSPECTION AND QUALITY ASSURANCE		59,700	10,302	70,002	
31.F.-.-	PROJECT OFFICE OPERATION					
31.F.-.-F.-.1	PROJECT OFFICE OPERATION-SWAN		354,000	38,020	392,020	
31.F.-.-F.-.2	PROJECT OFFICE OPERATION-DAMS,		95,000	11,001	106,001	
	PROJECT OFFICE OPERATION		449,000	49,021	498,021	
31.H.-.-	CONTRACTOR INITIATED CLAIMS AND					
	CONTRACTOR INITIATED CLAIMS AND		18,000	18,000	36,000	
31.P.-.-	PROJECT MANAGEMENT					
31.P.-.-P.-.1	PROJECT MANAGEMENT-SWAN		10,000	4,000	14,000	
31.P.-.-P.-.2	PROJECT MANAGEMENT-DAMS,SEDIMENT		1,600	400	2,000	
	PROJECT MANAGEMENT		11,600	4,400	16,000	
	CONSTRUCTION MANAGEMENT		697,000	109,860	806,860	
	SWAN LAKE - REVISED PER COMMENTS	1.00 EA	6,829,155	1,025,278	7,854,432	7854432

** PROJECT INDIRECT SUMMARY - LEVEL 1 **

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
04 DAMS		882,200	0	0	0	0	0	882,200	
06 FISH AND WILDLIFE		30,061	4,752	1,393	131	2,934	393	39,663	
08 ROADS,RAILROADS,		26,013	4,112	1,205	113	2,539	340	34,323	
11 LEVEES AND FLOODW		2,034,729	321,674	94,256	8,834	198,604	26,581	2,684,678	
13 PUMPING PLANT		949,599	150,124	43,989	4,123	92,688	12,405	1,252,927	
18 CULTURAL RESOURCE		128,664	0	0	0	0	0	128,664	
30 PLANNING, ENGINEE		1,109,700	0	0	0	0	0	1,109,700	
31 CONSTRUCTION MANA		697,000	0	0	0	0	0	697,000	
SWAN LAKE - REVIS	1.00 EA	5,857,966	480,663	140,843	13,200	296,765	39,719	6,829,155	6829155
% Contingencies								1,025,278	
TOTAL INCL OWNER COSTS								7,854,432	

** PROJECT INDIRECT SUMMARY - LEVEL 2 **

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
04 DAMS									
04.-.-.- HILLSIDE SE		749,980	0	0	0	0	0	749,980	
04.-.-.A ADMINISTRAT		132,220	0	0	0	0	0	132,220	
DAMS		882,200	0	0	0	0	0	882,200	
06 FISH AND WILDLIFE									
06. 3.A PARKING LOT		15,751	2,490	730	68	1,537	206	20,783	
06. 3.B PARKING LOT		14,309	2,262	663	62	1,397	187	18,880	
FISH AND WI		30,061	4,752	1,393	131	2,934	393	39,663	
08 ROADS,RAILROADS,									
08.2.-.A ROADS-RELOC		20,100	3,178	931	87	1,962	263	26,520	
08.2.-.B ROADS-LEVEE		5,086	804	236	22	496	66	6,710	
08.2.-.C ROADS-ACCES		828	131	38	4	81	11	1,092	
ROADS,RAILR		26,013	4,112	1,205	113	2,539	340	34,323	
11 LEVEES AND FLOODW									
11.0.1 A EARTHEN LEV		1,419,543	224,418	65,758	6,163	138,557	18,544	1,872,984	
11.0.1 B 48" GRAVITY		24,076	3,806	1,115	105	2,350	315	31,766	
11.0.1 C COFFERDAM F		81,201	12,837	3,762	353	7,926	1,061	107,139	
11.0.1 E INTERIOR CL		188,219	29,756	8,719	817	18,371	2,459	248,341	
11.0.1 F ISLAND CONS		157,900	24,963	7,315	686	15,412	2,063	208,338	
11.0.1 G EXISTING RO		27,282	4,313	1,264	118	2,663	356	35,997	
11.0.1 H SHORELINE &		53,308	8,428	2,469	231	5,203	696	70,336	
11.0.1 I MISCELLANEO		83,200	13,153	3,854	361	8,121	1,087	109,776	
LEVEES AND		2,034,729	321,674	94,256	8,834	198,604	26,581	2,684,678	
13 PUMPING PLANT									
13.0.-.A PUMP STATIO		425,784	67,313	19,724	1,849	41,560	5,562	561,791	
13.0.-.B PUMP STATIO		311,621	49,265	14,435	1,353	30,416	4,071	411,162	
13.0.-.C PUMP STATIO		212,194	33,546	9,830	921	20,712	2,772	279,975	
PUMPING PLA		949,599	150,124	43,989	4,123	92,688	12,405	1,252,927	
18 CULTURAL RESOURCE									
18.-.-.- DISTRICT LA		33,766	0	0	0	0	0	33,766	

** PROJECT INDIRECT SUMMARY - LEVEL 2 **

		QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
18.0.1.-	FIELD WORK		57,179	0	0	0	0	0	57,179	
18.0.2.-	DATA ANAYLI		31,089	0	0	0	0	0	31,089	
18.0.3.-	CURATION		6,630	0	0	0	0	0	6,630	
	CULTURAL RE		128,664	0	0	0	0	0	128,664	
30	PLANNING, ENGINEE									
30.A.-.-	PLANNING (P		677,000	0	0	0	0	0	677,000	
30.C.-.-	MEMORANDUM		5,000	0	0	0	0	0	5,000	
30.D.2.-	ENVIRONMENT		4,500	0	0	0	0	0	4,500	
30.H.-.-	PLANS AND S		295,000	0	0	0	0	0	295,000	
30.J.-.-	ENGINEERING		65,200	0	0	0	0	0	65,200	
30.M.-.-	COST ENGINE		20,000	0	0	0	0	0	20,000	
30.N.-.-	CONSTRUCTIO		15,000	0	0	0	0	0	15,000	
30.P.-.-	PROJECT MAN		20,000	0	0	0	0	0	20,000	
30.Z.-.-	MISCELLANEO		8,000	0	0	0	0	0	8,000	
	PLANNING, E		1,109,700	0	0	0	0	0	1,109,700	
31	CONSTRUCTION MANA									
31.B.-.-	CONTRACT AD		100,000	0	0	0	0	0	100,000	
31.C.-.-	BENCHMARKS		5,000	0	0	0	0	0	5,000	
31.D.-.-	REVIEW OF S		53,700	0	0	0	0	0	53,700	
31.E.-.-	INSPECTION		59,700	0	0	0	0	0	59,700	
31.F.-.-	PROJECT OFF		449,000	0	0	0	0	0	449,000	
31.H.-.-	CONTRACTOR		18,000	0	0	0	0	0	18,000	
31.P.-.-	PROJECT MAN		11,600	0	0	0	0	0	11,600	
	CONSTRUCTIO		697,000	0	0	0	0	0	697,000	
	SWAN LAKE -	1.00 EA	5,857,966	480,663	140,843	13,200	296,765	39,719	6,829,155	6829155
	% Contingencies								1,025,278	
	TOTAL INCL OWNER COSTS								7,854,432	

** PROJECT INDIRECT SUMMARY - LEVEL 3 **

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
04 DAMS									
04.-.-.- HILLSIDE SE									
04.-.-.- A PONDS	55.00 EA	412,610	0	0	0	0	0	412,610	7502.00
04.-.-.- B TERRAC	40.00 EA	100,004	0	0	0	0	0	100,004	2500.10
04.-.-.- C BASINS	95.00 EA	237,366	0	0	0	0	0	237,366	2498.58
HILLSI		749,980	0	0	0	0	0	749,980	
04.-.-.A ADMINISTRAT									
ADMINI		132,220	0	0	0	0	0	132,220	
DAMS		882,200	0	0	0	0	0	882,200	
06 FISH AND WILDLIFE									
06. 3.A PARKING LOT									
06. 3.A 2 CA-10	690.00 TON	6,772	1,071	314	29	661	88	8,935	12.95
06. 3.A 3 QUARRY	145.00 TON	1,700	269	79	7	166	22	2,243	15.47
06. 3.A 4 SEMI-C	1485.00 CY	3,938	623	182	17	384	51	5,196	3.50
06. 3.A 5 STRIPP	470.00 CY	790	125	37	3	77	10	1,042	2.22
06. 3.A 6 SEEDIN	0.20 ACR	195	31	9	1	19	3	257	1285.06
06. 3.A 7 CLEARI	0.30 ACR	357	56	17	2	35	5	471	1569.28
06. 3.A 8 14 FT.	1.00 EA	2,000	316	93	9	195	26	2,639	2638.86
PARKIN		15,751	2,490	730	68	1,537	206	20,783	
06. 3.B PARKING LOT									
06. 3.B 1 CA-10	660.00 TON	6,478	1,024	300	28	632	85	8,547	12.95
06. 3.B 2 QUARRY	145.00 TON	1,700	269	79	7	166	22	2,243	15.47
06. 3.B 3 SEMI-C	1465.00 CY	3,885	614	180	17	379	51	5,126	3.50
06. 3.B 4 STRIPP	470.00 CY	790	125	37	3	77	10	1,042	2.22
06. 3.B 5 SEEDIN	0.20 ACR	195	31	9	1	19	3	257	1285.06
06. 3.B 6 CLEARI	0.30 ACR	357	56	17	2	35	5	471	1569.28
06. 3.B 7 CMP -	30.00 LF	528	83	24	2	52	7	697	23.22
06. 3.B 8 CMP EN	2.00 EA	349	55	16	2	34	5	460	229.98
06. 3.B 9 CRUSHE	3.00 TON	29	5	1	0	3	0	38	12.67
PARKIN		14,309	2,262	663	62	1,397	187	18,880	
FISH A		30,061	4,752	1,393	131	2,934	393	39,663	

** PROJECT INDIRECT SUMMARY - LEVEL 3 **

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
08 ROADS,RAILROADS,									
08.2.-.A ROADS-RELOC									
08.2.-.A 2 CRUSHE	1780.00 TON	17,470	2,762	809	76	1,705	228	23,050	12.95
08.2.-.A 3 STRIPP	1565.00 CY	2,630	416	122	11	257	34	3,470	2.22
ROADS-		20,100	3,178	931	87	1,962	263	26,520	
08.2.-.B ROADS-LEVEE									
08.2.-.B 1 SEMI-C	900.00 CY	2,387	377	111	10	233	31	3,149	3.50
08.2.-.B 2 CRUSHE	275.00 TON	2,699	427	125	12	263	35	3,561	12.95
ROADS-		5,086	804	236	22	496	66	6,710	
08.2.-.C ROADS-ACCES									
08.2.-.C 1 SEMI-C	90.00 CY	239	38	11	1	23	3	315	3.50
08.2.-.C 2 CRUSHE	60.00 TON	589	93	27	3	57	8	777	12.95
ROADS-		828	131	38	4	81	11	1,092	
ROADS,		26,013	4,112	1,205	113	2,539	340	34,323	
11 LEVEES AND FLOODW									
11.0.1 A EARTHEN LEV									
11.0.1 A 2 SEMI-C	64800.00 CY	173,230	27,386	8,025	752	16,908	2,263	228,564	3.53
11.0.1 A 3 EXCAVA	195000.00 CY	685,133	108,314	31,738	2,975	66,874	8,950	903,983	4.64
11.0.1 A 4 CLEARI	90.00 ACR	111,715	17,661	5,175	485	10,904	1,459	147,400	1637.77
11.0.1 A 5 CRUSHE	12000.00 TON	117,775	18,619	5,456	511	11,496	1,539	155,396	12.95
11.0.1 A 6 "C" ST	10550.00 TON	134,504	21,264	6,231	584	13,129	1,757	177,468	16.82
11.0.1 A 7 "B" ST	5840.00 TON	74,455	11,771	3,449	323	7,267	973	98,238	16.82
11.0.1 A 8 CMP-18	70.00 LF	1,232	195	57	5	120	16	1,626	23.22
11.0.1 A 9 CMP EN	2.00 EA	349	55	16	2	34	5	460	229.98
11.0.1 A 10 CRUSHE	7.00 TON	67	11	3	0	7	1	89	12.67
11.0.1 A 11 ASPHAL	13.00 TON	534	84	25	2	52	7	704	54.16
11.0.1 A 12 AGGREG	34.00 TON	334	53	15	1	33	4	440	12.95
11.0.1 A 13 BARRIC	2.00 EA	400	63	19	2	39	5	528	263.89
11.0.1 A 14 ACCESS	2.00 EA	4,000	632	185	17	390	52	5,278	2638.86
11.0.1 A 15 STRIPP	8365.00 CY	14,057	2,222	651	61	1,372	184	18,548	2.22
11.0.1 A 16 CLEARI	3.00 ACR	3,568	564	165	15	348	47	4,708	1569.28
11.0.1 A 17 SEEDIN	3.00 ACR	2,922	462	135	13	285	38	3,855	1285.06
11.0.1 A 18 SEEDIN	81.00 ACR	78,133	12,352	3,619	339	7,626	1,021	103,090	1272.72
11.0.1 A 19 HAY BA	30600.00 LF	17,136	2,709	794	74	1,673	224	22,610	0.74

** PROJECT INDIRECT SUMMARY - LEVEL 3 **

			QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
		EARTHE		1,419,543	224,418	65,758	6,163	138,557	18,544	1,872,984	
11.0.1 B	48" GRAVITY										
11.0.1 B	6	SLUICE	1.00 EA	9,600	1,518	445	42	937	125	12,667	12667
11.0.1 B	7	CMP -	31.00 LF	1,503	238	70	7	147	20	1,983	63.97
11.0.1 B	8	END SE	2.00 EA	1,181	187	55	5	115	15	1,559	779.27
11.0.1 B	9	RISER	8.50 LF	1,020	161	47	4	100	13	1,346	158.33
11.0.1 B	10	CONCRE	8.00 CY	1,280	202	59	6	125	17	1,689	211.11
11.0.1 B	11	CRUSHE	400.00 TON	4,789	757	222	21	467	63	6,318	15.80
11.0.1 B	12	CRUSHE	190.00 TON	2,275	360	105	10	222	30	3,001	15.80
11.0.1 B	13	GEOGRI	200.00 SY	1,600	253	74	7	156	21	2,111	10.56
11.0.1 B	14	GEOTEX	460.00 SY	828	131	38	4	81	11	1,092	2.37
		48" GR		24,076	3,806	1,115	105	2,350	315	31,766	
11.0.1 C	COFFERDAM F										
11.0.1 C	1	"C" ST	5040.00 TON	64,256	10,158	2,977	279	6,272	839	84,781	16.82
11.0.1 C	2	CRUSHE	230.00 TON	2,257	357	105	10	220	29	2,978	12.95
11.0.1 C	3	PLASTI	1360.00 SY	14,688	2,322	680	64	1,434	192	19,380	14.25
		COFFER		81,201	12,837	3,762	353	7,926	1,061	107,139	
11.0.1 E	INTERIOR CL										
11.0.1 E	1	EXCAVA	12200.00 CY	42,865	6,777	1,986	186	4,184	560	56,557	4.64
11.0.1 E	2	CLEARI	1.00 ACR	1,189	188	55	5	116	16	1,569	1569.28
11.0.1 E	3	"C" ST	11250.00 TON	143,429	22,675	6,644	623	14,000	1,874	189,244	16.82
11.0.1 E	4	CRUSHE	75.00 TON	736	116	34	3	72	10	971	12.95
		INTERI		188,219	29,756	8,719	817	18,371	2,459	248,341	
11.0.1 F	ISLAND CONS										
11.0.1 F	1	EXCAVA	15900.00 CY	55,865	8,832	2,588	243	5,453	730	73,709	4.64
11.0.1 F	2	EXCAVA	25350.00 CY	89,067	14,081	4,126	387	8,694	1,164	117,518	4.64
11.0.1 F	3	SEEDIN	7.00 ACR	6,752	1,067	313	29	659	88	8,909	1272.72
11.0.1 F	4	HAY BA	11100.00 LF	6,216	983	288	27	607	81	8,202	0.74
		ISLAND		157,900	24,963	7,315	686	15,412	2,063	208,338	
11.0.1 G	EXISTING RO										
11.0.1 G	1	CLEARI	1.50 ACR	1,784	282	83	8	174	23	2,354	1569.28

** PROJECT INDIRECT SUMMARY - LEVEL 3 **

		QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
11.0.1 G	2 "C" ST	2000.00 TON	25,498	4,031	1,181	111	2,489	333	33,643	16.82
	EXISTI		27,282	4,313	1,264	118	2,663	356	35,997	
11.0.1 H	SHORELINE &									
11.0.1 H	1 WILLOW	2700.00 LF	8,640	1,366	400	38	843	113	11,400	4.22
11.0.1 H	2 WILLOW	15200.00 SF	1,824	288	84	8	178	24	2,407	0.16
11.0.1 H	3 WILLOW	4700.00 LF	15,040	2,378	697	65	1,468	196	19,844	4.22
11.0.1 H	4 WILLOW	26700.00 SF	3,204	507	148	14	313	42	4,227	0.16
11.0.1 H	5 WILLOW	205000.00 SF	24,600	3,889	1,140	107	2,401	321	32,458	0.16
	SHOREL		53,308	8,428	2,469	231	5,203	696	70,336	
11.0.1 I	MISCELLANEO									
11.0.1 I	1 AUTOMA	3.00 EA	24,000	3,794	1,112	104	2,343	314	31,666	10555
11.0.1 I	2 STAFF	6.00 EA	4,800	759	222	21	469	63	6,333	1055.54
11.0.1 I	3 SILT S	12000.00 SF	48,000	7,588	2,224	208	4,685	627	63,333	5.28
11.0.1 I	4 WATER	160.00 EA	6,400	1,012	296	28	625	84	8,444	52.78
	MISCEL		83,200	13,153	3,854	361	8,121	1,087	109,776	
	LEVEES		2,034,729	321,674	94,256	8,834	198,604	26,581	2,684,678	
13	PUMPING PLANT									
13.0.-.A	PUMP STATIO									
13.0.-.A	2 REINFO	400.00 CY	80,000	12,647	3,706	347	7,809	1,045	105,554	263.89
13.0.-.A	3 STRUCT	26400.00 LB	36,960	5,843	1,712	160	3,608	483	48,766	1.85
13.0.-.A	4 SLUICE	2.00 EA	35,200	5,565	1,631	153	3,436	460	46,444	23222
13.0.-.A	5 SLIDE	2.00 EA	19,200	3,035	889	83	1,874	251	25,333	12667
13.0.-.A	6 GUARD	200.00 LF	2,808	444	130	12	274	37	3,705	18.52
13.0.-.A	7 GEOTEX	1070.00 SY	1,926	304	89	8	188	25	2,541	2.37
13.0.-.A	8 STOP L	1280.00 SF	3,072	486	142	13	300	40	4,053	3.17
13.0.-.A	9 CONCRE	4.00 EA	91	14	4	0	9	1	120	30.08
13.0.-.A	10 CRUSHE	30.00 TON	294	47	14	1	29	4	388	12.95
13.0.-.A	11 PUMP A	2.00 EA	107,000	16,916	4,957	465	10,444	1,398	141,179	70589
13.0.-.A	12 GENTRY	2.00 EA	1,248	197	58	5	122	16	1,647	823.32
13.0.-.A	13 STRUCT	6000.00 CY	10,259	1,622	475	45	1,001	134	13,536	2.26
13.0.-.A	14 EXCAVA	6000.00 CY	10,083	1,594	467	44	984	132	13,304	2.22
13.0.-.A	15 EMBANK	3200.00 CY	11,980	1,894	555	52	1,169	157	15,807	4.94
13.0.-.A	16 DEWATE		48,322	7,639	2,238	210	4,717	631	63,758	
13.0.-.A	17 DITCH	14350.00 CY	33,598	5,312	1,556	146	3,279	439	44,330	3.09
13.0.-.A	18 CLEARI	1.00 ACR	1,189	188	55	5	116	16	1,569	1569.28
13.0.-.A	19 "C" ST	1725.00 TON	21,992	3,477	1,019	95	2,147	287	29,017	16.82
13.0.-.A	20 FISH S	2.00 EA	560	89	26	2	55	7	739	369.44

			QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
		PUMP S		425,784	67,313	19,724	1,849	41,560	5,562	561,791	
13.0.-.B		PUMP STATIO									
13.0.-.B	2	REINFO	330.00 CY	66,000	10,434	3,057	287	6,442	862	87,082	263.89
13.0.-.B	3	STRUCT	14300.00 LB	20,020	3,165	927	87	1,954	262	26,415	1.85
13.0.-.B	4	SLUICE	1.00 EA	17,600	2,782	815	76	1,718	230	23,222	23222
13.0.-.B	5	SLIDE	1.00 EA	9,600	1,518	445	42	937	125	12,667	12667
13.0.-.B	6	GUARD	100.00 LF	1,404	222	65	6	137	18	1,852	18.52
13.0.-.B	7	GEOTEX	4800.00 SF	8,640	1,366	400	38	843	113	11,400	2.37
13.0.-.B	8	STOP L	640.00 SF	1,536	243	71	7	150	20	2,027	3.17
13.0.-.B	9	CONCRE	2.00 EA	46	7	2	0	4	1	60	30.08
13.0.-.B	10	CRUSHE	15.00 TON	170	27	8	1	17	2	224	14.94
13.0.-.B	11	PUMP A	1.00 EA	53,500	8,458	2,478	232	5,222	699	70,589	70589
13.0.-.B	12	GENTRY	1.00 EA	624	99	29	3	61	8	823	823.32
13.0.-.B	13	STRUCT	6000.00 CY	10,259	1,622	475	45	1,001	134	13,536	2.26
13.0.-.B	14	EXCAVA	6000.00 CY	10,083	1,594	467	44	984	132	13,304	2.22
13.0.-.B	15	EMBANK	3200.00 CY	11,980	1,894	555	52	1,169	157	15,807	4.94
13.0.-.B	16	DEWATE		48,322	7,639	2,238	210	4,717	631	63,758	
13.0.-.B	17	DITCH	12000.00 CY	28,096	4,442	1,301	122	2,742	367	37,070	3.09
13.0.-.B	18	CLEARI	1.00 ACR	1,189	188	55	5	116	16	1,569	1569.28
13.0.-.B	19	"C" ST	1725.00 TON	21,992	3,477	1,019	95	2,147	287	29,017	16.82
13.0.-.B	20	FISH S	2.00 EA	560	89	26	2	55	7	739	369.44
		PUMP S		311,621	49,265	14,435	1,353	30,416	4,071	411,162	
13.0.-.C		PUMP STATIO									
13.0.-.C	2	REINFO	200.00 CY	40,000	6,324	1,853	174	3,904	523	52,777	263.89
13.0.-.C	3	STRUCT	800.00 LB	1,120	177	52	5	109	15	1,478	1.85
13.0.-.C	4	SLUICE	1.00 EA	17,600	2,782	815	76	1,718	230	23,222	23222
13.0.-.C	5	SLIDE	1.00 EA	9,600	1,518	445	42	937	125	12,667	12667
13.0.-.C	7	GEOTEX	2500.00 SF	4,500	711	208	20	439	59	5,937	2.37
13.0.-.C	9	CONCRE	2.00 EA	46	7	2	0	4	1	60	30.08
13.0.-.C	10	CRUSHE	16.00 TON	181	29	8	1	18	2	239	14.94
13.0.-.C	11	PUMP A	1.00 EA	53,500	8,458	2,478	232	5,222	699	70,589	70589
13.0.-.C	13	STRUCT	3500.00 CY	5,984	946	277	26	584	78	7,896	2.26
13.0.-.C	14	EXCAVA	3500.00 CY	5,882	930	272	26	574	77	7,761	2.22
13.0.-.C	15	EMBANK	2200.00 CY	8,237	1,302	382	36	804	108	10,868	4.94
13.0.-.C	16	DEWATE		32,217	5,093	1,492	140	3,145	421	42,508	
13.0.-.C	17	DITCH	11600.00 CY	27,159	4,294	1,258	118	2,651	355	35,834	3.09
13.0.-.C	18	CLEARI	1.50 ACR	1,784	282	83	8	174	23	2,354	1569.28
13.0.-.C	19	"C" ST	300.00 TON	3,825	605	177	17	373	50	5,046	16.82
13.0.-.C	20	FISH S	2.00 EA	560	89	26	2	55	7	739	369.44
		PUMP S		212,194	33,546	9,830	921	20,712	2,772	279,975	
		PUMPIN		949,599	150,124	43,989	4,123	92,688	12,405	1,252,927	

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
18 CULTURAL RESOURCE									
18.-.-.- DISTRICT LA									
DISTRI		33,766	0	0	0	0	0	33,766	
18.0.1.- FIELD WORK									
FIELD		57,179	0	0	0	0	0	57,179	
18.0.2.- DATA ANAYLI									
DATA A		31,089	0	0	0	0	0	31,089	
18.0.3.- CURATION									
CURATI		6,630	0	0	0	0	0	6,630	
CULTUR		128,664	0	0	0	0	0	128,664	
30 PLANNING, ENGINEE									
30.A.-.- PLANNING (P									
PLANNI		677,000	0	0	0	0	0	677,000	
30.C.-.- MEMORANDUM									
MEMORA		5,000	0	0	0	0	0	5,000	
30.D.2.- ENVIRONMENT									
ENVIRO		4,500	0	0	0	0	0	4,500	
30.H.-.- PLANS AND S									

** PROJECT INDIRECT SUMMARY - LEVEL 3 **

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNI
30.H.-.-H.1.- PLANS		290,000	0	0	0	0	0	290,000	
30.H.-.-H.2.- PLANS		5,000	0	0	0	0	0	5,000	
PLANS		295,000	0	0	0	0	0	295,000	
30.J.-.- ENGINEERING									
30.J.-.-J.H.- VECP's		11,000	0	0	0	0	0	11,000	
30.J.-.-J.H.2 PERIOD		12,000	0	0	0	0	0	12,000	
30.J.-.-J.H.8 EDC -		11,200	0	0	0	0	0	11,200	
30.J.-.-J.H.9 ALL OT		31,000	0	0	0	0	0	31,000	
ENGINE		65,200	0	0	0	0	0	65,200	
30.M.-.- COST ENGINE									
COST E		20,000	0	0	0	0	0	20,000	
30.N.-.- CONSTRUCTIO									
CONSTR		15,000	0	0	0	0	0	15,000	
30.P.-.- PROJECT MAN									
PROJEC		20,000	0	0	0	0	0	20,000	
30.Z.-.- MISCELLANEO									
MISCEL		8,000	0	0	0	0	0	8,000	
PLANNI		1,109,700	0	0	0	0	0	1,109,700	
31 CONSTRUCTION MANA									
31.B.-.- CONTRACT AD									
31.B.-.-B.-.1 CONTRA		90,000	0	0	0	0	0	90,000	
31.B.-.-B.-.2 CONTRA		10,000	0	0	0	0	0	10,000	
CONTRA		100,000	0	0	0	0	0	100,000	

** PROJECT INDIRECT SUMMARY - LEVEL 3 **

	QUANTITY UOM	DIRECT	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND	TOTAL COST	UNIT
31.C.-.- BENCHMARKS									
BENCHM		5,000	0	0	0	0	0	5,000	
31.D.-.- REVIEW OF S									
31.D.-.-D.-.1 REVIEW		42,000	0	0	0	0	0	42,000	
31.D.-.-D.-.2 REVIEW		11,700	0	0	0	0	0	11,700	
REVIEW		53,700	0	0	0	0	0	53,700	
31.E.-.- INSPECTION									
31.E.-.-E.-.1 INSPEC		48,000	0	0	0	0	0	48,000	
31.E.-.-E.-.2 INSPEC		11,700	0	0	0	0	0	11,700	
INSPEC		59,700	0	0	0	0	0	59,700	
31.F.-.- PROJECT OFF									
31.F.-.-F.-.1 PROJEC		354,000	0	0	0	0	0	354,000	
31.F.-.-F.-.2 PROJEC		95,000	0	0	0	0	0	95,000	
PROJEC		449,000	0	0	0	0	0	449,000	
31.H.-.- CONTRACTOR									
CONTRA		18,000	0	0	0	0	0	18,000	
31.P.-.- PROJECT MAN									
31.P.-.-P.-.1 PROJEC		10,000	0	0	0	0	0	10,000	
31.P.-.-P.-.2 PROJEC		1,600	0	0	0	0	0	1,600	
PROJEC		11,600	0	0	0	0	0	11,600	
CONSTR		697,000	0	0	0	0	0	697,000	
SWAN L	1.00 EA	5,857,966	480,663	140,843	13,200	296,765	39,719	6,829,155	6829155
% Contingencies								1,025,278	
TOTAL INCL OWNER COSTS								7,854,432	

** PROJECT DIRECT SUMMARY - LEVEL 1 **

		QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
04	DAMS		458,007	391,899	32,294	0	882,200	
06	FISH AND WILDLIFE FACILITIES		5,804	10,645	8,692	4,920	30,061	
08	ROADS,RAILROADS, AND BRIDGES		4,202	7,535	7,931	6,345	26,013	
11	LEVEES AND FLOODWALLS		636,080	936,434	289,409	172,806	2,034,729	
13	PUMPING PLANT		144,190	175,690	611,878	17,841	949,599	
18	CULTURAL RESOURCE PRESERVATION		128,664	0	0	0	128,664	
30	PLANNING, ENGINEERING,AND DESIGN		1,109,700	0	0	0	1,109,700	
31	CONSTRUCTION MANAGEMENT		697,000	0	0	0	697,000	
	SWAN LAKE - REVISED PER COMMENTS	1.00 EA	3,183,647	1,522,203	950,204	201,912	5,857,966	5857966
	FIELD OFFICE OVERHEAD/MOB & DEMOB						480,663	
	SUBTOTAL						6,338,628	
	HOME OFFICE OVERHEAD						140,843	
	SUBTOTAL						6,479,471	
	INTEREST ON OPERATING CAPITAL						13,200	
	SUBTOTAL						6,492,671	
	PROFIT						296,765	
	SUBTOTAL						6,789,436	
	BOND						39,719	
	TOTAL INCL INDIRECTS						6,829,155	
	% Contingencies						1,025,278	
	TOTAL INCL OWNER COSTS						7,854,432	

** PROJECT DIRECT SUMMARY - LEVEL 2 **

	QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
04 DAMS							
04.-.-.- HILLSIDE SEDIMENT CONTROL STRUCT		325,787	391,899	32,294	0	749,980	
04.-.-.A ADMINISTRATIVE COST-SOIL CONSER-		132,220	0	0	0	132,220	
DAMS		458,007	391,899	32,294	0	882,200	
06 FISH AND WILDLIFE FACILITIES							
06. 3.A PARKING LOT & BOAT RAMP (MIDDLE)		2,740	5,349	5,157	2,505	15,751	
06. 3.B PARKING LOT & BOAT RAMP (LOWER)		3,064	5,296	3,535	2,415	14,309	
FISH AND WILDLIFE FACILITIES		5,804	10,645	8,692	4,920	30,061	
08 ROADS,RAILROADS, AND BRIDGES							
08.2.-.A ROADS-RELOCATED GRAVEL RD		3,000	5,085	6,675	5,340	20,100	
08.2.-.B ROADS-LEVEE CROSSING RAMPS, 2EA		1,055	2,175	1,031	825	5,086	
08.2.-.C ROADS-ACCESS RAMP		146	276	225	180	828	
ROADS,RAILROADS, AND BRIDGES		4,202	7,535	7,931	6,345	26,013	
11 LEVEES AND FLOODWALLS							
11.0.1 A EARTHEN LEVEE		421,477	737,107	161,865	99,094	1,419,543	
11.0.1 B 48" GRAVITY DRAIN (MIDDLE&LOWER)		2,567	2,259	17,201	2,049	24,076	
11.0.1 C COFFERDAM FOR GRAVITY DRAIN		8,665	21,016	21,023	30,498	81,201	
11.0.1 E INTERIOR CLOSURE		34,959	74,003	45,281	33,975	188,219	
11.0.1 F ISLAND CONSTRUCTION (MIDDLE)		56,672	92,798	7,240	1,190	157,900	
11.0.1 G EXISTING ROCK CLOSURE		4,032	9,250	8,000	6,000	27,282	
11.0.1 H SHORELINE & BANKLINE PROTECTION		53,308	0	0	0	53,308	
11.0.1 I MISCELLANEOUS		54,400	0	28,800	0	83,200	
LEVEES AND FLOODWALLS		636,080	936,434	289,409	172,806	2,034,729	
13 PUMPING PLANT							
13.0.-.A PUMP STATION/CONTROL STRUCTURE		52,373	67,587	298,159	7,665	425,784	
13.0.-.B PUMP STATION/CONTROL STRUCTURE		55,203	63,468	185,327	7,624	311,621	
13.0.-.C PUMP STATION/CONTROL STRUCTURE		36,614	44,636	128,392	2,552	212,194	
PUMPING PLANT		144,190	175,690	611,878	17,841	949,599	
18 CULTURAL RESOURCE PRESERVATION							
18.-.-.- DISTRICT LABOR (CELMS)		33,766	0	0	0	33,766	

		QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
18.0.1.-	FIELD WORK		57,179	0	0	0	57,179	
18.0.2.-	DATA ANAYLISIS/REPORT PREP.		31,089	0	0	0	31,089	
18.0.3.-	CURATION		6,630	0	0	0	6,630	
	CULTURAL RESOURCE PRESERVATION		128,664	0	0	0	128,664	
30	PLANNING, ENGINEERING,AND DESIGN							
30.A.-.-	PLANNING (Preparation of DPR)		677,000	0	0	0	677,000	
30.C.-.-	MEMORANDUM OF AGREEMENT		5,000	0	0	0	5,000	
30.D.2.-	ENVIRONMENTAL AND REGULATORY		4,500	0	0	0	4,500	
30.H.-.-	PLANS AND SPECIFICATIONS		295,000	0	0	0	295,000	
30.J.-.-	ENGINEERING DURING CONSTRUCTION		65,200	0	0	0	65,200	
30.M.-.-	COST ENGINEERING		20,000	0	0	0	20,000	
30.N.-.-	CONSTRUCTION AND SUPPLY CONTRACT		15,000	0	0	0	15,000	
30.P.-.-	PROJECT MANAGEMENT		20,000	0	0	0	20,000	
30.Z.-.-	MISCELLANEOUS ACTIVITIES		8,000	0	0	0	8,000	
	PLANNING, ENGINEERING,AND DESIGN		1,109,700	0	0	0	1,109,700	
31	CONSTRUCTION MANAGEMENT							
31.B.-.-	CONTRACT ADMINISTRATION		100,000	0	0	0	100,000	
31.C.-.-	BENCHMARKS AND BASELINES		5,000	0	0	0	5,000	
31.D.-.-	REVIEW OF SHOP DRAWINGS		53,700	0	0	0	53,700	
31.E.-.-	INSPECTION AND QUALITY ASSURANCE		59,700	0	0	0	59,700	
31.F.-.-	PROJECT OFFICE OPERATION		449,000	0	0	0	449,000	
31.H.-.-	CONTRACTOR INITIATED CLAIMS AND		18,000	0	0	0	18,000	
31.P.-.-	PROJECT MANAGEMENT		11,600	0	0	0	11,600	
	CONSTRUCTION MANAGEMENT		697,000	0	0	0	697,000	
	SWAN LAKE - REVISED PER COMMENTS	1.00 EA	3,183,647	1,522,203	950,204	201,912	5,857,966	5857966
	FIELD OFFICE OVERHEAD/MOB & DEMOB						480,663	
	SUBTOTAL						6,338,628	
	HOME OFFICE OVERHEAD						140,843	
	SUBTOTAL						6,479,471	
	INTEREST ON OPERATING CAPITAL						13,200	
	SUBTOTAL						6,492,671	
	PROFIT						296,765	
	SUBTOTAL						6,789,436	
	BOND						39,719	
	TOTAL INCL INDIRECTS						6,829,155	
	% Contingencies						1,025,278	

	QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
TOTAL INCL OWNER COSTS						7,854,432	

** PROJECT DIRECT SUMMARY - LEVEL 3 **

		QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
04 DAMS								
04.-.-.-	HILLSIDE SEDIMENT CONTROL STRUCT							
04.-.-.-	A PONDS	55.00 EA	151,840	247,240	13,530	0	412,610	7502.0
04.-.-.-	B TERRACES	40.00 EA	81,235	10,113	8,656	0	100,004	2500.1
04.-.-.-	C BASINS	95.00 EA	92,712	134,546	10,108	0	237,366	2498.5
	HILLSIDE SEDIMENT CONTROL STRU		325,787	391,899	32,294	0	749,980	
04.-.-.A	ADMINISTRATIVE COST-SOIL CONSER-							
	ADMINISTRATIVE COST-SOIL CONSE		132,220	0	0	0	132,220	
	DAMS		458,007	391,899	32,294	0	882,200	
06 FISH AND WILDLIFE FACILITIES								
06. 3.A	PARKING LOT & BOAT RAMP (MIDDLE)							
06. 3.A	2 CA-10 CRUSHED STONE	690.00 TON	869	1,245	2,588	2,070	6,772	9.8
06. 3.A	3 QUARRY RUN STONE-BOAT RAMP	145.00 TON	228	529	508	435	1,700	11.7
06. 3.A	4 SEMI-COMPACTED EMBANKMENT	1485.00 CY	1,169	2,769	0	0	3,938	2.6
06. 3.A	5 STRIPPING	470.00 CY	228	562	0	0	790	1.6
06. 3.A	6 SEEDING	0.20 ACR	104	28	62	0	195	973.9
06. 3.A	7 CLEARING	0.30 ACR	142	215	0	0	357	1189.3
06. 3.A	8 14 FT. ACCESS GATE	1.00 EA	0	0	2,000	0	2,000	2000.0
	PARKING LOT & BOAT RAMP (MIDDL		2,740	5,349	5,157	2,505	15,751	
06. 3.B	PARKING LOT & BOAT RAMP (LOWER)							
06. 3.B	1 CA-10 CRUSHED STONE	660.00 TON	831	1,191	2,475	1,980	6,478	9.8
06. 3.B	2 QUARRY RUN STONE-BOAT RAMP	145.00 TON	228	529	508	435	1,700	11.7
06. 3.B	3 SEMI-COMPACTED EMBANKMENT	1465.00 CY	1,153	2,732	0	0	3,885	2.6
06. 3.B	4 STRIPPING	470.00 CY	228	562	0	0	790	1.6
06. 3.B	5 SEEDING	0.20 ACR	104	28	62	0	195	973.9
06. 3.B	6 CLEARING	0.30 ACR	142	215	0	0	357	1189.3
06. 3.B	7 CMP - 18 INCH DIA.	30.00 LF	252	26	251	0	528	17.6
06. 3.B	8 CMP END SECTION-18 IN.	2.00 EA	126	13	210	0	349	174.3
06. 3.B	9 CRUSHED STONE-1 IN. MINUS	3.00 TON	0	0	29	0	29	9.6
	PARKING LOT & BOAT RAMP (LOWER		3,064	5,296	3,535	2,415	14,309	
	FISH AND WILDLIFE FACILITIES		5,804	10,645	8,692	4,920	30,061	

			QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
08 ROADS,RAILROADS, AND BRIDGES									
08.2.-.A ROADS-RELOCATED GRAVEL RD									
08.2.-.A	2	CRUSHED STONE CA-10	1780.00 TON	2,242	3,213	6,675	5,340	17,470	9.81
08.2.-.A	3	STRIPPING	1565.00 CY	758	1,872	0	0	2,630	1.68
		ROADS-RELOCATED GRAVEL RD		3,000	5,085	6,675	5,340	20,100	
08.2.-.B ROADS-LEVEE CROSSING RAMPS, 2EA									
08.2.-.B	1	SEMI-COMPACTED EMBANKMENT	900.00 CY	709	1,678	0	0	2,387	2.65
08.2.-.B	2	CRUSHED STONE CA-10	275.00 TON	346	496	1,031	825	2,699	9.81
		ROADS-LEVEE CROSSING RAMPS, 2E		1,055	2,175	1,031	825	5,086	
08.2.-.C ROADS-ACCESS RAMP									
08.2.-.C	1	SEMI-COMPACTED EMBANKMENT	90.00 CY	71	168	0	0	239	2.65
08.2.-.C	2	CRUSHED STONE CA-10	60.00 TON	76	108	225	180	589	9.81
		ROADS-ACCESS RAMP		146	276	225	180	828	
		ROADS,RAILROADS, AND BRIDGES		4,202	7,535	7,931	6,345	26,013	
11 LEVEES AND FLOODWALLS									
11.0.1 A EARTHEN LEVEE									
11.0.1 A	2	SEMI-COMPACTED EMBANKMENT (1on	64800.00 CY	51,017	122,213	0	0	173,230	2.67
11.0.1 A	3	EXCAVATION (1on4)	195000.00 CY	250,907	434,226	0	0	685,133	3.51
11.0.1 A	4	CLEARING	90.00 ACR	39,447	72,268	0	0	111,715	1241.28
11.0.1 A	5	CRUSHED STONE (CA-10)	12000.00 TON	15,115	21,660	45,000	36,000	117,775	9.81
11.0.1 A	6	"C" STONE	10550.00 TON	17,531	43,123	42,200	31,650	134,504	12.75
11.0.1 A	7	"B" STONE	5840.00 TON	9,704	23,871	23,360	17,520	74,455	12.75
11.0.1 A	8	CMP-18" DIA.	70.00 LF	587	60	585	0	1,232	17.60
11.0.1 A	9	CMP END SECTION-18"	2.00 EA	126	13	210	0	349	174.31
11.0.1 A	10	CRUSHED STONE-1" MINUS	7.00 TON	0	0	67	0	67	9.60
11.0.1 A	11	ASPHALTIC CONCRETE	13.00 TON	104	40	338	52	534	41.05
11.0.1 A	12	AGGREGATE BASE COURSE-8"	34.00 TON	43	61	128	102	334	9.81
11.0.1 A	13	BARRICADE - 10 FT	2.00 EA	0	0	400	0	400	200.00
11.0.1 A	14	ACCESS GATE - 14 FT	2.00 EA	0	0	4,000	0	4,000	2000.00
11.0.1 A	15	STRIPPING (BORROW AREA)	8365.00 CY	4,053	10,005	0	0	14,057	1.68
11.0.1 A	16	CLEARING (BORROW AREA)	3.00 ACR	1,418	2,150	0	0	3,568	1189.36
11.0.1 A	17	SEEDING (BORROW AREA)	3.00 ACR	1,559	426	937	0	2,922	973.95
11.0.1 A	18	SEEDING (MAIN LEVEE)	81.00 ACR	26,195	5,767	32,400	13,770	78,133	964.60
11.0.1 A	19	HAY BAILS	30600.00 LF	3,672	1,224	12,240	0	17,136	0.56

	QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
EARTHEN LEVEE		421,477	737,107	161,865	99,094	1,419,543	
11.0.1 B 48" GRAVITY DRAIN (MIDDLE&LOWER)							
11.0.1 B 6 SLUICE GATE & OPER-48" DIA	1.00 EA	0	0	9,600	0	9,600	9600.00
11.0.1 B 7 CMP - 48" DIA	31.00 LF	274	82	868	279	1,503	48.48
11.0.1 B 8 END SECTIONS - 48"	2.00 EA	252	26	904	0	1,181	590.61
11.0.1 B 9 RISER PIPE - 72" DIA	8.50 LF	0	0	1,020	0	1,020	120.00
11.0.1 B 10 CONCRETE BASE	8.00 CY	0	0	1,280	0	1,280	160.00
11.0.1 B 11 CRUSHED STONE-3" MINUS	400.00 TON	630	1,459	1,500	1,200	4,789	11.97
11.0.1 B 12 CRUSHED STONE-6" MINUS	190.00 TON	299	693	713	570	2,275	11.97
11.0.1 B 13 GEOGRID	200.00 SY	560	0	1,040	0	1,600	8.00
11.0.1 B 14 GEOTEXTILE	460.00 SY	552	0	276	0	828	1.80
48" GRAVITY DRAIN (MIDDLE&LOWE		2,567	2,259	17,201	2,049	24,076	
11.0.1 C COFFERDAM FOR GRAVITY DRAIN							
11.0.1 C 1 "C" STONE	5040.00 TON	8,375	20,601	20,160	15,120	64,256	12.75
11.0.1 C 2 CRUSHED STONE	230.00 TON	290	415	863	690	2,257	9.81
11.0.1 C 3 PLASTIC LINER	1360.00 SY	0	0	0	14,688	14,688	10.80
COFFERDAM FOR GRAVITY DRAIN		8,665	21,016	21,023	30,498	81,201	
11.0.1 E INTERIOR CLOSURE							
11.0.1 E 1 EXCAVATION	12200.00 CY	15,698	27,167	0	0	42,865	3.51
11.0.1 E 2 CLEARING	1.00 ACR	473	717	0	0	1,189	1189.36
11.0.1 E 3 "C" STONE REVETMENT	11250.00 TON	18,694	45,984	45,000	33,750	143,429	12.75
11.0.1 E 4 CRUSHED STONE (CA-10)	75.00 TON	94	135	281	225	736	9.81
INTERIOR CLOSURE		34,959	74,003	45,281	33,975	188,219	
11.0.1 F ISLAND CONSTRUCTION (MIDDLE)							
11.0.1 F 1 EXCAVATION (MIDDLE)	15900.00 CY	20,459	35,406	0	0	55,865	3.51
11.0.1 F 2 EXCAVATION (LOWER)	25350.00 CY	32,618	56,449	0	0	89,067	3.51
11.0.1 F 3 SEEDING	7.00 ACR	2,264	498	2,800	1,190	6,752	964.60
11.0.1 F 4 HAY BAILS	11100.00 LF	1,332	444	4,440	0	6,216	0.56
ISLAND CONSTRUCTION (MIDDLE)		56,672	92,798	7,240	1,190	157,900	
11.0.1 G EXISTING ROCK CLOSURE							
11.0.1 G 1 CLEARING	1.50 ACR	709	1,075	0	0	1,784	1189.36

** PROJECT DIRECT SUMMARY - LEVEL 3 **

			QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 G	2	"C" STONE REPAIR	2000.00 TON	3,323	8,175	8,000	6,000	25,498	12.75
		EXISTING ROCK CLOSURE		4,032	9,250	8,000	6,000	27,282	
11.0.1 H		SHORELINE & BANKLINE PROTECTION							
11.0.1 H	1	WILLOW WATTLINGS(MIDDLE/ISLAND	2700.00 LF	8,640	0	0	0	8,640	3.20
11.0.1 H	2	WILLOW CUTTINGS(MIDDLE/ISLANDS	15200.00 SF	1,824	0	0	0	1,824	0.12
11.0.1 H	3	WILLOW WATTLINGS(LOWER/ISLANDS	4700.00 LF	15,040	0	0	0	15,040	3.20
11.0.1 H	4	WILLOW CUTTINGS(LOWER/ISLANDS)	26700.00 SF	3,204	0	0	0	3,204	0.12
11.0.1 H	5	WILLOW CUTTINGS(UPPER/LEVEE)	205000.00 SF	24,600	0	0	0	24,600	0.12
		SHORELINE & BANKLINE PROTECTIO		53,308	0	0	0	53,308	
11.0.1 I		MISCELLANEOUS							
11.0.1 I	1	AUTOMATIC GAGING STATION	3.00 EA	0	0	24,000	0	24,000	8000.00
11.0.1 I	2	STAFF GAGE	6.00 EA	0	0	4,800	0	4,800	800.00
11.0.1 I	3	SILT SCREEN	12000.00 SF	48,000	0	0	0	48,000	4.00
11.0.1 I	4	WATER QUALITY TESTS	160.00 EA	6,400	0	0	0	6,400	40.00
		MISCELLANEOUS		54,400	0	28,800	0	83,200	
		LEVEES AND FLOODWALLS		636,080	936,434	289,409	172,806	2,034,729	
13		PUMPING PLANT							
13.0.-.A		PUMP STATION/CONTROL STRUCTURE							
13.0.-.A	2	REINFORCED CONCRETE	400.00 CY	0	0	80,000	0	80,000	200.00
13.0.-.A	3	STRUCTURAL STEEL	26400.00 LB	0	0	36,960	0	36,960	1.40
13.0.-.A	4	SLUICE GATE W/OPERATOR-72"x72"	2.00 EA	0	0	35,200	0	35,200	17600
13.0.-.A	5	SLIDE GATE W/HARDWARE-72"x72"	2.00 EA	0	0	19,200	0	19,200	9600.00
13.0.-.A	6	GUARD RAIL	200.00 LF	397	11	2,400	0	2,808	14.04
13.0.-.A	7	GEOTEXTILE	1070.00 SY	1,284	0	642	0	1,926	1.80
13.0.-.A	8	STOP LOGS (4x6 OAK TIMBERS)	1280.00 SF	0	0	3,072	0	3,072	2.40
13.0.-.A	9	CONCRETE PARKING BLOCKS	4.00 EA	26	1	64	0	91	22.80
13.0.-.A	10	CRUSHED STONE CA-10	30.00 TON	38	54	113	90	294	9.81
13.0.-.A	11	PUMP AND ACCESSORIES	2.00 EA	0	0	107,000	0	107,000	53500
13.0.-.A	12	GENTRY CRANE W/HOIST	2.00 EA	0	0	1,248	0	1,248	624.00
13.0.-.A	13	STRUCTURAL EXCAVATION	6000.00 CY	2,519	7,739	0	0	10,259	1.71
13.0.-.A	14	EXCAVATED EMBANKMENT	6000.00 CY	2,907	7,176	0	0	10,083	1.68
13.0.-.A	15	EMBANKMENT, BORROW	3200.00 CY	3,556	8,424	0	0	11,980	3.74
13.0.-.A	16	DEWATERING		29,660	11,462	4,800	2,400	48,322	
13.0.-.A	17	DITCH EXCAVATION	14350.00 CY	8,646	24,952	0	0	33,598	2.34
13.0.-.A	18	CLEARING FOR DITCH EXCAVATION	1.00 ACR	473	717	0	0	1,189	1189.36
13.0.-.A	19	"C" STONE FOR DITCH EMBANKMENT	1725.00 TON	2,866	7,051	6,900	5,175	21,992	12.75
13.0.-.A	20	FISH SCREENS	2.00 EA	0	0	560	0	560	280.00

** PROJECT DIRECT SUMMARY - LEVEL 3 **

			QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
		PUMP STATION/CONTROL STRUCTURE		52,373	67,587	298,159	7,665	425,784	
13.0.-.B		PUMP STATION/CONTROL STRUCTURE							
13.0.-.B	2	REINFORCED CONCRETE	330.00 CY	0	0	66,000	0	66,000	200.0
13.0.-.B	3	STRUCTURAL STEEL	14300.00 LB	0	0	20,020	0	20,020	1.4
13.0.-.B	4	SLUICE GATE W/OPERATOR-72"x72"	1.00 EA	0	0	17,600	0	17,600	1760
13.0.-.B	5	SLIDE GATE W/HARDWARE-72"x72"	1.00 EA	0	0	9,600	0	9,600	9600.0
13.0.-.B	6	GUARD RAIL	100.00 LF	198	6	1,200	0	1,404	14.0
13.0.-.B	7	GEOTEXTILE	4800.00 SF	5,760	0	2,880	0	8,640	1.8
13.0.-.B	8	STOP LOGS (4x6 OAK TIMBERS)	640.00 SF	0	0	1,536	0	1,536	2.4
13.0.-.B	9	CONCRETE PARKING BLOCKS	2.00 EA	13	0	32	0	46	22.8
13.0.-.B	10	CRUSHED STONE CA-10	15.00 TON	19	27	75	49	170	11.3
13.0.-.B	11	PUMP AND ACCESSORIES	1.00 EA	0	0	53,500	0	53,500	5350
13.0.-.B	12	GENTRY CRANE W/HOIST	1.00 EA	0	0	624	0	624	624.0
13.0.-.B	13	STRUCTUARL EXCAVATION	6000.00 CY	2,519	7,739	0	0	10,259	1.7
13.0.-.B	14	EXCAVATED EMBANKMENT	6000.00 CY	2,907	7,176	0	0	10,083	1.6
13.0.-.B	15	EMBANKMENT, BORROW	3200.00 CY	3,556	8,424	0	0	11,980	3.7
13.0.-.B	16	DEWATERING		29,660	11,462	4,800	2,400	48,322	
13.0.-.B	17	DITCH EXCAVATION	12000.00 CY	7,230	20,866	0	0	28,096	2.3
13.0.-.B	18	CLEARING FOR DITCH EXCAVATION	1.00 ACR	473	717	0	0	1,189	1189.3
13.0.-.B	19	"C" STONE FOR DITCH EMBANKMENT	1725.00 TON	2,866	7,051	6,900	5,175	21,992	12.7
13.0.-.B	20	FISH SCREENS	2.00 EA	0	0	560	0	560	280.0
		PUMP STATION/CONTROL STRUCTURE		55,203	63,468	185,327	7,624	311,621	
13.0.-.C		PUMP STATION/CONTROL STRUCTURE							
13.0.-.C	2	REINFORCED CONCRETE	200.00 CY	0	0	40,000	0	40,000	200.00
13.0.-.C	3	STRUCTURAL STEEL	800.00 LB	0	0	1,120	0	1,120	1.40
13.0.-.C	4	SLUICE GATE W/OPERATOR-72"x72"	1.00 EA	0	0	17,600	0	17,600	17600
13.0.-.C	5	SLIDE GATE W/HARDWARE-72"x72"	1.00 EA	0	0	9,600	0	9,600	9600.00
13.0.-.C	7	GEOTEXTILE	2500.00 SF	3,000	0	1,500	0	4,500	1.80
13.0.-.C	9	CONCRETE PARKING BLOCKS	2.00 EA	13	0	32	0	46	22.80
13.0.-.C	10	CRUSHED STONE CA-10	16.00 TON	20	29	80	52	181	11.32
13.0.-.C	11	PUMP AND ACCESSORIES	1.00 EA	0	0	53,500	0	53,500	53500
13.0.-.C	13	STRUCTUARL EXCAVATION	3500.00 CY	1,470	4,515	0	0	5,984	1.71
13.0.-.C	14	EXCAVATED EMBANKMENT	3500.00 CY	1,696	4,186	0	0	5,882	1.68
13.0.-.C	15	EMBANKMENT, BORROW	2200.00 CY	2,445	5,792	0	0	8,237	3.74
13.0.-.C	16	DEWATERING		19,774	7,643	3,200	1,600	32,217	
13.0.-.C	17	DITCH EXCAVATION	11600.00 CY	6,989	20,170	0	0	27,159	2.34
13.0.-.C	18	CLEARING FOR DITCH EXCAVATION	1.50 ACR	709	1,075	0	0	1,784	1189.36
13.0.-.C	19	"C" STONE FOR DITCH EMBANKMENT	300.00 TON	499	1,226	1,200	900	3,825	12.75
13.0.-.C	20	FISH SCREENS	2.00 EA	0	0	560	0	560	280.00
		PUMP STATION/CONTROL STRUCTURE		36,614	44,636	128,392	2,552	212,194	
		PUMPING PLANT		144,190	175,690	611,878	17,841	949,599	

	QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
18 CULTURAL RESOURCE PRESERVATION							
18.-.-.- DISTRICT LABOR (CELMS)							
DISTRICT LABOR (CELMS)		33,766	0	0	0	33,766	
18.0.1.- FIELD WORK							
FIELD WORK		57,179	0	0	0	57,179	
18.0.2.- DATA ANAYLISIS/REPORT PREP.							
DATA ANAYLISIS/REPORT PREP.		31,089	0	0	0	31,089	
18.0.3.- CURATION							
CURATION		6,630	0	0	0	6,630	
CULTURAL RESOURCE PRESERVATION		128,664	0	0	0	128,664	
30 PLANNING, ENGINEERING,AND DESIGN							
30.A.-.- PLANNING (Preparation of DPR)							
PLANNING (Preparation of DPR)		677,000	0	0	0	677,000	
30.C.-.- MEMORANDUM OF AGREEMENT							
MEMORANDUM OF AGREEMENT		5,000	0	0	0	5,000	
30.D.2.- ENVIRONMENTAL AND REGULATORY							
ENVIRONMENTAL AND REGULATORY		4,500	0	0	0	4,500	
30.H.-.- PLANS AND SPECIFICATIONS							

	QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
30.H.-.-H.1.- PLANS & SPECS - SWAN LAKE		290,000	0	0	0	290,000	
30.H.-.-H.2.- PLANS & SPECS - DAMS, SEDIMENT		5,000	0	0	0	5,000	
PLANS AND SPECIFICATIONS		295,000	0	0	0	295,000	
30.J.-.- ENGINEERING DURING CONSTRUCTION							
30.J.-.-J.H.- VECP's		11,000	0	0	0	11,000	
30.J.-.-J.H.2 PERIODIC INSPECTIONS		12,000	0	0	0	12,000	
30.J.-.-J.H.8 EDC - DAMS, SEDIMENT CONTROL		11,200	0	0	0	11,200	
30.J.-.-J.H.9 ALL OTHER EDC		31,000	0	0	0	31,000	
ENGINEERING DURING CONSTRUCTIO		65,200	0	0	0	65,200	
30.M.-.- COST ENGINEERING							
COST ENGINEERING		20,000	0	0	0	20,000	
30.N.-.- CONSTRUCTION AND SUPPLY CONTRACT							
CONSTRUCTION AND SUPPLY CONTRA		15,000	0	0	0	15,000	
30.P.-.- PROJECT MANAGEMENT							
PROJECT MANAGEMENT		20,000	0	0	0	20,000	
30.Z.-.- MISCELLANEOUS ACTIVITIES							
MISCELLANEOUS ACTIVITIES		8,000	0	0	0	8,000	
PLANNING, ENGINEERING,AND DESI		1,109,700	0	0	0	1,109,700	
31 CONSTRUCTION MANAGEMENT							
31.B.-.- CONTRACT ADMINISTRATION							
31.B.-.-B.-.1 CONTRACT ADMIN - SWAN		90,000	0	0	0	90,000	
31.B.-.-B.-.2 CONTRACT ADMIN - DAMS, SEDIMEN		10,000	0	0	0	10,000	
CONTRACT ADMINISTRATION		100,000	0	0	0	100,000	

		QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
31.C.-.-	BENCHMARKS AND BASELINES							
	BENCHMARKS AND BASELINES		5,000	0	0	0	5,000	
31.D.-.-	REVIEW OF SHOP DRAWINGS							
31.D.-.-D.-.1	REVIEW OF SHOP DRAWINGS-SWAN		42,000	0	0	0	42,000	
31.D.-.-D.-.2	REVIEW OF SHOP DRAWINGS-DAMS,		11,700	0	0	0	11,700	
	REVIEW OF SHOP DRAWINGS		53,700	0	0	0	53,700	
31.E.-.-	INSPECTION AND QUALITY ASSURANCE							
31.E.-.-E.-.1	INSPECTION & QA-SWAN		48,000	0	0	0	48,000	
31.E.-.-E.-.2	INSPECTION & QA-DAMS, SEDIMENT		11,700	0	0	0	11,700	
	INSPECTION AND QUALITY ASSURAN		59,700	0	0	0	59,700	
31.F.-.-	PROJECT OFFICE OPERATION							
31.F.-.-F.-.1	PROJECT OFFICE OPERATION-SWAN		354,000	0	0	0	354,000	
31.F.-.-F.-.2	PROJECT OFFICE OPERATION-DAMS,		95,000	0	0	0	95,000	
	PROJECT OFFICE OPERATION		449,000	0	0	0	449,000	
31.H.-.-	CONTRACTOR INITIATED CLAIMS AND							
	CONTRACTOR INITIATED CLAIMS AN		18,000	0	0	0	18,000	
31.P.-.-	PROJECT MANAGEMENT							
31.P.-.-P.-.1	PROJECT MANAGEMENT-SWAN		10,000	0	0	0	10,000	
31.P.-.-P.-.2	PROJECT MANAGEMENT-DAMS,SEDIME		1,600	0	0	0	1,600	
	PROJECT MANAGEMENT		11,600	0	0	0	11,600	
	CONSTRUCTION MANAGEMENT		697,000	0	0	0	697,000	
	SWAN LAKE - REVISED PER COMMEN	1.00 EA	3,183,647	1,522,203	950,204	201,912	5,857,966	5857966
	FIELD OFFICE OVERHEAD/MOB & DEMOB						480,663	
	SUBTOTAL						6,338,628	
	HOME OFFICE OVERHEAD						140,843	

	QUANTITY UOM	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
SUBTOTAL						6,479,471	
INTEREST ON OPERATING CAPITAL						13,200	
SUBTOTAL						6,492,671	
PROFIT						296,765	
SUBTOTAL						6,789,436	
BOND						39,719	
TOTAL INCL INDIRECTS						6,829,155	
% Contingencies						1,025,278	
TOTAL INCL OWNER COSTS						7,854,432	

0. OH&P. OVERHEAD/MOB/IOOC/PROFIT/BOND

The project information record covers the following distributed costs:

1. Field office overhead - developed detail costs for field items.
2. Mob/Demob - developed detail costs to mobilize and demob equipment to the construction site.
3. Home office overhead - used 5 percent.
4. Interest on operating capital - 8.0% x (assumed bid amount) divided by duration of job, 24 months. (3,970,000 x 8% divide by 24 months.)
5. Profit - used OCE weighted guideline method.
6. Bond - used 1 percent

0. OH&P 0. FIELD OFFICE OVERHEAD/MOB

0. OH&P 001. FIELD OFFICE OVERHEAD

	0. OH&P. OVERHEAD/MOB/IOOC/	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
USR	JOB SUPERINTENDENT			4000.00	0.00	0.00	0.00	4000.00	
		24.00 MO	0.00	96,000	0	0	0	96,000	4000.00
USR	OFFICE ENGINEER			2800.00	0.00	0.00	0.00	2800.00	
		24.00 MO	0.00	67,200	0	0	0	67,200	2800.00
USR	QUALITY CONTROL MA			3000.00	0.00	0.00	0.00	3000.00	
		24.00 MO	0.00	72,000	0	0	0	72,000	3000.00
USR	SECRETARY/TIME KEE			1500.00	0.00	0.00	0.00	1500.00	
		24.00 MO	0.00	36,000	0	0	0	36,000	1500.00
USR	GENERAL LABORER, C			2000.00	0.00	0.00	0.00	2000.00	
		24.00 MO	0.00	48,000	0	0	0	48,000	2000.00
USR	SECURITY GUARD			1800.00	0.00	0.00	0.00	1800.00	
		24.00 MO	0.00	43,200	0	0	0	43,200	1800.00
USR	OFFICE TRAILER			0.00	450.00	0.00	0.00	450.00	
		24.00 MO	0.00	0	10,800	0	0	10,800	450.00
USR	TEMPORARY FENCING			0.00	0.00	7.00	0.00	7.00	
		1000.00 LF	0.00	0	0	7,000	0	7,000	7.00
USR	SANITARY FACILITIE			0.00	225.00	0.00	0.00	225.00	
		24.00 MO	0.00	0	5,400	0	0	5,400	225.00
USR	ELECTRICAL			0.00	0.00	250.00	0.00	250.00	
		24.00 MO	0.00	0	0	6,000	0	6,000	250.00
USR	TELEPHONE SERVICE			0.00	0.00	300.00	0.00	300.00	
		24.00 MO	0.00	0	0	7,200	0	7,200	300.0

0. OH&P.	OVERHEAD/MOB/IOOC/	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
USR	OFFICE EQUIPMENT &					0.00	0.00	2500.00	0.00	2500.00	
		1.00	LS		0.00	0	0	2,500	0	2,500	2500.00
USR	PROJECT & SAFETY S					0.00	0.00	2500.00	0.00	2500.00	
		1.00	LS		0.00	0	0	2,500	0	2,500	2500.00
USR	PICKUP TRUCK					0.00	400.00	0.00	0.00	400.00	
		24.00	MO		0.00	0	9,600	0	0	9,600	400.00
	FIELD OFFICE OVERH					362,400	25,800	25,200	0	413,400	

0. OH&P 002. MOBILIZATION & DEMOBILIZATION

Mobilization of equipment to the Swan Lake Project is assume to be within a radius of 100 miles, which will include the entire metropolitan St. Louis area. All land based equipment will be hauled by lowboy trailers. Only load/unload time will be charged to hauled equipment.

One Cycle Period for hauled equipment:

Load	2 hours
Transport	3 hours
Unload	2 hours
Return	3 hours
	10 hours/roundtrip

There will be 15 trips, which results in 150 hours for the truck/lowboy, two laborers, and truck driver. An operator will be used for the load/unload activity(15 trips x 4 hours/trip = 60 hours). Assume demob. will take the same amount of time to return equipment to the Contractor's yard.

Transporting Equipment to Project Site & Return:
150hrs x 2.0 = 300 hours —— truck/lowboy, 2 laborers, & truck driver
60hrs x 2.0 = 120 hours —— operator
4hrs x 2.0 = 8 hours —— each piece of equipment

Four dump trucks will be driven to the Jobsite & return:
3 hours/trip x 4 trucks = 12 hours to mob.
12 hours x 2.0 = 24 hours —— truck driver, 2 laborers

Floating Plant to be Mobilized & Demobilized:
Time for travel to site = 100 miles/4 miles/hour = 25 hours x2.0 =50hrs
750hp Push Boat, spud barge, & work barge
Load time for dragline & bucket = 8 hours x 2.0 = 16 hours
1 operator = 66 hrs, 2 laborers = 66 hrs/each

MIL	HYD EXCAV,CRWLR,1					0.00	29.12	0.00	0.00	29.12	
	1.00 CY BUCKET	8.00	HR	H2SCS003	1.00	0	233	0	0	233	29.1

Project Distributed Costs

0. OH&P.	OVERHEAD/MOB/IOOC/	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
MIL	LDR,W/BH,WH, 1CY F				0.00	12.41	0.00	0.00	12.41	
	1.00 CY FE BUCKET	8.00 HR	L50MF002	1.00	0	99	0	0	99	12.41
MIL	ASPHALT FIN, 10' S				0.00	32.79	0.00	0.00	32.79	
	10' STD PAVING WID	8.00 HR	A30BK004	1.00	0	262	0	0	262	32.79
MIL	TRUCK OPT,FLATBED,				0.00	0.47	0.00	0.00	0.47	
	8' x 10.0'	6.00 HR	T40XX013	1.00	0	3	0	0	3	0.47
MIL	TRK,HWY,4X2,F250,3				0.00	6.34	0.00	0.00	6.34	
	4X2 3/4-TON PICK-U	6.00 HR	T50F0003	1.00	0	38	0	0	38	6.34
MIL	TRK, HWY, 2 AXLE,				0.00	11.68	0.00	0.00	11.68	
	4X2, 2 AXLE, 24000	6.00 HR	T50GM012	1.00	0	70	0	0	70	11.68
MIL	LDR,FE,CRWLR, 3.75				0.00	68.16	0.00	0.00	68.16	
	3.75 CY	8.00 HR	L35CA007	1.00	0	545	0	0	545	68.16
MIL	SCRAPER,SELF,14-20				0.00	73.01	0.00	0.00	73.01	
	14-20 CY, 24 TON,	8.00 HR	S15CA001	1.00	0	584	0	0	584	73.01
MIL	BLADE, STRAIGHT,HY				0.00	6.42	0.00	0.00	6.42	
	BLADE, STRAIGHT,HY	8.00 HR	T10CA016	1.00	0	51	0	0	51	6.42
MIL	DOZER,CWLR,CAT D-8				0.00	71.32	0.00	0.00	71.32	
	POWERSHIFT, (ADD B	8.00 HR	T15CA015	1.00	0	571	0	0	571	71.32
MIL	TRK,OFF-HWY,35T 22				0.00	67.75	0.00	0.00	67.75	
	22-30 CY, 35T,REAR	8.00 HR	T55CA001	1.00	0	542	0	0	542	67.75
MIL	TRK, HWY, 21,700GV				0.00	12.12	0.00	0.00	12.12	
	21,700 GVW, 4X2, S	6.00 HR	T50IT003	1.00	0	73	0	0	73	12.12
USR	Air Curtain Destru				0.00	13.47	0.00	0.00	13.47	
		8.00 HR	L10VE009	1.00	0	108	0	0	108	13.47
MIL	TRACTOR,WH,FARM, J				0.00	5.77	0.00	0.00	5.77	
	INDUSTRIAL 2WD	8.00 HR	T25JD001	1.00	0	46	0	0	46	5.77
MIL	HYD EXCAV,CRWLR,3				0.00	125.32	0.00	0.00	125.32	
	3.00 CY BUCKET	8.00 HR	H25K0007	1.00	0	1,003	0	0	1,003	125.32
MIL	TRK,OFF,R-DUMP,20-				0.00	59.47	0.00	0.00	59.47	
	20-26 CY, 35T, REA	8.00 HR	T55DJ005	1.00	0	476	0	0	476	59.47
MIL	BLADE, PUSH PLATE				0.00	0.26	0.00	0.00	0.26	
	BLADE, PUSH PLATE	8.00 HR	T10CA019	1.00	0	2	0	0	2	0.26
MIL	BUCKET, DRAGLINE,				0.00	3.10	0.00	0.00	3.10	
	4.5 CY BUCKET,LIG	16.00 HR	B35HE009	1.00	0	50	0	0	50	3.10

0. OH&P.	OVERHEAD/MOB/IOOC/	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
MIL	CRA,DRAG/CLAM,4.5C				0.00	109.71	0.00	0.00	109.71	
	4.50 CY DRAGLINE/C	16.00 HR	C85AM003	1.00	0	1,755	0	0	1,755	109.7
USR	Spud Barge				0.00	20.00	0.00	0.00	20.00	
		50.00 HR	XX0XX011	1.00	0	1,000	0	0	1,000	20.0
USR	2300 hp Tow Boat				0.00	256.01	0.00	0.00	256.01	
		50.00 HR	XX0XX008	1.00	0	12,801	0	0	12,801	256.0
USR	Work Barge				0.00	8.50	0.00	0.00	8.50	
		50.00 HR	XX0XX013	1.00	0	425	0	0	425	8.5
MIL	Outside Laborer				24.68	0.00	0.00	0.00	24.68	
		780.00 HR	X-LABORER	1.00	19,250	0	0	0	19,250	24.6
MIL	TRK, HWY, 52,400 G				0.00	25.59	0.00	0.00	25.59	
	52,400 GVW, 3 AXLE	300.00 HR	T50F0013	1.00	0	7,677	0	0	7,677	25.5
MIL	TRK TRLR,LOWBOY,12				0.00	14.01	0.00	0.00	14.01	
	120 TON, 4 AXLE	300.00 HR	T45XX023	1.00	0	4,203	0	0	4,203	14.0
MIL	Outside Equip. Op.				31.49	0.00	0.00	0.00	31.49	
		186.00 HR	X-EQOPRMED	1.00	5,857	0	0	0	5,857	31.4
MIL	Outside Truck Dr.				29.44	0.00	0.00	0.00	29.44	
		324.00 HR	X-TRKDVRHV	1.00	9,539	0	0	0	9,539	29.4

FIELD OFFICE OVERH	397,046	58,416	25,200	0	480,662

04.-.-.-. HILLSIDE SEDIMENT		QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT

04. DAMS

The cost for this item(04 Dams) was estimated by the Soil Conservation Service and guaranties a 30% reduction in sedimentation.

The Soil Conservation Service will provide technical assistance to the Corps of Engineers for the implementation of the Hillside Sediment Control Structures.

Hillside Sediment Control Structures consist of the following:

55 - Ponds
40 - Terraces
95 - Basins

Cost provided by the Soil Conservation Service:

Construction Cost	$ 750,000
18% Administrative Cost	132,200
Total Project Cost	$ 882,200

04.-.-.-. HILLSIDE SEDIMENT CONTROL STRUCT

Detail costs have been developed for ponds, terraces, and basins by the Soil Conservation Service. Cost per unit are based on actual costs of installed components of projects constructed in Calhoun County and updated to reflect present day costs.

04.-.-.- A. PONDS

		QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
L USR	Dozer/ U Blade			0.36	0.89	0.00	0.00	1.25	
	PRODUCTION RATE =	269500 CY XSWNLAKE04	175.00	96,993	239,451	0	0	336,444	1.25
	FOR TWO DOZERS								
L USR	PVC PIPE - 6 Inch			2.86	0.29	2.45	0.00	5.60	
	PRODUCTION RATE =	5500.00 LF CODEK	44.00	15,723	1,603	13,475	0	30,801	5.60
L USR	SEEDING			411.33	112.49	1.00	0.00	524.82	
		55.00 AC XSWNLAKE06	0.12	22,623	6,187	55	0	28,865	524.82
B MIL	ARCHEOLOGICAL			300.00	0.00	0.00	0.00	300.00	
		55.00 EA ULABA	0.00	16,500	0	0	0	16,500	300.00
	PONDS	55.00 EA		151,840	247,240	13,530	0	412,610	7502.00

04.-.-.-. HILLSIDE SEDIMENT		QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
	04.-.-.- B. TERRACES									
L USR	Dozer/ U Blade				1.37	0.14	0.00	0.00	1.51	
	PRODUCTION RATE =	40000 FT	CODEK	92.00	54,692	5,576	0	0	60,268	1.51
USR	PVC PIPE - 6 Inch				0.84	0.09	2.07	0.00	2.99	
		800.00 LF	CODEK	150.00	671	68	1,656	0	2,395	2.99
B USR	CORRUGATED PLASTIC				0.80	0.08	0.30	0.00	1.18	
		10000 LF	CODEK	157.00	8,012	817	3,000	0	11,829	1.18
M USR	PVC RISER - 6 INCH				89.85	9.16	50.00	0.00	149.01	
		80.00 EA	CODEK	1.40	7,188	733	4,000	0	11,921	149.01
B USR	ARCHEOLOGICAL				266.81	72.97	0.00	0.00	339.78	
		40.00 EA	XSWNLAKE06	0.19	10,672	2,919	0	0	13,591	339.78
	TERRACES	40.00 EA			81,235	10,113	8,656	0	100,004	2500.10
	04.-.-.- C. BASINS									
USR	EARTHFILL - OVER 3				0.45	1.10	0.00	0.00	1.54	
	PRODUCTION RATE =	118750 CY	XSWNLAKE04	141.50	52,856	130,483	0	0	183,338	1.54
	FOR TWO DOZERS									
USR	CORRUGATED PLASTIC				0.80	0.08	0.30	0.00	1.18	
		4750.00 LF	CODEK	157.00	3,806	388	1,425	0	5,619	1.18
L USR	PVC PIPE - 6 INCH				0.84	0.09	2.07	0.00	2.99	
		1900.00 LF	CODEK	150.00	1,593	162	3,933	0	5,689	2.99
B USR	PVC RISER - 6 INCH				89.85	9.16	50.00	0.00	149.01	
		95.00 EA	CODEK	1.40	8,536	870	4,750	0	14,156	149.01
USR	ARCHEOLOGICAL				272.86	27.82	0.00	0.00	300.67	
		95.00 EA	CODEK	0.46	25,922	2,643	0	0	28,564	300.67
	BASINS	95.00 EA			92,712	134,546	10,108	0	237,366	2498.58
	HILLSIDE SEDIMENT				325,787	391,899	32,294	0	749,980	

04.-.-.A. ADMINISTRATIVE COS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
04.-.-.A. ADMINISTRATIVE COST-SOIL CONSERVATION SERVICE								
ADMINISTRATIVE COS			132,220	0	0	0	132,220	
DAMS			458,007	391,899	32,294	0	882,200	

06. 3.A. PARKING LOT & BOAT	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
06. FISH AND WILDLIFE FACILITIES								
06. 3.A. PARKING LOT & BOAT RAMP (MIDDLE)								
06. 3.A 2. CA-10 CRUSHED STONE								
Stone is assumed to be delivered to the site and end dumped. (approx. haul distance = 20mi)								
B MIL PM CRUSHED STONE CA-1			1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	690.00 TON XSWNLAKE01	50.00	869	1,245	2,588	2,070	6,772	9.81
HAULING PAID FOR UNDER SUPPLIES								
HAUL DISTANCE = 20 MILES								
PRODUCTION RATE = 50 TONS/HOUR								
CA-10 CRUSHED STON	690.00 TON		869	1,245	2,588	2,070	6,772	9.81
06. 3.A 3. QUARRY RUN STONE-BOAT RAMP								
B MIL PM QUARRY RUN STONE (			1.57	3.65	3.50	3.00	11.72	
HAULING PAID FOR UNDER SUPPLIES	XSWNLAKE03	40.00	228	529	508	435	1,700	11.72
THIS MATERIAL WILL BE USED FOR THE BOAT RAMP								
HAUL DISTANCE = 20 MILES								
PRODUCTION RATE = 40 TON/HR								
QUARRY RUN STONE-B	145.00 TON		228	529	508	435	1,700	11.72
06. 3.A 4. SEMI-COMPACTED EMBANKMENT								
This material is assumed to be dropped by scrapers in the fill area and spread with a dozer.								
USR PM SEMI-COMPACTED FIL			0.79	1.86	0.00	0.00	2.65	
HAUL DISTANCE = 2	1485.00 CY XSWNLAKE02	120.00	1,169	2,769	0	0	3,938	2.65
PRODUCTION RATE = 120 CY/HR								
SEMI-COMPACTED EMB	1485.00 CY		1,169	2,769	0	0	3,938	2.65
06. 3.A 5. STRIPPING								
Hauling of this material to a disposal area will not be necessary, it is assumed to be pushed off to the side and graded to blend in with the surrounding area with a dozer.								
USR PM STRIPPING			0.48	1.20	0.00	0.00	1.68	
PRODUCTION RATE =	470.00 CY XSWNLAKE04	130.00	228	562	0	0	790	1.68
STRIPPING	470.00 CY		228	562	0	0	790	1.68

06. 3.A. PARKING LOT & BOAT	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
06. 3.A 6. SEEDING									
B MIL PM SEEDING BY HAND -				519.58	142.09	312.28	0.00	973.95	
PRODUCTION RATE =	0.20 ACR	XSWNLAKE06	0.10	104	28	62	0	195	973.95
OR 4,100 SF/HR									
SEEDING	0.20 ACR			104	28	62	0	195	973.95
06. 3.A 7. CLEARING This item is for clearing of a small area, debris is assumed to be hauled to the levee area where the majority of clearing will be done.									
L MIL PM MEDIUM CLEARING -				472.60	716.76	0.00	0.00	1189.36	
PRODUCTION RATE =	0.30 ACR	XSWNLAKE05	0.30	142	215	0	0	357	1189.36
CLEARING	0.30 ACR			142	215	0	0	357	1189.36
14 FT. ACCESS GATE	1.00 EA			0	0	2,000	0	2,000	2000.00
PARKING LOT & BOAT				2,740	5,349	5,157	2,505	15,751	

06. 3.B. PARKING LOT & BOAT	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
06. 3.B. PARKING LOT & BOAT RAMP (LOWER)								
06. 3.B 1. CA-10 CRUSHED STONE Stone is assumed to be hauled to the site and end dumped (approx. haul distance = 20mi)								
B MIL PM CRUSHED STONE CA-1			1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	660.00 TON XSWNLAKE01	50.00	831	1,191	2,475	1,980	6,478	9.81
HAULING PAID FOR UNDER SUPPLIES HAUL DISTANCE = 20 MILES PRODUCTION RATE = 50 TON/HR								
CA-10 CRUSHED STON	660.00 TON		831	1,191	2,475	1,980	6,478	9.81
06. 3.B 2. QUARRY RUN STONE-BOAT RAMP								
B MIL PM QUARRY RUN STONE			1.57	3.65	3.50	3.00	11.72	
(DELIVERED)	145.00 TON XSWNLAKE03	40.00	228	529	508	435	1,700	11.72
HAULING PAID FOR UNDER SUPPLIES THIS MATERIAL WILL BE USED FOR THE BOAT RAMP HAUL DISTANCE = 20 MILES PRODUCTION RATE = 40 TON/HR								
QUARRY RUN STONE-B	145.00 TON		228	529	508	435	1,700	11.72
06. 3.B 3. SEMI-COMPACTED EMBANKMENT This material is assumed to be dropped by scrapers in the fill area and spread with a dozer.								
USR PM SEMI-COMPACTED FIL			0.79	1.86	0.00	0.00	2.65	
HAUL DISTANCE = 2	1465.00 CY XSWNLAKE02	120.00	1,153	2,732	0	0	3,885	2.65
PRODUCTION RATE = 120 TON/HR								
SEMI-COMPACTED EMB	1465.00 CY		1,153	2,732	0	0	3,885	2.65
06. 3.B 4. STRIPPING Hauling of this material to a disposal area will not be necessary, it is assumed to be pushed off to the side and graded to blend in with the surrounding area with a dozer.								
USR PM STRIPPING			0.48	1.20	0.00	0.00	1.68	
PRODUCTION RATE =	470.00 CY XSWNLAKE04	130.00	228	562	0	0	790	1.68
STRIPPING	470.00 CY		228	562	0	0	790	1.68

06. 3.B. PARKING LOT & BOAT	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
06. 3.B 5. SEEDING										
B MIL PM SEEDING BY HAND					519.58	142.09	312.28	0.00	973.95	
THIS IS A SMALL AR	0.20	ACR	XSWNLAKE06	0.10	104	28	62	0	195	973.9
PRODUCTION RATE = .10 AC/HR										
SEEDING	0.20	ACR			104	28	62	0	195	973.9
06. 3.B 6. CLEARING This item is for clearing of a small area, debris is assumed to be hauled to the levee area where the majority of clearing will be done.										
L MIL PM MEDIUM CLEARING					472.60	716.76	0.00	0.00	1189.36	
THIS IS FOR A SMAL	0.30	ACR	XSWNLAKE05	0.30	142	215	0	0	357	1189.3
PRODUCTION RATE = .30 AC/HR										
CLEARING	0.30	ACR			142	215	0	0	357	1189.3
06. 3.B 7. CMP - 18 INCH DIA.										
B MIL PM CMP-18 INCH DIA.					8.39	0.85	8.36	0.00	17.60	
PIPE IS A 16 GAGE.	30.00	LF	CODEK	15.00	252	26	251	0	528	17.6
PRODUCTION RATE = 15 LF/HR										
CMP - 18 INCH DIA.	30.00	LF			252	26	251	0	528	17.6
06. 3.B 8. CMP END SECTION-18 IN.										
B MIL PM CMP END SECTION					62.89	6.41	80.00	0.00	149.31	
THIS END SECTION I	2.00	EA	CODEK	2.00	126	13	160	0	299	149.3
18 INCH DIA. CMP.										
PRODUCTION RATE = 2 EA/HR										
M MIL PM COUPLINGS FOR CMP					0.00	0.00	6.25	0.00	6.25	
	8.00	EA	N/A	0.00	0	0	50	0	50	6.2
CMP END SECTION-18	2.00	EA			126	13	210	0	349	174.3
CRUSHED STONE-1 IN	3.00	TON			0	0	29	0	29	9.6
PARKING LOT & BOAT					3,064	5,296	3,535	2,415	14,309	
FISH AND WILDLIFE					5,804	10,645	8,692	4,920	30,061	

08.2.-.A. ROADS-RELOCATED GR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
08. ROADS,RAILROADS, AND BRIDGES										
08.2.-.A. ROADS-RELOCATED GRAVEL RD										
08.2.-.A 2. CRUSHED STONE CA-10 Stone is assumed to be delivered to the site and end dumped. (approx. haul distance = 20 mi)										
B MIL PM CRUSHED STONE CA-1					1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	1780.00	TON	XSWNLAKE01	50.00	2,242	3,213	6,675	5,340	17,470	9.81
HAULING PAID FOR UNDER SUPPLIES HAUL DISTANCE = 20 MILES PRODUCTION RATE = 50 TON/HR										
CRUSHED STONE CA-1	1780.00	TON			2,242	3,213	6,675	5,340	17,470	9.81
08.2.-.A 3. STRIPPING Hauling of this material to a disposal area will not be necessary, it is assumed to be pushed off to the side and graded to blend in with surrounding area with a dozer.										
USR PM STRIPPING					0.48	1.20	0.00	0.00	1.68	
PRODUCTION RATE =	1565.00	CY	XSWNLAKE04	130.00	758	1,872	0	0	2,630	1.68
STRIPPING	1565.00	CY			758	1,872	0	0	2,630	1.68
ROADS-RELOCATED GR					3,000	5,085	6,675	5,340	20,100	

08.2.-.B. ROADS-LEVEE CROSSI	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
08.2.-.B. ROADS-LEVEE CROSSING RAMPS, 2EA									
08.2.-.B 1. SEMI-COMPACTED EMBANKMENT									
This material is assumed to be dropped by scrapers in the fill area and spread with a dozer.									
USR PM SEMI-COMPACTED FIL				0.79	1.86	0.00	0.00	2.65	
HAUL DISTANCE = 2	900.00 CY	XSWNLAKE02	120.00	709	1,678	0	0	2,387	2.6
PRODUCTION RATE = 120 CY/HR									
SEMI-COMPACTED EMB	900.00 CY			709	1,678	0	0	2,387	2.6
08.2.-.B 2. CRUSHED STONE CA-10									
Stone is assumed to be delivered to the site and end dumped. (approx. haul distance = 20mi)									
B MIL PM CRUSHED STONE CA-1				1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	275.00 TON	XSWNLAKE01	50.00	346	496	1,031	825	2,699	9.8
HAULING PAID FOR UNDER SUPPLIES									
HAUL DISTANCE = 20 MILES									
PRODUCTION RATE = 50 TON/HR									
CRUSHED STONE CA-1	275.00 TON			346	496	1,031	825	2,699	9.8
ROADS-LEVEE CROSSI				1,055	2,175	1,031	825	5,086	

08.2.-.C. ROADS-ACCESS RAMP	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
08.2.-.C. ROADS-ACCESS RAMP									
08.2.-.C 1. SEMI-COMPACTED EMBANKMENT This material is assumed to be dropped by scrapers in the fill area and spread with a dozer.									
USR PM SEMI-COMPACTED FIL				0.79	1.86	0.00	0.00	2.65	
HAUL DISTANCE = 20	90.00 CY	XSWNLAKE02	120.00	71	168	0	0	239	2.65
PRODUCTION RATE = 120 CY/HR									
SEMI-COMPACTED EMB	90.00 CY			71	168	0	0	239	2.65
08.2.-.C 2. CRUSHED STONE CA-10 Stone is assumed to be delivered to the site and end dumped. (approx. haul distance = 20mi)									
B MIL PM CRUSHED STONE CA-1				1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	60.00 TON	XSWNLAKE01	50.00	76	108	225	180	589	9.81
HAULING PAID FOR UNDER SUPPLIES									
HAUL DISTANCE = 20 MILES									
PRODUCTION RATE = 50 TON/HR									
CRUSHED STONE CA-1	60.00 TON			76	108	225	180	589	9.81
ROADS-ACCESS RAMP				146	276	225	180	828	
ROADS,RAILROADS, A				4,202	7,535	7,931	6,345	26,013	

11.0.1 A. EARTHEN LEVEE	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT

11. LEVEES AND FLOODWALLS

11.0.1 A. EARTHEN LEVEE

11.0.1 A 2. SEMI-COMPACTED EMBANKMENT (1on3)

It is assumed that wet conditions will be encountered in the excavating and hauling of this material, therefore two dozers are considered, one to be used as a push dozer and one to be used to spread the material.

Item	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
USR PM SEMI-COMPACTED EMB					0.79	1.89	0.00	0.00	2.67	
HAUL DISTANCE = 2	64800	CY	XSWNLAKE10	160.00	51,017	122,213	0	0	173,230	2.67
PRODUCTION RATE = 160 CY/HR										
SEMI-COMPACTED EMB	64800	CY			51,017	122,213	0	0	173,230	2.67

11.0.1 A 3. EXCAVATION (1on4)

This item is for the clamshell excavation of channel material to be used for the construction of the levee. This material will be placed on the levee alignment and shaped after the material dries. Payment for shaping of the levee material is considered under a seperate item.

Item	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
USR PM EXCAVATION (Floati					1.15	1.88	0.00	0.00	3.03	
PRODUCTION RATE =	195000	CY	XSWNLAKE11	120.00	223,607	366,854	0	0	590,460	3.03
USR PM SHAPING OF LEVEE					0.14	0.35	0.00	0.00	0.49	
This item cannot b	195000	CY	XSWNLAKE13	450.00	27,300	67,373	0	0	94,673	0.49
until the material dries.										
PRODUCTION RATE = 450 CY/HR										
EXCAVATION (1on4)	195000	CY			250,907	434,226	0	0	685,133	3.51

11.0.1 A 4. CLEARING

Item	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
L MIL PM CLEARING - LARGE A					438.30	802.98	0.00	0.00	1241.28	
THIS IS FOR CEARIN	90.00	ACR	C	0.00	39,447	72,268	0	0	111,715	1241.28
AREA BY CUT AND CHIP METHOD.										
PRODUCTION RATE = .40 AC/HR										
CLEARING	90.00	ACR			39,447	72,268	0	0	111,715	1241.28

11.0.1 A 5. CRUSHED STONE (CA-10)

Stone is assumed to de delivered to the site and end dumped. (approx. haul distance = 20mi)

Item	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
B MIL PM CRUSHED STONE CA-1					1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	12000	TON	XSWNLAKE01	50.00	15,115	21,660	45,000	36,000	117,775	9.81
HAULING PAID FOR UNDER SUPPLIES										
HAUL DISTANCE = 20 MILES										
PRODUCTION RATE = 50 TON/HR										

11.0.1 A. EARTHEN LEVEE	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
CRUSHED STONE (CA-	12000 TON		15,115	21,660	45,000	36,000	117,775	9.81
11.0.1 A 6. "C" STONE This stone is assumed to be delivered to the site by barge and loaded into off road trucks, the stone will then be end dumped at its final destination and spread with dozers. (delivery charge paid for under supplies)								
USR PM "C" STONE			1.66	4.09	4.00	3.00	12.75	
HAUL DISTANCE = 20	10550 TON XSWNLAKE09	110.00	17,531	43,123	42,200	31,650	134,504	12.75
PRODUCTION RATE = 110 TON/HR								
"C" STONE	10550 TON		17,531	43,123	42,200	31,650	134,504	12.75
11.0.1 A 7. "B" STONE This stone is assumed to be delivered to the site by barge and loaded into off road trucks, the stone will then be end dumped at its final destination and spread with dozers. (delivery charge paid for under supplies)								
USR PM "B" STONE			1.66	4.09	4.00	3.00	12.75	
HAUL DISTANCE = 20	5840.00 TON XSWNLAKE09	110.00	9,704	23,871	23,360	17,520	74,455	12.75
PRODUCTION RATE = 110 TON/HR								
"B" STONE	5840.00 TON		9,704	23,871	23,360	17,520	74,455	12.75
11.0.1 A 8. CMP-18" DIA.								
B MIL PM CMP-18 INCH DIA.			8.39	0.85	8.36	0.00	17.60	
ASSUME 16 GAGE PIP	70.00 LF CODEK	15.00	587	60	585	0	1,232	17.60
PRODUCTION RATE 15 LF/HR								
CMP-18" DIA.	70.00 LF		587	60	585	0	1,232	17.60
11.0.1 A 9. CMP END SECTION-18"								
B MIL PM CMP END SECTION-18			62.89	6.41	80.00	0.00	149.31	
PRODUCTION RATE =	2.00 EA CODEK	2.00	126	13	160	0	299	149.31
M MIL PM COUPLINGS FOR CMP			0.00	0.00	6.25	0.00	6.25	
	8.00 EA N/A	0.00	0	0	50	0	50	6.25
CMP END SECTION-18	2.00 EA		126	13	210	0	349	174.31
CRUSHED STONE-1" M	7.00 TON		0	0	67	0	67	9.60

11.0.1 A. EARTHEN LEVEE	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 A 11. ASPHALTIC CONCRETE								
This item consists of an asphalt apron for the entrance onto a county road. Hauling from the plant to the job site is considered under supplies.								
M USR PM BITUMINOUS HOT MIX			7.98	3.07	26.00	4.00	41.05	
CENTRAL PLANT, (37	13.00 TON XASPA	35.00	104	40	338	52	534	41.05
PRODUCTION RATE = 35 TON/HR								
ASPHALTIC CONCRETE	13.00 TON		104	40	338	52	534	41.05
11.0.1 A 12. AGGREGATE BASE COURSE-8"								
B MIL PM CRUSHED STONE CA-1			1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	34.00 TON XSWNLAKE01	50.00	43	61	128	102	334	9.81
HAULING PAID FOR UNDER SUPPLIES								
HAUL DISTANCE = 20 MILES								
PRODUCTION RATE = 50 TON/HR								
AGGREGATE BASE COU	34.00 TON		43	61	128	102	334	9.81
BARRICADE - 10 FT	2.00 EA		0	0	400	0	400	200.00
ACCESS GATE - 14 F	2.00 EA		0	0	4,000	0	4,000	2000.00
11.0.1 A 15. STRIPPING (BORROW AREA)								
USR PM STRIPPING			0.48	1.20	0.00	0.00	1.68	
PRODUCTION RATE =	8365.00 CY XSWNLAKE04	130.00	4,053	10,005	0	0	14,057	1.68
STRIPPING (BORROW	8365.00 CY		4,053	10,005	0	0	14,057	1.68
11.0.1 A 16. CLEARING (BORROW AREA)								
B MIL PM MEDIUM CLEARING			472.60	716.76	0.00	0.00	1189.36	
ASSUME A SMALL ARE	3.00 ACR XSWNLAKE05	0.30	1,418	2,150	0	0	3,568	1189.36
PRODUCTION RATE = .3 AC/HR								
CLEARING (BORROW A	3.00 ACR		1,418	2,150	0	0	3,568	1189.36

11.0.1 A. EARTHEN LEVEE	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 A 17. SEEDING (BORROW AREA)								
B MIL PM SEEDING BY HAND			519.58	142.09	312.28	0.00	973.95	
ASSUME A SMALL ARE	3.00 ACR XSWNLAKE06	0.10	1,559	426	937	0	2,922	973.95
PRODUCTION RATE = .10 AC/HR								
SEEDING (BORROW AR	3.00 ACR		1,559	426	937	0	2,922	973.95
11.0.1 A 18. SEEDING (MAIN LEVEE)								
B MIL PM HYDRO SEEDING			323.40	71.20	400.00	170.00	964.60	
ASSUME A LARGE ARE	81.00 ACR XSWNLAKE08	0.25	26,195	5,767	32,400	13,770	78,133	964.60
PRODUCTION RATE = .25 AC/HR								
SEEDING (MAIN LEVE	81.00 ACR		26,195	5,767	32,400	13,770	78,133	964.60
11.0.1 A 19. HAY BAILS								
HAYBAILS ARE TO BE PLACED FROM STA 40+00 TO APPROXIMATELY STA 346+00 ,TO BE PLACED ON LANDSIDE TO PREVENT LEVEE MATERIAL FROM ENTERING THE LAKE.								
HAY BAILS	30600 LF		3,672	1,224	12,240	0	17,136	0.56
EARTHEN LEVEE			421,477	737,107	161,865	99,094	1,419,543	

11.0.1 B. 48" GRAVITY DRAIN	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 B. 48" GRAVITY DRAIN (MIDDLE&LOWER)								
SLUICE GATE & OPER	1.00 EA		0	0	9,600	0	9,600	9600.00
11.0.1 B 7. CMP - 48" DIA								
B MIL PM CMP-48" DIA. 12 GA			8.85	2.63	28.00	9.00	48.48	
PRODUCTION RATE =	31.00 LF CODED	12.00	274	82	868	279	1,503	48.48
CMP - 48" DIA	31.00 LF		274	82	868	279	1,503	48.48
11.0.1 B 8. END SECTIONS - 48"								
B MIL PM END SECTION - 48"			125.79	12.82	400.00	0.00	538.61	
PRODUCTION RATE =	2.00 EA CODEK	1.00	252	26	800	0	1,077	538.61
M MIL PM COUPLINGS FOR CMP			0.00	0.00	13.00	0.00	13.00	
	8.00 EA N/A	0.00	0	0	104	0	104	13.00
END SECTIONS - 48"	2.00 EA		252	26	904	0	1,181	590.61
RISER PIPE - 72" D	8.50 LF		0	0	1,020	0	1,020	120.00
CONCRETE BASE	8.00 CY		0	0	1,280	0	1,280	160.00
11.0.1 B 11. CRUSHED STONE-3" MINUS								
B MIL PM CRUSHED STONE-3" M			1.57	3.65	3.75	3.00	11.97	
HAULING PAID FOR UNDER SUPPLIESXSWNLAKE03		40.00	630	1,459	1,500	1,200	4,789	11.97
THIS MATERIAL WILL BE USED FOR								
THE BOAT RAMP								
HAUL DISTANCE = 20 MILES								
PRODUCTION RATE = 40 TON/HR								
CRUSHED STONE-3" M	400.00 TON		630	1,459	1,500	1,200	4,789	11.97
11.0.1 B 12. CRUSHED STONE-6" MINUS								
B MIL PM CRUSHED STONE-6" M			1.57	3.65	3.75	3.00	11.97	
HAULING PAID FOR UNDER SUPPLIESXSWNLAKE03		40.00	299	693	713	570	2,275	11.97
THIS MATERIAL WILL BE USED FOR								
THE BOAT RAMP								
HAUL DISTANCE = 20 MILES								
PRODUCTION RATE = 40 TON/HR								
CRUSHED STONE-6" M	190.00 TON		299	693	713	570	2,275	11.97

11.0.1 B. 48" GRAVITY DRAIN	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
GEOGRID	200.00 SY			560	0	1,040	0	1,600	8.00
GEOTEXTILE	460.00 SY			552	0	276	0	828	1.80
48" GRAVITY DRAIN				2,567	2,259	17,201	2,049	24,076	

11.0.1 C. COFFERDAM FOR GRAV	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
11.0.1 C. COFFERDAM FOR GRAVITY DRAIN LOWER & MIDDLE COMPARTMENT										
11.0.1 C 1. "C" STONE This stone is assumed to be delivered to the site by barge and loaded into off road trucks, the stone will then be end dumped at its final destination and spread with dozers. (delivery charge paid for under supplies)										
USR PM "C" STONE					1.66	4.09	4.00	3.00	12.75	
HAUL DISTANCE = 20	5040.00	TON	XSWNLAKE09	110.00	8,375	20,601	20,160	15,120	64,256	12.7
PRODUCTION RATE = 110 TON/HR										
"C" STONE	5040.00	TON			8,375	20,601	20,160	15,120	64,256	12.7
11.0.1 C 2. CRUSHED STONE										
B MIL PM CRUSHED STONE CA-1					1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	230.00	TON	XSWNLAKE01	50.00	290	415	863	690	2,257	9.8
HAULING PAID FOR UNDER SUPPLIES										
HAUL DISTANCE = 20 MILES										
PRODUCTION RATE = 50 TON/HR										
CRUSHED STONE	230.00	TON			290	415	863	690	2,257	9.8
PLASTIC LINER	1360.00	SY			0	0	0	14,688	14,688	10.8
COFFERDAM FOR GRAV					8,665	21,016	21,023	30,498	81,201	

11.0.1 E. INTERIOR CLOSURE	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 E. INTERIOR CLOSURE										
11.0.1 E 1. EXCAVATION										
This item is for the clamshell excavation of channel material to be used for the construction of the interior closure. The interior closure will be shaped after the material dries.										
USR PM EXCAVATION (Floati					1.15	1.88	0.00	0.00	3.03	
PRODUCTION RATE =	12200	CY	XSWNLAKE11	120.00	13,990	22,952	0	0	36,942	3.03
USR PM SHAPING OF INTERIO					0.14	0.35	0.00	0.00	0.49	
This item cannot b	12200	CY	XSWNLAKE13	450.00	1,708	4,215	0	0	5,923	0.49
until the material dries.										
PRODUCTION RATE = 450 CY/HR										
EXCAVATION	12200	CY			15,698	27,167	0	0	42,865	3.51
11.0.1 E 2. CLEARING										
L MIL PM MEDIUM CLEARING					472.60	716.76	0.00	0.00	1189.36	
ASSUME A SMALL ARE	1.00	ACR	XSWNLAKE05	0.30	473	717	0	0	1,189	1189.36
PRODUCTION RATE = .30 AC/HR										
CLEARING	1.00	ACR			473	717	0	0	1,189	1189.36
11.0.1 E 3. "C" STONE REVETMENT										
USR PM "C" STONE REVETMEN					1.66	4.09	4.00	3.00	12.75	
STONE ASSUMED TO B	11250	TON	XSWNLAKE09	110.00	18,694	45,984	45,000	33,750	143,429	12.75
BARGE FROM LOCAL QUARRY.										
HAUL DISTANCE = 20 MILES										
PRODUCTION RATE = 110 TON/HR										
"C" STONE REVETMEN	11250	TON			18,694	45,984	45,000	33,750	143,429	12.75
11.0.1 E 4. CRUSHED STONE (CA-10)										
B MIL PM CRUSHED STONE CA-1					1.26	1.81	3.75	3.00	9.81	
(DELIVERED)	75.00	TON	XSWNLAKE01	50.00	94	135	281	225	736	9.81
HAULING PAID FOR UNDER SUPPLIES										
HAUL DISTANCE = 20 MILES										
PRODUCTION RATE = 50 TON/HR										
CRUSHED STONE (CA-	75.00	TON			94	135	281	225	736	9.81
INTERIOR CLOSURE					34,959	74,003	45,281	33,975	188,219	

11.0.1 F. ISLAND CONSTRUCTIO	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 F. ISLAND CONSTRUCTION (MIDDLE)									
11.0.1 F 1. EXCAVATION (MIDDLE) This item is for the clamshell excavation of channel material to be used for the construction of the middle islands. The islands will be shaped after the material dries.									
USR PM EXCAVATION (Floati				1.15	1.88	0.00	0.00	3.03	
PRODUCTION RATE = 120 CY/HRCY		XSWNLAKE11	120.00	18,233	29,913	0	0	48,145	3.0
USR PM SHAPING OF ISLANDS				0.14	0.35	0.00	0.00	0.49	
This item cannot b until the material dries. PRODUCTION RATE = 450 CY/HR	15900 CY	XSWNLAKE13	450.00	2,226	5,493	0	0	7,719	0.4
EXCAVATION (MIDDLE	15900 CY			20,459	35,406	0	0	55,865	3.5
11.0.1 F 2. EXCAVATION (LOWER) This item is for the clamshell excavation of channel material to be used for the construction of the lower islands. The islands will be shaped after the material dries.									
USR PM EXCAVATION (Floati				1.15	1.88	0.00	0.00	3.03	
PRODUCTION RATE = 120 CY/HRCY		XSWNLAKE11	120.00	29,069	47,691	0	0	76,760	3.0
USR PM SHAPING OF ISLANDS				0.14	0.35	0.00	0.00	0.49	
This item cannot b until the material dries. PRODUCTION RATE = 450 CY/HR	25350 CY	XSWNLAKE13	450.00	3,549	8,758	0	0	12,307	0.4
EXCAVATION (LOWER)	25350 CY			32,618	56,449	0	0	89,067	3.5
11.0.1 F 3. SEEDING									
B MIL PM HYDRO SEEDING				323.40	71.20	400.00	170.00	964.60	
ASSUME A LARGE ARE PRODUCTION RATE = .25 AC/HR	7.00 ACR	XSWNLAKE08	0.25	2,264	498	2,800	1,190	6,752	964.6
SEEDING	7.00 ACR			2,264	498	2,800	1,190	6,752	964.6
11.0.1 F 4. HAY BAILS The hay bails are to be placed around the perimeter of the islands.									
HAY BAILS	11100 LF			1,332	444	4,440	0	6,216	0.5
ISLAND CONSTRUCTIO				56,672	92,798	7,240	1,190	157,900	

11.0.1 G. EXISTING ROCK CLOS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 G. EXISTING ROCK CLOSURE										
11.0.1 G 1. CLEARING										
L MIL PM MEDIUM CLEARING					472.60	716.76	0.00	0.00	1189.36	
ASSUME A SMALL ARE	1.50	ACR	XSWNLAKE05	0.30	709	1,075	0	0	1,784	1189.36
PRODUCTION RATE = .30 AC/HR										
CLEARING	1.50	ACR			709	1,075	0	0	1,784	1189.36
11.0.1 G 2. "C" STONE REPAIR										
USR PM "C" STONE REVETMEN					1.66	4.09	4.00	3.00	12.75	
STONE ASSUMED TO B	2000.00	TON	XSWNLAKE09	110.00	3,323	8,175	8,000	6,000	25,498	12.75
BARGE FROM LOCAL QUARRY										
HAUL DISTANCE = 20 MILES										
PRODUCTION RATE = 110 TON/HR										
"C" STONE REPAIR	2000.00	TON			3,323	8,175	8,000	6,000	25,498	12.75
EXISTING ROCK CLOS					4,032	9,250	8,000	6,000	27,282	

11.0.1 H. SHORELINE & BANKLI	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
11.0.1 H. SHORELINE & BANKLINE PROTECTION									
Items 1-4 are all considered to be shoreline protection									
Item 5 is considered to be bankline protection									
WILLOW WATTLINGS(M	2700.00 LF			8,640	0	0	0	8,640	3.2
WILLOW CUTTINGS(MI	15200 SF			1,824	0	0	0	1,824	0.1
WILLOW WATTLINGS(L	4700.00 LF			15,040	0	0	0	15,040	3.2
WILLOW CUTTINGS(LO	26700 SF			3,204	0	0	0	3,204	0.1
WILLOW CUTTINGS(UP	205000 SF			24,600	0	0	0	24,600	0.1
SHORELINE & BANKLI				53,308	0	0	0	53,308	

11.0.1 I. MISCELLANEOUS	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
11.0.1 I. MISCELLANEOUS								
AUTOMATIC GAGING S	3.00 EA		0	0	24,000	0	24,000	8000.00
STAFF GAGE	6.00 EA		0	0	4,800	0	4,800	800.00
11.0.1 I 3. SILT SCREEN The silt screen is refered to as a turbidity curtain and is constructed of geotextile fabric w/ flotation devices. The silt screen is a EPA requirement and will be used for all clamshell excavation.								
SILT SCREEN	12000 SF		48,000	0	0	0	48,000	4.00
WATER QUALITY TEST	160.00 EA		6,400	0	0	0	6,400	40.00
MISCELLANEOUS			54,400	0	28,800	0	83,200	
LEVEES AND FLOODWA			636,080	936,434	289,409	172,806	2,034,729	

13.0.-.A. PUMP STATION/CONTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT

13. PUMPING PLANT

13.0.-.A. PUMP STATION/CONTROL STRUCTURE

The following is general information taken from the drawings. This information was used to develop a basic plan for the dewatering system to be used for this item.

Location = Sta. 20+50
From the river to the center line of the structure is approximately 80 ft.
Existing grade @ Elev. 422
Bottom of excav. @ Elev. 410
Cofferdam to Elev. 430

	STRUCTURAL STEEL	26400 LB		0	0	36,960	0	36,960	1.40
	SLUICE GATE W/OPER	2.00 EA		0	0	35,200	0	35,200	17600
	SLIDE GATE W/HARDW	2.00 EA		0	0	19,200	0	19,200	9600.00

13.0.-.A 6. GUARD RAIL

M MIL PM	CORRUGATED BEAM			1.98	0.06	12.00	0.00	14.04	
	PRODUCTION RATE =	200.00 LF ULABH	50.00	397	11	2,400	0	2,808	14.04
	GUARD RAIL	200.00 LF		397	11	2,400	0	2,808	14.04
	GEOTEXTILE	1070.00 SY		1,284	0	642	0	1,926	1.80
	STOP LOGS (4x6 OAK	1280.00 SF		0	0	3,072	0	3,072	2.40

13.0.-.A 9. CONCRETE PARKING BLOCKS

M MIL PM	PRECAST CONCRETE B			6.61	0.18	16.00	0.00	22.80	
	6" x 10" x 6FT, IN	4.00 EA ULABH	15.00	26	1	64	0	91	22.80
	PRODUCTION RATE = 15 EA/HR								
	CONCRETE PARKING B	4.00 EA		26	1	64	0	91	22.80

13.0.-.A 10. CRUSHED STONE CA-10

B MIL PM	CRUSHED STONE CA-1			1.26	1.81	3.75	3.00	9.81	
	(DELIVERED)	30.00 TON XSWNLAKE01	50.00	38	54	113	90	294	9.81
	HAULING PAID FOR UNDER SUPPLIES								
	HAUL DISTANCE = 20 MILES								
	PRODUCTION RATE = 50 TON/HR								

13.0.-.A. PUMP STATION/CONTR	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UN
CRUSHED STONE CA-1	30.00 TON			38	54	113	90	294	9.
PUMP AND ACCESSORI	2.00 EA			0	0	107,000	0	107,000	535
GENTRY CRANE W/HOI	2.00 EA			0	0	1,248	0	1,248	624.

13.0.-.A 13. STRUCTURAL EXCAVATION

This material is assumed to be placed in the vicinity of the excavation until it is needed for the cofferdam. (excavated embankment)

USR PM STRUCTURAL EXCAVAT				0.42	1.29	0.00	0.00	1.71	
PRODUCTION RATE =	6000.00 CY	XSWNLAKE14	150.00	2,519	7,739	0	0	10,259	1.
STRUCTURAL EXCAVAT	6000.00 CY			2,519	7,739	0	0	10,259	1.

13.0.-.A 14. EXCAVATED EMBANKMENT

This material comes from the structural excavation and is to be used for the construction of the cofferdam.

USR PM EXCAVATED EMBANKME				0.48	1.20	0.00	0.00	1.68	
PRODUCTION RATE =	6000.00 CY	XSWNLAKE13	130.00	2,907	7,176	0	0	10,083	1.
EXCAVATED EMBANKME	6000.00 CY			2,907	7,176	0	0	10,083	1.

13.0.-.A 15. EMBANKMENT, BORROW

This material will come from one of the borrow areas. Approximately 100 cy of the material will be used for the pump staging area & storage area, the remaining material will be used for the cofferdam.

USR PM EMBANKMENT FROM BO				1.11	2.63	0.00	0.00	3.74	
HAUL DISTANCE = LE	3200.00 CY	XSWNLAKE02	85.00	3,556	8,424	0	0	11,980	3.
PRODUCTION RATE = 85 CY/HR									
EMBANKMENT, BORROW	3200.00 CY			3,556	8,424	0	0	11,980	3.

13.0.-.A. PUMP STATION/CONTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT

13.0.-.A 16. DEWATERING

The material in the area of the structure is assumed to be all sand. Based on the material and the distance of the structure from the river(80'), it has been calculated that approximately 6500 GPM will need to be pumped to keep the hole dewatered.
The dewatering system will consist of wells with centrifugal pumps. For this site it has been assumed that 6 pumps will be required due to the size of the excavation. (42'x 146')
Assume a 1 1/2 month dewatering operation. (558 hrs)

13.0.-.A. PUMP STATION/CONTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
MIL PM Outside Equip. Ope					26.58	0.00	0.00	0.00	26.58	
These operators are to be used			X-EQOPRLT	1.00	29,660	0	0	0	29,660	26.58
for the daily operation of the dewatering system. Pumping is assumed to be a 12hr/day operation. There are 2-operators assumed for this operation, the total hours will reflect the number of operators used.										
L MIL PM Pump, water, cen,					0.00	7200.00	0.00	0.00	7200.00	
@ 20 Feet Head	1.50	MO	P60ML 4	0.00	0	10,800	0	0	10,800	7200.00
Rental of 6 pumps @ $1200 per month for each pump: Cost = 6 pumps x $1200 = $ 7200										
Dewatering Time = 1.5 months										
USR PM Drilled Well					0.00	5.47	40.00	0.00	45.47	
This item is for the	120.00	LF	P60ML 4	0.00	0	656	4,800	0	5,456	45.47
installation and removal of cased wells and includes all labor, equip., material, & supplies associated with this item.										
USR PM Miscellaneous Supp					0.00	5.47	0.00	2400.00	2405.47	
This item includes hose for the			P60ML 4	0.00	0	5	0	2,400	2,405	2405.47
pumps and other misc. supplies as needed.										
DEWATERING					29,660	11,462	4,800	2,400	48,322	

13.0.-.A. PUMP STATION/CONTR	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
13.0.-.A 17. DITCH EXCAVATION									
USR PM DITCH EXCAVATION				0.60	1.74	0.00	0.00	2.34	
PRODUCTION RATE =	14350 CY	XSWNLAKE12	150.00	8,646	24,952	0	0	33,598	2.34
DITCH EXCAVATION	14350 CY			8,646	24,952	0	0	33,598	2.34
13.0.-.A 18. CLEARING FOR DITCH EXCAVATION									
L MIL PM MEDIUM CLEARING				472.60	716.76	0.00	0.00	1189.36	
ASSUME SMALL AREA.	1.00 ACR	XSWNLAKE05	0.30	473	717	0	0	1,189	1189.36
PRODUCTION RATE = .30 AC/HR									
CLEARING FOR DITCH	1.00 ACR			473	717	0	0	1,189	1189.36
13.0.-.A 19. "C" STONE FOR DITCH EMBANKMENT This stone is assumed to be delivered dy barge to the site and loaded into off road trucks, the stone will then be end dumped at its final destination and spread with dozers. (delivery charge paid for under supplies)									
USR PM "C" STONE				1.66	4.09	4.00	3.00	12.75	
HAUL DISTANCE = 20	1725.00 TON	XSWNLAKE09	110.00	2,866	7,051	6,900	5,175	21,992	12.75
PRODUCTION RATE = 110 TON/HR									
"C" STONE FOR DITC	1725.00 TON			2,866	7,051	6,900	5,175	21,992	12.75
13.0.-.A 20. FISH SCREENS Removable screens with 1.5"x1.5" openings, approx. size = 9'-8"x10'-0" Screens can be constructed of lightweight galvinized steel, aluminum or nylon. It is assumed that a light gage chain link fencing will be used.									
FISH SCREENS	2.00 EA			0	0	560	0	560	280.00
PUMP STATION/CONTR				52,373	67,587	298,159	7,665	425,784	

13.0.-.B. PUMP STATION/CONTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
13.0.-.B. PUMP STATION/CONTROL STRUCTURE										
The following is general information taken from the drawings. This information was used to develop a basic plan for the dewatering system to be used for this item.										
Location = Sta. 287+00										
From the river to the center line of the structure is approximately 230 ft.										
Existing grade @ Elev. 422										
Bottom of excav. @ Elev. 410										
Cofferdam to Elev. 430										
REINFORCED CONCRET	330.00	CY			0	0	66,000	0	66,000	200.00
STRUCTURAL STEEL	14300	LB			0	0	20,020	0	20,020	1.40
SLUICE GATE W/OPER	1.00	EA			0	0	17,600	0	17,600	17600
SLIDE GATE W/HARDW	1.00	EA			0	0	9,600	0	9,600	9600.00
13.0.-.B 6. GUARD RAIL										
M MIL PM CORRUGATED BEAM					1.98	0.06	12.00	0.00	14.04	
PRODUCTION RATE =	100.00	LF	ULABH	50.00	198	6	1,200	0	1,404	14.04
GUARD RAIL	100.00	LF			198	6	1,200	0	1,404	14.04
GEOTEXTILE	4800.00	SF			5,760	0	2,880	0	8,640	1.80
STOP LOGS (4x6 OAK	640.00	SF			0	0	1,536	0	1,536	2.40
13.0.-.B 9. CONCRETE PARKING BLOCKS										
M MIL PM PRECAST CONCRETE B					6.61	0.18	16.00	0.00	22.80	
6" x 10" x 6FT, IN	2.00	EA	ULABH	15.00	13	0	32	0	46	22.80
PRODUCTION RATE = 15 EA/HR										
CONCRETE PARKING B	2.00	EA			13	0	32	0	46	22.80
13.0.-.B 10. CRUSHED STONE CA-10										
B MIL PM CRUSHED STONE CA-1					1.26	1.81	5.00	3.26	11.32	
(DELIVERED)	15.00	TON	XSWNLAKE01	50.00	19	27	75	49	170	11.32
HAULING PAID FOR UNDER SUPPLIES										
HAUL DISTANCE = 20 MILES										
PRODUCTION RATE = 50 TON/HR										
CRUSHED STONE CA-1	15.00	TON			19	27	75	49	170	11.32

13.0.-.B. PUMP STATION/CONTR	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
PUMP AND ACCESSORI	1.00 EA			0	0	53,500	0	53,500	5350
GENTRY CRANE W/HOI	1.00 EA			0	0	624	0	624	624.0

13.0.-.B 13. STRUCTUARL EXCAVATION

USR PM STRUCTURAL EXCAVAT				0.42	1.29	0.00	0.00	1.71	
PRODUCTION RATE =	6000.00 CY	XSWNLAKE14	150.00	2,519	7,739	0	0	10,259	1.7
STRUCTUARL EXCAVAT	6000.00 CY			2,519	7,739	0	0	10,259	1.7

13.0.-.B 14. EXCAVATED EMBANKMENT

This material comes from the structural excavation and is to be used for the construction of the cofferdam.

USR PM EXCAVATED EMBANKME				0.48	1.20	0.00	0.00	1.68	
PRODUCTION RATE =	6000.00 CY	XSWNLAKE13	130.00	2,907	7,176	0	0	10,083	1.6
EXCAVATED EMBANKME	6000.00 CY			2,907	7,176	0	0	10,083	1.6

13.0.-.B 15. EMBANKMENT, BORROW

This material will come from one of the borrow areas. Approximately 100 cy of the material will be used for the pump staging area & storage area, the remaining material will be used for the cofferdam.

USR PM EMBANKMENT FROM BO				1.11	2.63	0.00	0.00	3.74	
PRODUCTION RATE =	3200.00 CY	XSWNLAKE02	85.00	3,556	8,424	0	0	11,980	3.7
EMBANKMENT, BORROW	3200.00 CY			3,556	8,424	0	0	11,980	3.7

13.0.-.B 16. DEWATERING

The material in the area of the structure is assumed to be mostly clay. Based on the material and the distance of the structure from the river (230'), it has been calculated that approximately 3700 GPM will need to be pumped to keep the hole dewatered.
The dewatering system will consist of wells with centrifugal pumps. For this site it has been assumed that 6 pumps will will be required due to the the size of the excavation. (42'x 146')
Assume a 1 1/2 month dewatering operation. (558 hrs)

MIL PM Outside Equip. Ope				26.58	0.00	0.00	0.00	26.58	
These operators are to be used		X-EQOPRLT	1.00	29,660	0	0	0	29,660	26.5

for the daily operation of the dewatering system. Pumping is assumed to be a 12hr/day operation. There are 2-operators assumed for this operation, the

13.0.-.B. PUMP STATION/CONTR	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
total hours will reflect the									
number of operators used.									
L MIL PM Pump, water, cen,				0.00	7200.00	0.00	0.00	7200.00	
@ 20 Feet Head	1.50 MO	P60ML 4	0.00	0	10,800	0	0	10,800	7200.00
Rental of 6 pumps @ $1200 per									
month for each pump:									
Cost = 6 pumps x $1200 = $7200									
USR PM Drilled Well				0.00	5.47	40.00	0.00	45.47	
This item is for the	120.00 LF	P60ML 4	0.00	0	656	4,800	0	5,456	45.47
installation and removal of									
cased wells and includes all									
labor, equip., material, &									
supplies associated with this									
item.									
USR PM Miscellaneous Supp				0.00	5.47	0.00	2400.00	2405.47	
This item includes hose for the		P60ML 4	0.00	0	5	0	2,400	2,405	2405.47
pumps and any other misc.									
supplies needed.									
DEWATERING				29,660	11,462	4,800	2,400	48,322	
13.0.-.B 17. DITCH EXCAVATION									
USR PM DITCH EXCAVATION				0.60	1.74	0.00	0.00	2.34	
PRODUCTION RATE =	12000 CY	XSWNLAKE12	150.00	7,230	20,866	0	0	28,096	2.34
DITCH EXCAVATION	12000 CY			7,230	20,866	0	0	28,096	2.34
13.0.-.B 18. CLEARING FOR DITCH EXCAVATION									
L MIL PM MEDIUM CLEARING				472.60	716.76	0.00	0.00	1189.36	
ASSUME A SMALL ARE	1.00 ACR	XSWNLAKE05	0.30	473	717	0	0	1,189	1189.36
PRODUCTION RATE = .30 AC/HR									
CLEARING FOR DITCH	1.00 ACR			473	717	0	0	1,189	1189.36
13.0.-.B 19. "C" STONE FOR DITCH EMBANKMENT									
USR PM "C" STONE				1.66	4.09	4.00	3.00	12.75	
HAUL DISTANCE = 20	1725.00 TON	XSWNLAKE09	110.00	2,866	7,051	6,900	5,175	21,992	12.75
PRODUCTION RATE = 110 TON/HR									
"C" STONE FOR DITC	1725.00 TON			2,866	7,051	6,900	5,175	21,992	12.75

13.0.-.B. PUMP STATION/CONTR	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
13.0.-.B 20. FISH SCREENS Removable screens with 1.5"x1.5" openings, approx. size = 9'-8"x10'-0" Screens can be constructed of lightweight galvinized steel, aluminum or nylon. It is assumed that a light gage chain link fencing will be used.									
FISH SCREENS	2.00 EA			0	0	560	0	560	280.0
PUMP STATION/CONTR				55,203	63,468	185,327	7,624	311,621	

13.0.-.C. PUMP STATION/CONTR	QUANTY UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
13.0.-.C. PUMP STATION/CONTROL STRUCTURE									
The following is general information taken from the drawings. This information was used to develop a basic plan for the dewatering system to be used for this item.									
Location Sta. 416+00									
From the river to the center line of the structure is appoximately 600 ft.									
Existing grade @ Elev. 422									
Bottom of excav. @ Elev. 410									
Cofferdam to elev. 430									
REINFORCED CONCRET	200.00 CY			0	0	40,000	0	40,000	200.00
STRUCTURAL STEEL	800.00 LB			0	0	1,120	0	1,120	1.40
SLUICE GATE W/OPER	1.00 EA			0	0	17,600	0	17,600	17600
SLIDE GATE W/HARDW	1.00 EA			0	0	9,600	0	9,600	9600.00
GEOTEXTILE	2500.00 SF			3,000	0	1,500	0	4,500	1.80
13.0.-.C 9. CONCRETE PARKING BLOCKS									
M MIL PM PRECAST CONCRETE B				6.61	0.18	16.00	0.00	22.80	
6" x 10" x 6FT, IN	2.00 EA	ULABH	15.00	13	0	32	0	46	22.80
PRODUCTION RATE = 15 EA/HR									
CONCRETE PARKING B	2.00 EA			13	0	32	0	46	22.80
13.0.-.C 10. CRUSHED STONE CA-10									
B MIL PM CRUSHED STONE CA-1				1.26	1.81	5.00	3.26	11.32	
(DELIVERED)	16.00 TON	XSWNLAKE01	50.00	20	29	80	52	181	11.32
HAULING PAID FOR UNDER SUPPLIES									
PRODUCTION = 50 TON/HR									
CRUSHED STONE CA-1	16.00 TON			20	29	80	52	181	11.32
PUMP AND ACCESSORI	1.00 EA			0	0	53,500	0	53,500	53500
13.0.-.C 13. STRUCTUARL EXCAVATION									
USR PM STRUCTURAL EXCAVAT				0.42	1.29	0.00	0.00	1.71	
PRODUCTION 150 CY/	3500.00 CY	XSWNLAKE14	150.00	1,470	4,515	0	0	5,984	1.71
STRUCTUARL EXCAVAT	3500.00 CY			1,470	4,515	0	0	5,984	1.71

13.0.-.C. PUMP STATION/CONTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT

13.0.-.C 14. EXCAVATED EMBANKMENT

This material comes from the structural excavation and is to be used for the construction of the cofferdam.

USR PM EXCAVATED EMBANKME					0.48	1.20	0.00	0.00	1.68	
PRODUCTION = 130 C	3500.00	CY	XSWNLAKE13	130.00	1,696	4,186	0	0	5,882	1.68
EXCAVATED EMBANKME	3500.00	CY			1,696	4,186	0	0	5,882	1.68

13.0.-.C 15. EMBANKMENT, BORROW

This material will come from one of the borrow areas. Approximately 100 cy of the material will be used for the pump staging area & storage area, the remaining material will be used for the cofferdam.

USR PM EMBANKMENT FROM BO					1.11	2.63	0.00	0.00	3.74	
PRODUCTION = 85 CY	2200.00	CY	XSWNLAKE02	85.00	2,445	5,792	0	0	8,237	3.74
EMBANKMENT, BORROW	2200.00	CY			2,445	5,792	0	0	8,237	3.74

13.0.-.C 16. DEWATERING

The material in the area of the structure is assumed to be all sand. Based on the material and the distance of the structure from the river (600'), it has been determined that approximately 3900 GPM will need to be pumped to keep the hole dewatered.
This dewatering system will consist of wells with centrifigal pumps. For this site it has been assumed that 4 pumps will be used.
Size of excavation is approx. 22'x 50'
Assume a 1 month dewatering operation. (372 hrs)

MIL PM Outside Equip. Ope					26.58	0.00	0.00	0.00	26.58	
These operators are to be used			X-EOOPRLT	1.00	19,774	0	0	0	19,774	26.58

for the daily operation of the dewatering system. Pumping is assumed to be a 12hr/day operation. There are 2-operators assumed for this operation, the total hours will reflect the number of operators used.

L MIL PM Pump, water, cen,					0.00	4800.00	0.00	0.00	4800.00	
@ 20 Feet Head	1.50	MO	P60ML 4	0.00	0	7,200	0	0	7,200	4800.00

Rental of 4 pumps @ $1200 per month for each pump:
Cost = 4 pumps x $1200 = $4800

Dewatering Time = 1.5 mo.

13.0.-.C. PUMP STATION/CONTR	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
USR PM Drilled Well			0.00	5.47	40.00	0.00	45.47	
This item is for the	80.00 LF P60ML 4	0.00	0	438	3,200	0	3,638	45.47
installation and removal of cased wells and includes all labor, equip., material, & supplies associated with this item.								
USR PM Miscellaneous Supp			0.00	5.47	0.00	1600.00	1605.47	
This item includes hose for the	P60ML 4	0.00	0	5	0	1,600	1,605	1605.47
pumps and any other misc. supplies needed.								
DEWATERING			19,774	7,643	3,200	1,600	32,217	
13.0.-.C 17. DITCH EXCAVATION								
USR PM DITCH EXCAVATION			0.60	1.74	0.00	0.00	2.34	
PRODUCTION = 150 C	11600 CY XSWNLAKE12	150.00	6,989	20,170	0	0	27,159	2.34
DITCH EXCAVATION	11600 CY		6,989	20,170	0	0	27,159	2.34
13.0.-.C 18. CLEARING FOR DITCH EXCAVATION								
L MIL PM MEDIUM CLEARING			472.60	716.76	0.00	0.00	1189.36	
ASSUME A SMALL ARE	1.50 ACR XSWNLAKE05	0.30	709	1,075	0	0	1,784	1189.36
PRODUCTION = .30 AC/HR								
CLEARING FOR DITCH	1.50 ACR		709	1,075	0	0	1,784	1189.36
13.0.-.C 19. "C" STONE FOR DITCH EMBANKMENT								
USR PM "C" STONE			1.66	4.09	4.00	3.00	12.75	
HAUL DISTANCE = 20	300.00 TON XSWNLAKE09	110.00	499	1,226	1,200	900	3,825	12.75
PRODUCTION = 110 TON/HR								
"C" STONE FOR DITC	300.00 TON		499	1,226	1,200	900	3,825	12.75
13.0.-.C 20. FISH SCREENS								
Removable screens with 1.5"x1.5" openings, approx. size = 9'-8"x10'-0" Screens can be constructed of lightweight galvinized steel, aluminum or nylon. It is assumed that a light gage chain link fencing will be used.								
FISH SCREENS	2.00 EA		0	0	560	0	560	280.00

13.0.-.C. PUMP STATION/CONTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
PUMP STATION/CONTR					36,614	44,636	128,392	2,552	212,194	
PUMPING PLANT					144,190	175,690	611,878	17,841	949,599	

18.-.-.-. DISTRICT LABOR (CE	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
18. CULTURAL RESOURCE PRESERVATION								
DISTRICT LABOR (CE			33,766	0	0	0	33,766	
FIELD WORK			57,179	0	0	0	57,179	
DATA ANAYLISIS/REP			31,089	0	0	0	31,089	
CURATION			6,630	0	0	0	6,630	
CULTURAL RESOURCE			128,664	0	0	0	128,664	

30.A.-.-. PLANNING (Preparat	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
30. PLANNING, ENGINEERING,AND DESIGN										
PLANNING (Preparat					677,000	0	0	0	677,000	
MEMORANDUM OF AGRE					5,000	0	0	0	5,000	
ENVIRONMENTAL AND					4,500	0	0	0	4,500	
30.H.-.-. PLANS AND SPECIFICATIONS										
PLANS & SPECS - SW					290,000	0	0	0	290,000	
PLANS & SPECS - DA					5,000	0	0	0	5,000	
PLANS AND SPECIFIC					295,000	0	0	0	295,000	

30.J.-.-. ENGINEERING DURING	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
30.J.-.-. ENGINEERING DURING CONSTRUCTION										
VECP's					11,000	0	0	0	11,000	
PERIODIC INSPECTIO					12,000	0	0	0	12,000	
30.J.-.-J.H.8. EDC - DAMS, SEDIMENT CONTROL STRUCTURES										
EDC - DAMS, SEDIME					11,200	0	0	0	11,200	
ALL OTHER EDC					31,000	0	0	0	31,000	
ENGINEERING DURING					65,200	0	0	0	65,200	

30.M.-.-. COST ENGINEERING	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
COST ENGINEERING			20,000	0	0	0	20,000	
30.N.-.-. CONSTRUCTION AND SUPPLY CONTRACT ACTIVITIES								
CONSTRUCTION AND S			15,000	0	0	0	15,000	
PROJECT MANAGEMENT			20,000	0	0	0	20,000	
MISCELLANEOUS ACTI			8,000	0	0	0	8,000	
PLANNING, ENGINEER			1,109,700	0	0	0	1,109,700	

31.B.-.-. CONTRACT ADMINISTR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
31. CONSTRUCTION MANAGEMENT										
31.B.-.-. CONTRACT ADMINISTRATION										
CONTRACT ADMIN - S					90,000	0	0	0	90,000	
31.B.-.-B.-.2. CONTRACT ADMIN - DAMS, SEDIMENT CONTROL STRUCTURES										
CONTRACT ADMIN - D					10,000	0	0	0	10,000	
CONTRACT ADMINISTR					100,000	0	0	0	100,000	

31.C.-.-. BENCHMARKS AND BAS	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
BENCHMARKS AND BAS					5,000	0	0	0	5,000	
31.D.-.-. REVIEW OF SHOP DRAWINGS										
REVIEW OF SHOP DRA					42,000	0	0	0	42,000	
31.D.-.-D.-.2. REVIEW OF SHOP DRAWINGS-DAMS, SEDIMENT CONTROL STRUCTURES										
REVIEW OF SHOP DRA					11,700	0	0	0	11,700	
REVIEW OF SHOP DRA					53,700	0	0	0	53,700	

31.E.-.-. INSPECTION AND QUA	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
31.E.-.-. INSPECTION AND QUALITY ASSURANCE										
INSPECTION & QA-SW					48,000	0	0	0	48,000	
31.E.-.-E.-.2. INSPECTION & QA-DAMS, SEDIMENT CONTROL STRUCTURES										
INSPECTION & QA-DA					11,700	0	0	0	11,700	
INSPECTION AND QUA					59,700	0	0	0	59,700	

31.F.-.-. PROJECT OFFICE OPE	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNI
31.F.-.-. PROJECT OFFICE OPERATION										
PROJECT OFFICE OPE					354,000	0	0	0	354,000	
31.F.-.-F.-.2. PROJECT OFFICE OPERATION-DAMS, SEDIMENT CONTROL STRUCTURES										
PROJECT OFFICE OPE					95,000	0	0	0	95,000	
PROJECT OFFICE OPE					449,000	0	0	0	449,000	

31.H.-.-. CONTRACTOR INITIAT	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	TOTAL COST	UNIT
CONTRACTOR INITIAT			18,000	0	0	0	18,000	
31.P.-.-. PROJECT MANAGEMENT								
PROJECT MANAGEMENT			10,000	0	0	0	10,000	
31.P.-.-P.-.2. PROJECT MANAGEMENT-DAMS,SEDIMENT CONTROL STRUCTURES								
PROJECT MANAGEMENT			1,600	0	0	0	1,600	
PROJECT MANAGEMENT			11,600	0	0	0	11,600	
CONSTRUCTION MANAG			697,000	0	0	0	697,000	
SWAN LAKE - REVISE	1.00 EA		3,183,647	1,522,203	950,204	201,912	5,857,966	5857966

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	CODED				PROD =	100%			CREW HOURS =	3
MIL *	H25CS003	E HYD EXCAV,CRWLR,1 CY BKT	1.00	HR	29.12			1.00	29.12	29.1
MIL *	XMIXX020	E Small Tools	1.80	HR	1.38			1.80	2.48	2.4
MIL *	B-EQOPRCRNL	Eq Oper, Crane/Shovl	1.00	HR	31.65	1.00	31.65			31.6
MIL *	B-LABORER	L Laborer (Semi-Skilled)	2.00	HR	24.68	2.00	49.36			49.3
MIL *	B-LABORER	F Laborer (Semi-Skilled)	1.00	HR	25.18	1.00	25.18			25.1
	TOTAL					4.00	106.19	2.80	31.60	137.7
	CODEK				PROD =	100%			CREW HOURS =	1013
MIL *	L50MF002	E LDR,W/BH,WH, 1CY FE BKT W/24"DI	1.00	HR	12.41			1.00	12.41	12.4
MIL *	XMIXX020	E Small Tools	0.30	HR	1.38			0.30	0.41	0.4
MIL *	B-EQOPRLT	L Eq Oper, Light	1.00	HR	26.58	1.00	26.58			26.5
MIL *	B-LABORER	L Laborer (Semi-Skilled)	3.00	HR	24.68	3.00	74.03			74.0
MIL *	B-LABORER	F Laborer (Semi-Skilled)	1.00	HR	25.18	1.00	25.18			25.1
	TOTAL					5.00	125.79	1.30	12.82	138.6
	ULABH				PROD =	100%			CREW HOURS =	7
MIL *	XMIXX020	E Small Tools	2.00	HR	1.38			2.00	2.76	2.7
MIL *	B-LABORER	F Laborer (Semi-Skilled)	1.00	HR	25.18	1.00	25.18			25.1
MIL *	B-LABORER	L Laborer (Semi-Skilled)	3.00	HR	24.68	3.00	74.03			74.0
	TOTAL					4.00	99.21	2.00	2.76	101.9
	XASPA				PROD =	100%			CREW HOURS =	0
MIL *	A30BK004	E ASPHALT FIN, 10' SPW, PNEUM	1.00	HR	32.79			1.00	32.79	32.7
MIL *	T40XX013	E TRUCK OPT,FLATBED, 8' x 10.0'	1.00	HR	0.47			1.00	0.47	0.4
MIL *	T50FO003	E TRK,HWY,4X2,F250,3/4T,8600 GVW	1.00	HR	6.34			1.00	6.34	6.3
MIL *	T50GM012	E TRK, HWY, 2 AXLE, 24000 GVW, 4X	1.00	HR	11.68			1.00	11.68	11.6
MIL *	XMIXX020	E Small Tools	2.00	HR	1.38			2.00	2.76	2.7
MIL *	X-EQOPRMEDF	Outside Equip. Op. Medium	1.00	HR	31.99	1.00	31.99			31.9
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	3.00	HR	31.49	3.00	94.47			94.4
MIL *	X-LABORER	L Outside Laborer (Semi-Skilled)	5.00	HR	24.68	5.00	123.40			123.4
MIL *	X-TRKDVRHVL	Outside Truck Dr. Heavy	1.00	HR	29.44	1.00	29.44			29.4
MIL *	B15RS001	E STR. SWEEPER, SELF-PROP	1.00	HR	8.22			1.00	8.22	8.2
MIL *	R30CA002	E ROLLER,STATIC,SELF,68"W,9 TIRE	1.00	HR	14.89			1.00	14.89	14.8
MIL *	R30ID005	E ROLLER,STATIC,SELF,12T,TANDEM,S	2.00	HR	15.09			2.00	30.18	30.1
	TOTAL					10.00	279.30	10.00	107.33	386.6
	XSWNLAKE01	Crushed Stone			PROD =	100%			CREW HOURS =	317
MIL *	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00	HR	68.16			1.00	68.16	68.1
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00	HR	31.49	2.00	62.98			62.9
MIL *	G15CA001	E GRADER,MOTOR,CAT120-G, ARTIC	1.00	HR	22.09			1.00	22.09	22.0
	TOTAL					2.00	62.98	2.00	90.25	153.2

SRC	ITEM ID	DESCRIPTION	NO. UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	XSWNLAKE02	Semi-Compacted Fill (Scrapers)		PROD = 100%			CREW HOURS =		134
MIL *	S15CA001	E SCRAPER,SELF,14-20CY,24T,PWRSHF	2.00 HR	73.01			2.00	146.02	146.02
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	1.00 HR	6.42			1.00	6.42	6.42
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	1.00 HR	71.32			1.00	71.32	71.32
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	3.00 HR	31.49	3.00	94.47			94.47
	TOTAL				3.00	94.47	4.00	223.76	318.23
	XSWNLAKE03	Quarry Run Stone		PROD = 100%			CREW HOURS =		22
MIL *	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00 HR	68.16			1.00	68.16	68.16
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	1.00 HR	6.42			1.00	6.42	6.42
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	1.00 HR	71.32			1.00	71.32	71.32
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00 HR	31.49	2.00	62.98			62.98
	TOTAL				2.00	62.98	3.00	145.90	208.88
	XSWNLAKE04	Stripping		PROD = 100%			CREW HOURS =		2463
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	2.00 HR	6.42			2.00	12.84	12.84
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	2.00 HR	71.32			2.00	142.64	142.64
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00 HR	31.49	2.00	62.98			62.98
	TOTAL				2.00	62.98	4.00	155.48	218.46
	XSWNLAKE05	Clearing		PROD = 100%			CREW HOURS =		32
MIL *	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00 HR	68.16			1.00	68.16	68.16
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	1.00 HR	6.42			1.00	6.42	6.42
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	1.00 HR	71.32			1.00	71.32	71.32
MIL *	T55CA001	E TRK,OFF-HWY,35T 22-30CY, 769C	1.00 HR	67.75			1.00	67.75	67.75
MIL *	XMIXX020	E Small Tools	1.00 HR	1.38			1.00	1.38	1.38
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00 HR	31.49	2.00	62.98			62.98
MIL *	X-LABORER	L Outside Laborer (Semi-Skilled)	2.00 HR	24.68	2.00	49.36			49.36
MIL *	X-TRKDVRHVL	Outside Truck Dr. Heavy	1.00 HR	29.44	1.00	29.44			29.44
	TOTAL				5.00	141.78	5.00	215.03	356.81
	XSWNLAKE06	Seeding (Small Areas By hand)		PROD = 100%			CREW HOURS =		710
MIL *	T50IT003	E TRK, HWY, 21,700GVW, 4X2, 2 AXL	1.00 HR	12.12			1.00	12.12	12.12
MIL *	XMIXX020	E Small Tools	1.00 HR	1.38			1.00	1.38	1.38
MIL *	X-LABORER	L Outside Laborer (Semi-Skilled)	2.00 HR	24.68	2.00	49.36			49.36
	TOTAL				2.00	49.36	2.00	13.50	62.86
	XSWNLAKE08	Seeding (Large Areas - Mechanical)		PROD = 100%			CREW HOURS =		352
MIL *	T25JD001	E TRACTOR,WH,FARM, JD-2155	1.00 HR	5.77			1.00	5.77	5.77
MIL *	T50FO003	E TRK,HWY,4X2,F250,3/4T,8600 GVW	1.00 HR	6.34			1.00	6.34	6.34
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	1.00 HR	31.49	1.00	31.49			31.49
MIL *	X-LABORER	L Outside Laborer (Semi-Skilled)	2.00 HR	24.68	2.00	49.36			49.36
USR *	S45DA004	E Hydro-Seeder	1.00 HR	5.69			1.00	5.69	5.69
	TOTAL				3.00	80.85	3.00	17.80	98.65

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	LABOR COST	**** EQUIP **** HOURS	EQUIP COST	TOTAL COST
	XSWNLAKE09	Stone Placement (Barged Stone)				PROD = 100%			CREW HOURS =	349
MIL *	H25K0007	E HYD EXCAV,CRWLR,3 CY BKT	1.00	HR	125.32			1.00	125.32	125.32
MIL *	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00	HR	68.16			1.00	68.16	68.16
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	1.00	HR	6.42			1.00	6.42	6.42
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	1.00	HR	71.32			1.00	71.32	71.32
MIL *	T55DJ005	E TRK,OFF,R-DUMP,20-26CY,35T,D350	3.00	HR	59.47			3.00	178.41	178.41
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	3.00	HR	31.49	3.00	94.47			94.47
MIL *	X-TRKDVRHVL	Outside Truck Dr. Heavy	3.00	HR	29.44	3.00	88.32			88.32
	TOTAL					6.00	182.79	7.00	449.63	632.42
	XSWNLAKE10	Semi-Compacted EMB(Scrapers W/Push Dozer)				PROD = 100%			CREW HOURS =	405
MIL *	S15CA001	E SCRAPER,SELF,14-20CY,24T,PWRSHF	2.00	HR	73.01			2.00	146.02	146.02
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	2.00	HR	6.42			2.00	12.84	12.84
MIL *	T10CA019	E BLADE, PUSH PLATE FOR D8	1.00	HR	0.26			1.00	0.26	0.26
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	2.00	HR	71.32			2.00	142.64	142.64
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	4.00	HR	31.49	4.00	125.96			125.96
	TOTAL					4.00	125.96	7.00	301.76	427.72
	XSWNLAKE11	Floating Plant W/Dragline & Clam				PROD = 100%			CREW HOURS =	2070
MIL *	B35HE009	E BUCKET, DRAGLINE, LTWT, 4.5 CY	1.00	HR	3.10			1.00	3.10	3.10
MIL *	C85AM003	E CRA,DRAG/CLAM,4.5CY,95'B,ADD BK	1.00	HR	109.71			1.00	109.71	109.71
USR *	XX0XX011	E Spud Barge	1.00	HR	20.00			1.00	20.00	20.00
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00	HR	31.49	2.00	62.98			62.98
MIL *	X-EQOPROILL	Outside Oiler	1.00	HR	25.27	1.00	25.27			25.27
MIL *	X-LABORER	L Outside Laborer (Semi-Skilled)	2.00	HR	24.68	2.00	49.36			49.36
MIL *	XX0XX002	E 750hp Push Boat	1.00	HR	84.45			1.00	84.45	84.45
USR *	XX0XX013	E Work Barge	1.00	HR	8.50			1.00	8.50	8.50
	TOTAL					5.00	137.61	5.00	225.76	363.37
	XSWNLAKE12	Ditching W/Hyd Excavator				PROD = 100%			CREW HOURS =	253
MIL *	H25K0007	E HYD EXCAV,CRWLR,3 CY BKT	1.00	HR	125.32			1.00	125.32	125.32
MIL *	T55CA001	E TRK,OFF-HWY,35T 22-30CY, 769C	2.00	HR	67.75			2.00	135.50	135.50
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	1.00	HR	31.49	1.00	31.49			31.49
MIL *	X-TRKDVRHVL	Outside Truck Dr. Heavy	2.00	HR	29.44	2.00	58.88			58.88
	TOTAL					3.00	90.37	3.00	260.82	351.19
	XSWNLAKE13	Shaping Crew				PROD = 100%			CREW HOURS =	671
MIL *	T10CA016	E BLADE, STRAIGHT,HYDR,FOR D8	2.00	HR	6.42			2.00	12.84	12.84
MIL *	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	2.00	HR	71.32			2.00	142.64	142.64
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00	HR	31.49	2.00	62.98			62.98
	TOTAL					2.00	62.98	4.00	155.48	218.46

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	XSWNLAKE14	Structural Excavation				PROD = 100%			CREW HOURS =	103
MIL *	H25KD007	E HYD EXCAV,CRWLR,3 CY BKT	1.00	HR	125.32			1.00	125.32	125.32
MIL *	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00	HR	68.16			1.00	68.16	68.16
MIL *	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00	HR	31.49	2.00	62.98			62.98
	TOTAL					2.00	62.98	2.00	193.48	256.46

ITEM ID	DESCRIPTION		
04. DAMS			
CODEK		PROD = 100%	CREW HOURS = 1003
XSWNLAKE04	Stripping	PROD = 100%	CREW HOURS = 2379
XSWNLAKE06	Seeding (Small Areas By hand)	PROD = 100%	CREW HOURS = 675
06. FISH AND WILDLIFE FACILITIES			
CODEK		PROD = 100%	CREW HOURS = 3
XSWNLAKE01	Crushed Stone	PROD = 100%	CREW HOURS = 27
XSWNLAKE02	Semi-Compacted Fill (Scrapers)	PROD = 100%	CREW HOURS = 25
XSWNLAKE03	Quarry Run Stone	PROD = 100%	CREW HOURS = 7
XSWNLAKE04	Stripping	PROD = 100%	CREW HOURS = 7
XSWNLAKE05	Clearing	PROD = 100%	CREW HOURS = 2
XSWNLAKE06	Seeding (Small Areas By hand)	PROD = 100%	CREW HOURS = 4
08. ROADS,RAILROADS, AND BRIDGES			
XSWNLAKE01	Crushed Stone	PROD = 100%	CREW HOURS = 42
XSWNLAKE02	Semi-Compacted Fill (Scrapers)	PROD = 100%	CREW HOURS = 8
XSWNLAKE04	Stripping	PROD = 100%	CREW HOURS = 12
11. LEVEES AND FLOODWALLS	ADE)		
CODED		PROD = 100%	CREW HOURS = 3
CODEK		PROD = 100%	CREW HOURS = 8
XASPA		PROD = 100%	CREW HOURS = 0
XSWNLAKE01	Crushed Stone	PROD = 100%	CREW HOURS = 247
XSWNLAKE03	Quarry Run Stone	PROD = 100%	CREW HOURS = 15
XSWNLAKE04	Stripping	PROD = 100%	CREW HOURS = 64
XSWNLAKE05	Clearing	PROD = 100%	CREW HOURS = 18
XSWNLAKE06	Seeding (Small Areas By hand)	PROD = 100%	CREW HOURS = 32
XSWNLAKE08	Seeding (Large Areas - Mechanical)	PROD = 100%	CREW HOURS = 352
XSWNLAKE09	Stone Placement (Barged Stone)	PROD = 100%	CREW HOURS = 315
XSWNLAKE10	Semi-Compacted EMB(Scrapers W/Push Dozer)	PROD = 100%	CREW HOURS = 405
XSWNLAKE11	Floating Plant W/Dragline & Clam	PROD = 100%	CREW HOURS = 2070
XSWNLAKE13	Shaping Crew	PROD = 100%	CREW HOURS = 552
13. PUMPING PLANT			
ULABH		PROD = 100%	CREW HOURS = 7
XSWNLAKE01	Crushed Stone	PROD = 100%	CREW HOURS = 1
XSWNLAKE02	Semi-Compacted Fill (Scrapers)	PROD = 100%	CREW HOURS = 101
XSWNLAKE05	Clearing	PROD = 100%	CREW HOURS = 12
XSWNLAKE09	Stone Placement (Barged Stone)	PROD = 100%	CREW HOURS = 34
XSWNLAKE12	Ditching W/Hyd Excavator	PROD = 100%	CREW HOURS = 253
XSWNLAKE13	Shaping Crew	PROD = 100%	CREW HOURS = 119
XSWNLAKE14	Structural Excavation	PROD = 100%	CREW HOURS = 103
18. CULTURAL RESOURCE PRESERVATION			
30. PLANNING, ENGINEERING,AND DESIGN			
31. CONSTRUCTION MANAGEMENT			

** LABOR BACKUP **

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	**** TOTAL **** DEFAULT	HOURS
MIL	B-EQOPRCRN	Eq Oper, Crane/Shovl	20.85	0.0%	25.0%	5.59	0.00	31.65	HR	12/01/92	26.00	3
MIL	B-EQOPRLT	Eq Oper, Light	16.79	0.0%	25.0%	5.59	0.00	26.58	HR	12/01/92	23.68	1013
MIL	B-LABORER	Laborer/Helper	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	12/01/92	20.20	4088
MIL	X-EQOPRLT	Outside Equip. Oper Light	16.79	0.0%	25.0%	5.59	0.00	26.58	HR	12/01/92	23.68	2976
MIL	X-EQOPRMED	Outside Equip. Op. Medium	20.72	0.0%	25.0%	5.59	0.00	31.49	HR	07/29/91	25.06	15221
MIL	X-EQOPROIL	Outside Oiler	15.74	0.0%	25.0%	5.59	0.00	25.27	HR	12/01/92	19.72	2070
MIL	X-LABORER	Outside Laborer	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	07/29/91	20.20	7111
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	20.02	0.0%	25.0%	4.41	0.00	29.44	HR	07/30/91	22.02	1910

** LABOR BACKUP - LEVEL 1 **

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	**** TOTAL **** DEFAULT	HOURS
04. DAMS												
MIL	B-EQOPRLT	Eq Oper, Light	16.79	0.0%	25.0%	5.59	0.00	26.58	HR	12/01/92	23.68	1003
MIL	B-LABORER	Laborer/Helper	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	12/01/92	20.20	4011
MIL	X-EQOPRMED	Outside Equip. Op. Medium	20.72	0.0%	25.0%	5.59	0.00	31.49	HR	07/29/91	25.06	4944
MIL	X-LABORER	Outside Laborer	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	07/29/91	20.20	2129
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	20.02	0.0%	25.0%	4.41	0.00	29.44	HR	07/30/91	22.02	324
06. FISH AND WILDLIFE FACILITIES												
MIL	B-EQOPRLT	Eq Oper, Light	16.79	0.0%	25.0%	5.59	0.00	26.58	HR	12/01/92	23.68	3
MIL	B-LABORER	Laborer/Helper	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	12/01/92	20.20	12
MIL	X-EQOPRMED	Outside Equip. Op. Medium	20.72	0.0%	25.0%	5.59	0.00	31.49	HR	07/29/91	25.06	161
MIL	X-LABORER	Outside Laborer	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	07/29/91	20.20	12
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	20.02	0.0%	25.0%	4.41	0.00	29.44	HR	07/30/91	22.02	2
08. ROADS,RAILROADS, AND BRIDGES												
MIL	X-EQOPRMED	Outside Equip. Op. Medium	20.72	0.0%	25.0%	5.59	0.00	31.49	HR	07/29/91	25.06	133
11. LEVEES AND FLOODWALLS												
MIL	B-EQOPRCRN	Eq Oper, Crane/Shovl	20.85	0.0%	25.0%	5.59	0.00	31.65	HR	12/01/92	26.00	3
MIL	B-EQOPRLT	Eq Oper, Light	16.79	0.0%	25.0%	5.59	0.00	26.58	HR	12/01/92	23.68	8
MIL	B-LABORER	Laborer/Helper	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	12/01/92	20.20	38
MIL	X-EQOPRMED	Outside Equip. Op. Medium	20.72	0.0%	25.0%	5.59	0.00	31.49	HR	07/29/91	25.06	8853
MIL	X-EQOPROIL	Outside Oiler	15.74	0.0%	25.0%	5.59	0.00	25.27	HR	12/01/92	19.72	2070
MIL	X-LABORER	Outside Laborer	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	07/29/91	20.20	4947
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	20.02	0.0%	25.0%	4.41	0.00	29.44	HR	07/30/91	22.02	965
13. PUMPING PLANT												
MIL	B-LABORER	Laborer/Helper	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	12/01/92	20.20	26
MIL	X-EQOPRLT	Outside Equip. Oper Light	16.79	0.0%	25.0%	5.59	0.00	26.58	HR	12/01/92	23.68	2976
MIL	X-EQOPRMED	Outside Equip. Op. Medium	20.72	0.0%	25.0%	5.59	0.00	31.49	HR	07/29/91	25.06	1130
MIL	X-LABORER	Outside Laborer	16.95	0.0%	25.0%	3.49	0.00	24.68	HR	07/29/91	20.20	23
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	20.02	0.0%	25.0%	4.41	0.00	29.44	HR	07/30/91	22.02	620
18. CULTURAL RESOURCE PRESERVATION												
30. PLANNING, ENGINEERING,AND DESIGN												
31. CONSTRUCTION MANAGEMENT												

** EQUIPMENT BACKUP **

SRC	EQUIP ID	DESCRIPTION	DEPR	CAPT	FUEL	FOG	EQ REP	TR WR	TR REP	TOTAL	UOM	** TOTAL ** HOURS
MIL	A30BK004	ASPHALT FIN, 10' SPW, PNEUM	11.01	4.16			15.08			32.79	HR	8
MIL	B15RS001	STR. SWEEPER, SELF-PROP	2.29	0.71			3.00			8.22	HR	0
MIL	B35HE009	BUCKET, DRAGLINE, LTWT, 4.5 CY	1.47	0.40			1.23			3.10	HR	2086
MIL	C85AM003	CRA,DRAG/CLAM,4.5CY,95'B,ADD BKT	38.33	19.86			45.19			109.71	HR	2086
MIL	G15CA001	GRADER,MOTOR,CAT120-G, ARTIC	7.00	3.47			8.28			22.09	HR	317
MIL	H25CS003	HYD EXCAV,CRWLR,1 CY BKT	10.44	3.47			11.12			29.12	HR	11
MIL	H25KO007	HYD EXCAV,CRWLR,3 CY BKT	42.14	16.50			55.45			125.32	HR	714
USR	L10VE009	Air Curtain Destructor	3.00	1.60			8.87			13.47	HR	8
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	19.66	7.19			34.68			68.16	HR	832
MIL	L50MF002	LDR,W/BH,WH, 1CY FE BKT W/24"DIP	3.66	1.54			5.05			12.41	HR	1021
MIL	R30CA002	ROLLER,STATIC,SELF,68"W,9 TIRE	5.24	1.65			5.75			14.89	HR	0
MIL	R30ID005	ROLLER,STATIC,SELF,12T,TANDEM,SD	5.13	1.87			5.55			15.09	HR	1
MIL	S15CA001	SCRAPER,SELF,14-20CY,24T,PWRSHF	24.55	8.84			30.80			73.01	HR	1086
USR	S45DA004	Hydro-Seeder	2.20	0.25			3.24			5.69	HR	352
MIL	T10CA016	BLADE, STRAIGHT,HYDR,FOR D8	2.68	0.99			2.75			6.42	HR	7624
MIL	T10CA019	BLADE, PUSH PLATE FOR D8	0.09	0.03			0.14			0.26	HR	413
MIL	T15CA015	DOZER,CWLR,CAT D-8L, (ADD BLADE)	22.30	8.19			30.25			71.32	HR	7624
MIL	T25JD001	TRACTOR,WH,FARM, JD-2155	1.55	0.47			2.20			5.77	HR	360
MIL	T40XX013	TRUCK OPT,FLATBED, 8' x 10.0'	0.23	0.07			0.17			0.47	HR	6
MIL	T45XX023	TRK TRLR,LOWBOY,120 TON, 4 AXLE	4.76	2.60			6.65			14.01	HR	300
MIL	T50FO003	TRK,HWY,4X2,F250,3/4T,8600 GVW	1.25	0.38			2.12			6.34	HR	358
MIL	T50FO013	TRK, HWY, 52,400 GVW, 3 AXLE	6.23	1.97			8.79			25.59	HR	300
MIL	T50GM012	TRK, HWY, 2 AXLE, 24000 GVW, 4X2	2.55	0.89			3.89			11.68	HR	6
MIL	T50IT003	TRK, HWY, 21,700GVW, 4X2, 2 AXLE	2.60	0.91			4.00			12.12	HR	716
MIL	T55CA001	TRK,OFF-HWY,35T 22-30CY, 769C	23.06	9.66			27.01			67.75	HR	546
MIL	T55DJ005	TRK,OFF,R-DUMP,20-26CY,35T,D350C	20.11	8.65			26.08			59.47	HR	1056
MIL	XMIXX020	Small Tools	1.38							1.38	HR	1065
MIL	XX0XX002	750hp Push Boat	84.45							84.45	HR	2070
USR	XX0XX008	2300 hp Tow Boat	256.01							256.01	HR	50
USR	XX0XX011	Spud Barge	20.00							20.00	HR	2120
USR	XX0XX013	Work Barge	8.50							8.50	HR	2120

** EQUIPMENT BACKUP - LEVEL 1 **

SRC	EQUIP ID	DESCRIPTION	DEPR	CAPT	FUEL	FOG	EQ REP	TR WR	TR REP	TOTAL	UOM	** TOTAL ** HOURS
04. DAMS												
MIL	A30BK004	ASPHALT FIN, 10' SPW, PNEUM	11.01	4.16			15.08			32.79	HR	8
MIL	B35HE009	BUCKET, DRAGLINE, LTWT, 4.5 CY	1.47	0.40			1.23			3.10	HR	16
MIL	C85AM003	CRA,DRAG/CLAM,4.5CY,95'B,ADD BKT	38.33	19.86			45.19			109.71	HR	16
MIL	H25CS003	HYD EXCAV,CRWLR,1 CY BKT	10.44	3.47			11.12			29.12	HR	8
MIL	H25KD007	HYD EXCAV,CRWLR,3 CY BKT	42.14	16.50			55.45			125.32	HR	8
USR	L10VE009	Air Curtain Destructor	3.00	1.60			8.87			13.47	HR	8
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	19.66	7.19			34.68			68.16	HR	8
MIL	L50MF002	LDR,W/BH,WH, 1CY FE BKT W/24"DIP	3.66	1.54			5.05			12.41	HR	1011
MIL	S15CA001	SCRAPER,SELF,14-20CY,24T,PWRSHF	24.55	8.84			30.80			73.01	HR	8
MIL	T10CA016	BLADE, STRAIGHT,HYDR,FOR D8	2.68	0.99			2.75			6.42	HR	4766
MIL	T10CA019	BLADE, PUSH PLATE FOR D8	0.09	0.03			0.14			0.26	HR	8
MIL	T15CA015	DOZER,CWLR,CAT D-8L, (ADD BLADE)	22.30	8.19			30.25			71.32	HR	4766
MIL	T25JD001	TRACTOR,WH,FARM, JD-2155	1.55	0.47			2.20			5.77	HR	8
MIL	T40XX013	TRUCK OPT,FLATBED, 8' x 10.0'	0.23	0.07			0.17			0.47	HR	6
MIL	T45XX023	TRK TRLR,LOWBOY,120 TON, 4 AXLE	4.76	2.60			6.65			14.01	HR	300
MIL	T50FO003	TRK,HWY,4X2,F250,3/4T,8600 GVW	1.25	0.38			2.12			6.34	HR	6
MIL	T50FO013	TRK, HWY, 52,400 GVW, 3 AXLE	6.23	1.97			8.79			25.59	HR	300
MIL	T50GM012	TRK, HWY, 2 AXLE, 24000 GVW, 4X2	2.55	0.89			3.89			11.68	HR	6
MIL	T50IT003	TRK, HWY, 21,700GVW, 4X2, 2 AXLE	2.60	0.91			4.00			12.12	HR	681
MIL	T55CA001	TRK,OFF-HWY,35T 22-30CY, 769C	23.06	9.66			27.01			67.75	HR	8
MIL	T55DJ005	TRK,OFF,R-DUMP,20-26CY,35T,D350C	20.11	8.65			26.08			59.47	HR	8
MIL	XMIXX020	Small Tools	1.38							1.38	HR	975
USR	XX0XX008	2300 hp Tow Boat	256.01							256.01	HR	50
USR	XX0XX011	Spud Barge	20.00							20.00	HR	50
USR	XX0XX013	Work Barge	8.50							8.50	HR	50
06. FISH AND WILDLIFE FACILITIES												
MIL	G15CA001	GRADER,MOTOR,CAT120-G, ARTIC	7.00	3.47			8.28			22.09	HR	27
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	19.66	7.19			34.68			68.16	HR	36
MIL	L50MF002	LDR,W/BH,WH, 1CY FE BKT W/24"DIP	3.66	1.54			5.05			12.41	HR	3
MIL	S15CA001	SCRAPER,SELF,14-20CY,24T,PWRSHF	24.55	8.84			30.80			73.01	HR	49
MIL	T10CA016	BLADE, STRAIGHT,HYDR,FOR D8	2.68	0.99			2.75			6.42	HR	48
MIL	T15CA015	DOZER,CWLR,CAT D-8L, (ADD BLADE)	22.30	8.19			30.25			71.32	HR	48
MIL	T50IT003	TRK, HWY, 21,700GVW, 4X2, 2 AXLE	2.60	0.91			4.00			12.12	HR	4
MIL	T55CA001	TRK,OFF-HWY,35T 22-30CY, 769C	23.06	9.66			27.01			67.75	HR	2
MIL	XMIXX020	Small Tools	1.38							1.38	HR	7
08. ROADS,RAILROADS, AND BRIDGES												
MIL	G15CA001	GRADER,MOTOR,CAT120-G, ARTIC	7.00	3.47			8.28			22.09	HR	42
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	19.66	7.19			34.68			68.16	HR	42
MIL	S15CA001	SCRAPER,SELF,14-20CY,24T,PWRSHF	24.55	8.84			30.80			73.01	HR	17
MIL	T10CA016	BLADE, STRAIGHT,HYDR,FOR D8	2.68	0.99			2.75			6.42	HR	32
MIL	T15CA015	DOZER,CWLR,CAT D-8L, (ADD BLADE)	22.30	8.19			30.25			71.32	HR	32
11. LEVEES AND FLOODWALLS												
MIL	A30BK004	ASPHALT FIN, 10' SPW, PNEUM	11.01	4.16			15.08			32.79	HR	0
MIL	B15RS001	STR. SWEEPER, SELF-PROP	2.29	0.71			3.00			8.22	HR	0
MIL	B35HE009	BUCKET, DRAGLINE, LTWT, 4.5 CY	1.47	0.40			1.23			3.10	HR	2070
MIL	C85AM003	CRA,DRAG/CLAM,4.5CY,95'B,ADD BKT	38.33	19.86			45.19			109.71	HR	2070
MIL	G15CA001	GRADER,MOTOR,CAT120-G, ARTIC	7.00	3.47			8.28			22.09	HR	247

SRC	EQUIP ID	DESCRIPTION	DEPR	CAPT	FUEL	FOG	EQ REP	TR WR	TR REP	TOTAL	UOM	** TOTAL ** HOURS
MIL	H25CS003	HYD EXCAV,CRWLR,1 CY BKT	10.44	3.47			11.12			29.12	HR	3
MIL	H25KD007	HYD EXCAV,CRWLR,3 CY BKT	42.14	16.50			55.45			125.32	HR	315
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	19.66	7.19			34.68			68.16	HR	595
MIL	L50MF002	LDR,W/BH,WH, 1CY FE BKT W/24"DIP	3.66	1.54			5.05			12.41	HR	8
MIL	R30CA002	ROLLER,STATIC,SELF,68"W,9 TIRE	5.24	1.65			5.75			14.89	HR	0
MIL	R30ID005	ROLLER,STATIC,SELF,12T,TANDEM,SD	5.13	1.87			5.55			15.09	HR	1
MIL	S15CA001	SCRAPER,SELF,14-20CY,24T,PWRSHF	24.55	8.84			30.80			73.01	HR	810
USR	S45DA004	Hydro-Seeder	2.20	0.25			3.24			5.69	HR	352
MIL	T10CA016	BLADE, STRAIGHT,HYDR,FOR D8	2.68	0.99			2.75			6.42	HR	2391
MIL	T10CA019	BLADE, PUSH PLATE FOR D8	0.09	0.03			0.14			0.26	HR	405
MIL	T15CA015	DOZER,CWLR,CAT D-8L, (ADD BLADE)	22.30	8.19			30.25			71.32	HR	2391
MIL	T25JD001	TRACTOR,WH,FARM, JD-2155	1.55	0.47			2.20			5.77	HR	352
MIL	T40XX013	TRUCK OPT,FLATBED, 8' x 10.0'	0.23	0.07			0.17			0.47	HR	0
MIL	T50FO003	TRK,HWY,4X2,F250,3/4T,8600 GVW	1.25	0.38			2.12			6.34	HR	352
MIL	T50GM012	TRK, HWY, 2 AXLE, 24000 GVW, 4X2	2.55	0.89			3.89			11.68	HR	0
MIL	T50IT003	TRK, HWY, 21,700GVW, 4X2, 2 AXLE	2.60	0.91			4.00			12.12	HR	32
MIL	T55CA001	TRK,OFF-HWY,35T 22-30CY, 769C	23.06	9.66			27.01			67.75	HR	18
MIL	T55DJ005	TRK,OFF,R-DUMP,20-26CY,35T,D350C	20.11	8.65			26.08			59.47	HR	946
MIL	XMIXX020	Small Tools	1.38							1.38	HR	58
MIL	XX0XX002	750hp Push Boat	84.45							84.45	HR	2070
USR	XX0XX011	Spud Barge	20.00							20.00	HR	2070
USR	XX0XX013	Work Barge	8.50							8.50	HR	2070
13. PUMPING PLANT												
MIL	G15CA001	GRADER,MOTOR,CAT120-G, ARTIC	7.00	3.47			8.28			22.09	HR	1
MIL	H25KD007	HYD EXCAV,CRWLR,3 CY BKT	42.14	16.50			55.45			125.32	HR	390
MIL	L35CA007	LDR,FE,CRWLR, 3.75 CY, 973	19.66	7.19			34.68			68.16	HR	150
MIL	S15CA001	SCRAPER,SELF,14-20CY,24T,PWRSHF	24.55	8.84			30.80			73.01	HR	202
MIL	T10CA016	BLADE, STRAIGHT,HYDR,FOR D8	2.68	0.99			2.75			6.42	HR	385
MIL	T15CA015	DOZER,CWLR,CAT D-8L, (ADD BLADE)	22.30	8.19			30.25			71.32	HR	385
MIL	T55CA001	TRK,OFF-HWY,35T 22-30CY, 769C	23.06	9.66			27.01			67.75	HR	518
MIL	T55DJ005	TRK,OFF,R-DUMP,20-26CY,35T,D350C	20.11	8.65			26.08			59.47	HR	102
MIL	XMIXX020	Small Tools	1.38							1.38	HR	25

18. CULTURAL RESOURCE PRESERVATION
30. PLANNING, ENGINEERING, AND DESIGN
31. CONSTRUCTION MANAGEMENT

** PROJECT SETTINGS **

ESTIMATE TYPE : A-Crews with Auto Reprice

SALES TAX : 0.00%

DATE OF ESCALATION SCHEDULE : 07/23/92

PROJECT DIRECT COST COLUMNS

Col Type	L	E	M	U	X
Rep Width	12	12	12	12	0
Title	LABOR	EQUIPMNT	MATERIAL	SUPPLIES	(Unused)

PROJECT INDIRECT COST COLUMNS

Col Type	O	O	O	P	B
Rep Width	12	12	12	12	12
Title	OVH&MOB	HOME OFC	IOOC	PROFIT	BOND

PROJECT OWNER COST COLUMNS

Col Type	U	X	X	X	X
Rep Width	12	0	0	0	0
Title	CONTINGN	(Unused)	(Unused)	(Unused)	(Unused)

PROJECT BREAKDOWN

PROJECT ID	Length	Trail Sep	Level Title	2nd View Order
Level 1 ID :	2	.	Bid Item	0
Level 2 ID :	5	N	Facility	0
Level 3 ID :	5	N	Feature	0
Level 4 ID :	2	N	Feature	0
Level 5 ID :	2	N	(Unused)	0
Level 6 ID :	0	N	(Unused)	0

Owner Cost Level : 0

** PROJECT SETTINGS **

2ND VIEW COLUMNS

Quantity Column Width : 10

Col Type	X	X	X	X	X
Rep Width	0	0	0	0	0
Title	(Unused)	(Unused)	(Unused)	(Unused)	(Unused)
Shadow	X	X	X	X	X

DETAIL REPORT FORMATTING

PAGE OPTIONS
Page Break Levels : 2
Table of Contents Levels : 3

0 1 2 3 4 5 6 7

ROW OPTIONS
Print Titles at Levels : Y Y Y Y Y Y
Print Totals at Levels : Y Y Y Y Y Y
Print Notes at Levels : Y Y Y Y Y Y Y Y
Print Unit Cost Row : Y
Print Page Footer : Y
Show Cost Codes : Y

COLUMNS OPTIONS
Print Crew Id : Y
Crew Output : Y
Unit Cost : Y

UPB TITLES
No. of Levels to Print : 0
Bracket Titles With : N N
Include titles Notes : N

** PROJECT SETTINGS **

OTHER REPORT FORMATTING

COLUMN TITLES FOR SUMMARY REPORTS

Column 1 OVH&MOB : FIELD OFFICE OVERHEAD/MOB & DEMOB
Column 2 HOME OFC : HOME OFFICE OVERHEAD
Column 3 IOOC : INTEREST ON OPERATING CAPITAL
Column 4 PROFIT : PROFIT
Column 5 BOND : BOND

Column 1 CONTINGN : % Contingencies
Column 2 (Unused) :
Column 3 (Unused) :
Column 4 (Unused) :
Column 5 (Unused) :

STANDARD COLUMN WIDTHS		SUMMARY FEATURES	
Quantity Columns	10	Round Totals Column	N-None
Total cost Columns	12	Contingency Notes	No
Unit Cost Columns	8	Show Project Totals	Yes

REPORT SELECTION

Project Settings : Y
Contractor Settings : Y Measurement Units : U.S.
Link Listing : N

	Direct	Indirect	Owner	0	1	2	3	4	5	6
Detail :	Y									
Project :	Y	Y	Y		Y	Y	Y	N	N	N
Contractor :	N	N		N	N	N	N	N	N	N
Division :	N	N	N	Y	N	N	N	N	N	N
System :	N	N	N	Y	N	N	N	N	N	N
2nd View :	N									
Crew :	Y			Y	Y	N	N	N	N	N
Labor :	Y									
Equipment :	Y									

(REPORT FORMAT TYPE: Direct, Indirect, Owner; FOR LEVEL (S): 0 1 2 3 4 5 6)

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
Project Information Record							
% Contingencies	P		0.00				
04 DAMS							
04.-.-.- HILLSIDE SEDIMENT CONTROL STRUCT							
04.-.-.- A PONDS							
% Contingencies	0						
04.-.-.- B TERRACES							
% Contingencies	0						
04.-.-.- C BASINS							
% Contingencies	0						
04.-.-.A ADMINISTRATIVE COST-SOIL CONSER-							
% Contingencies	0						
06 FISH AND WILDLIFE FACILITIES							
06. 3.A PARKING LOT & BOAT RAMP (MIDDLE)							
06. 3.A 2 CA-10 CRUSHED STONE							
% Contingencies	P		15.00				
06. 3.A 3 QUARRY RUN STONE-BOAT RAMP							
% Contingencies	P		20.00				
06. 3.A 4 SEMI-COMPACTED EMBANKMENT							
% Contingencies	P		25.00				
06. 3.A 5 STRIPPING							
% Contingencies	P		15.00				
06. 3.A 6 SEEDING							
% Contingencies	P		20.00				
06. 3.A 7 CLEARING							
% Contingencies	P		20.00				
06. 3.A 8 14 FT. ACCESS GATE							
% Contingencies	P		20.00				
06. 3.B PARKING LOT & BOAT RAMP (LOWER)							
06. 3.B 1 CA-10 CRUSHED STONE							
% Contingencies	P		15.00				
06. 3.B 2 QUARRY RUN STONE-BOAT RAMP							
% Contingencies	P		20.00				
06. 3.B 3 SEMI-COMPACTED EMBANKMENT							
% Contingencies	P		25.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
06. 3.B 4 STRIPPING							
% Contingencies	P		15.00				
06. 3.B 5 SEEDING							
% Contingencies	P		20.00				
06. 3.B 6 CLEARING							
% Contingencies	P		20.00				
06. 3.B 7 CMP - 18 INCH DIA.							
% Contingencies	P		15.00				
06. 3.B 8 CMP END SECTION-18 IN.							
% Contingencies	P		15.00				
06. 3.B 9 CRUSHED STONE-1 IN. MINUS							
% Contingencies	P		15.00				
08 ROADS,RAILROADS, AND BRIDGES							
08.2.-.A ROADS-RELOCATED GRAVEL RD							
08.2.-.A 2 CRUSHED STONE CA-10							
% Contingencies	P		12.00				
08.2.-.A 3 STRIPPING							
% Contingencies	P		15.00				
08.2.-.B ROADS-LEVEE CROSSING RAMPS, 2EA							
08.2.-.B 1 SEMI-COMPACTED EMBANKMENT							
% Contingencies	P		25.00				
08.2.-.B 2 CRUSHED STONE CA-10							
% Contingencies	P		15.00				
08.2.-.C ROADS-ACCESS RAMP							
08.2.-.C 1 SEMI-COMPACTED EMBANKMENT							
% Contingencies	P		25.00				
08.2.-.C 2 CRUSHED STONE CA-10							
% Contingencies	P		15.00				
11 LEVEES AND FLOODWALLS							
11.0.1 A EARTHEN LEVEE							
11.0.1 A 2 SEMI-COMPACTED EMBANKMENT (1on3)							
% Contingencies	P		25.00				
11.0.1 A 3 EXCAVATION (1on4)							
% Contingencies	P		25.00				
11.0.1 A 4 CLEARING							
% Contingencies	P		15.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
11.0.1 A 5 CRUSHED STONE (CA-10)							
% Contingencies	P		15.00				
11.0.1 A 6 "C" STONE							
% Contingencies	P		15.00				
11.0.1 A 7 "B" STONE							
% Contingencies	P		15.00				
11.0.1 A 8 CMP-18" DIA.							
% Contingencies	P		15.00				
11.0.1 A 9 CMP END SECTION-18"							
% Contingencies	P		15.00				
11.0.1 A 10 CRUSHED STONE-1" MINUS							
% Contingencies	P		15.00				
11.0.1 A 11 ASPHALTIC CONCRETE							
% Contingencies	P		20.00				
11.0.1 A 12 AGGREGATE BASE COURSE-8"							
% Contingencies	P		15.00				
11.0.1 A 13 BARRICADE - 10 FT							
% Contingencies	P		20.00				
11.0.1 A 14 ACCESS GATE - 14 FT							
% Contingencies	P		15.00				
11.0.1 A 15 STRIPPING (BORROW AREA)							
% Contingencies	P		15.00				
11.0.1 A 16 CLEARING (BORROW AREA)							
% Contingencies	P		15.00				
11.0.1 A 17 SEEDING (BORROW AREA)							
% Contingencies	P		20.00				
11.0.1 A 18 SEEDING (MAIN LEVEE)							
% Contingencies	P		25.00				
11.0.1 A 19 HAY BAILS							
% Contingencies	P		15.00				
11.0.1 B 48" GRAVITY DRAIN (MIDDLE&LOWER)							
11.0.1 B 6 SLUICE GATE & OPER-48" DIA							
% Contingencies	P		15.00				
11.0.1 B 7 CMP - 48" DIA							
% Contingencies	P		15.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX BEGIN	END
11.0.1 B 8 END SECTIONS - 48"							
% Contingencies	P		15.00				
11.0.1 B 9 RISER PIPE - 72" DIA							
% Contingencies	P		15.00				
11.0.1 B 10 CONCRETE BASE							
% Contingencies	P		20.00				
11.0.1 B 11 CRUSHED STONE-3" MINUS							
% Contingencies	P		15.00				
11.0.1 B 12 CRUSHED STONE-6" MINUS							
% Contingencies	P		15.00				
11.0.1 B 13 GEOGRID							
% Contingencies	P		20.00				
11.0.1 B 14 GEOTEXTILE							
% Contingencies	P		20.00				
11.0.1 C COFFERDAM FOR GRAVITY DRAIN							
11.0.1 C 1 "C" STONE							
% Contingencies	P		15.00				
11.0.1 C 2 CRUSHED STONE							
% Contingencies	P		15.00				
11.0.1 C 3 PLASTIC LINER							
% Contingencies	P		20.00				
11.0.1 E INTERIOR CLOSURE							
11.0.1 E 1 EXCAVATION							
% Contingencies	P		25.00				
11.0.1 E 2 CLEARING							
% Contingencies	P		15.00				
11.0.1 E 3 "C" STONE REVETMENT							
% Contingencies	P		15.00				
11.0.1 E 4 CRUSHED STONE (CA-10)							
% Contingencies	P		15.00				
11.0.1 F ISLAND CONSTRUCTION (MIDDLE)							
11.0.1 F 1 EXCAVATION (MIDDLE)							
% Contingencies	P		25.00				
11.0.1 F 2 EXCAVATION (LOWER)							
% Contingencies	P		25.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
11.0.1 F 3 SEEDING							
% Contingencies	P		20.00				
11.0.1 F 4 HAY BAILS							
% Contingencies	P		15.00				
11.0.1 G EXISTING ROCK CLOSURE							
11.0.1 G 1 CLEARING							
% Contingencies	P		15.00				
11.0.1 G 2 "C" STONE REPAIR							
% Contingencies	P		15.00				
11.0.1 H SHORELINE & BANKLINE PROTECTION							
11.0.1 H 1 WILLOW WATTLINGS(MIDDLE/ISLANDS)							
% Contingencies	P		30.00				
11.0.1 H 2 WILLOW CUTTINGS(MIDDLE/ISLANDS)							
% Contingencies	P		30.00				
11.0.1 H 3 WILLOW WATTLINGS(LOWER/ISLANDS)							
% Contingencies	P		30.00				
11.0.1 H 4 WILLOW CUTTINGS(LOWER/ISLANDS)							
% Contingencies	P		30.00				
11.0.1 H 5 WILLOW CUTTINGS(UPPER/LEVEE)							
% Contingencies	P		30.00				
11.0.1 I MISCELLANEOUS							
11.0.1 I 1 AUTOMATIC GAGING STATION							
% Contingencies	P		15.00				
11.0.1 I 2 STAFF GAGE							
% Contingencies	P		15.00				
11.0.1 I 3 SILT SCREEN							
% Contingencies	P		15.00				
11.0.1 I 4 WATER QUALITY TESTS							
% Contingencies	P		15.00				
13 PUMPING PLANT							
13.0.-.A PUMP STATION/CONTROL STRUCTURE							
13.0.-.A 2 REINFORCED CONCRETE							
% Contingencies	P		20.00				
13.0.-.A 3 STRUCTURAL STEEL							
% Contingencies	P		20.00				

** OWNER SETTINGS **

			AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
13.0.-.A	4 SLUICE GATE W/OPERATOR-72"x72"							
	% Contingencies	P		25.00				
13.0.-.A	5 SLIDE GATE W/HARDWARE-72"x72"							
	% Contingencies	P		25.00				
13.0.-.A	6 GUARD RAIL							
	% Contingencies	P		15.00				
13.0.-.A	7 GEOTEXTILE							
	% Contingencies	P		15.00				
13.0.-.A	8 STOP LOGS (4x6 OAK TIMBERS)							
	% Contingencies	P		25.00				
13.0.-.A	9 CONCRETE PARKING BLOCKS							
	% Contingencies	P		20.00				
13.0.-.A	10 CRUSHED STONE CA-10							
	% Contingencies	P		15.00				
13.0.-.A	11 PUMP AND ACCESSORIES							
	% Contingencies	P		15.00				
13.0.-.A	12 GENTRY CRANE W/HOIST							
	% Contingencies	P		20.00				
13.0.-.A	13 STRUCTURAL EXCAVATION							
	% Contingencies	P		20.00				
13.0.-.A	14 EXCAVATED EMBANKMENT							
	% Contingencies	P		20.00				
13.0.-.A	15 EMBANKMENT, BORROW							
	% Contingencies	P		15.00				
13.0.-.A	16 DEWATERING							
	% Contingencies	P		25.00				
13.0.-.A	17 DITCH EXCAVATION							
	% Contingencies	P		15.00				
13.0.-.A	18 CLEARING FOR DITCH EXCAVATION							
	% Contingencies	P		20.00				
13.0.-.A	19 "C" STONE FOR DITCH EMBANKMENT							
	% Contingencies	P		15.00				
13.0.-.A	20 FISH SCREENS							
	% Contingencies	P		35.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
13.0.-.B PUMP STATION/CONTROL STRUCTURE							
13.0.-.B 2 REINFORCED CONCRETE							
% Contingencies	P		20.00				
13.0.-.B 3 STRUCTURAL STEEL							
% Contingencies	P		20.00				
13.0.-.B 4 SLUICE GATE W/OPERATOR-72"x72"							
% Contingencies	P		25.00				
13.0.-.B 5 SLIDE GATE W/HARDWARE-72"x72"							
% Contingencies	P		25.00				
13.0.-.B 6 GUARD RAIL							
% Contingencies	P		15.00				
13.0.-.B 7 GEOTEXTILE							
% Contingencies	P		15.00				
13.0.-.B 8 STOP LOGS (4x6 OAK TIMBERS)							
% Contingencies	P		25.00				
13.0.-.B 9 CONCRETE PARKING BLOCKS							
% Contingencies	P		20.00				
13.0.-.B 10 CRUSHED STONE CA-10							
% Contingencies	P		15.00				
13.0.-.B 11 PUMP AND ACCESSORIES							
% Contingencies	P		15.00				
13.0.-.B 12 GENTRY CRANE W/HOIST							
% Contingencies	P		20.00				
13.0.-.B 13 STRUCTUARL EXCAVATION							
% Contingencies	P		20.00				
13.0.-.B 14 EXCAVATED EMBANKMENT							
% Contingencies	P		20.00				
13.0.-.B 15 EMBANKMENT, BORROW							
% Contingencies	P		15.00				
13.0.-.B 16 DEWATERING							
% Contingencies	P		25.00				
13.0.-.B 17 DITCH EXCAVATION							
% Contingencies	P		15.00				
13.0.-.B 18 CLEARING FOR DITCH EXCAVATION							
% Contingencies	P		20.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
13.0.-.B 19 "C" STONE FOR DITCH EMBANKMENT							
% Contingencies	P		15.00				
13.0.-.B 20 FISH SCREENS							
% Contingencies	P		35.00				
13.0.-.C PUMP STATION/CONTROL STRUCTURE							
13.0.-.C 2 REINFORCED CONCRETE							
% Contingencies	P		20.00				
13.0.-.C 3 STRUCTURAL STEEL							
% Contingencies	P		20.00				
13.0.-.C 4 SLUICE GATE W/OPERATOR-72"x72"							
% Contingencies	P		25.00				
13.0.-.C 5 SLIDE GATE W/HARDWARE-72"x72"							
% Contingencies	P		25.00				
13.0.-.C 7 GEOTEXTILE							
% Contingencies	P		15.00				
13.0.-.C 9 CONCRETE PARKING BLOCKS							
% Contingencies	P		20.00				
13.0.-.C 10 CRUSHED STONE CA-10							
% Contingencies	P		15.00				
13.0.-.C 11 PUMP AND ACCESSORIES							
% Contingencies	P		15.00				
13.0.-.C 13 STRUCTUARL EXCAVATION							
% Contingencies	P		20.00				
13.0.-.C 14 EXCAVATED EMBANKMENT							
% Contingencies	P		20.00				
13.0.-.C 15 EMBANKMENT, BORROW							
% Contingencies	P		15.00				
13.0.-.C 16 DEWATERING							
% Contingencies	P		25.00				
13.0.-.C 17 DITCH EXCAVATION							
% Contingencies	P		15.00				
13.0.-.C 18 CLEARING FOR DITCH EXCAVATION							
% Contingencies	P		20.00				
13.0.-.C 19 "C" STONE FOR DITCH EMBANKMENT							
% Contingencies	P		15.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
13.0.-.C 20 FISH SCREENS							
% Contingencies	P		35.00				
18 CULTURAL RESOURCE PRESERVATION							
18.-.-.- DISTRICT LABOR (CELMS)							
% Contingencies	P		10.00				
18.0.1.- FIELD WORK							
% Contingencies	P		10.00				
18.0.2.- DATA ANAYLISIS/REPORT PREP.							
% Contingencies	P		10.00				
18.0.3.- CURATION							
% Contingencies	P		10.00				
30 PLANNING, ENGINEERING,AND DESIGN							
30.A.-.- PLANNING (Preparation of DPR)							
% Contingencies	P		0.00				
30.C.-.- MEMORANDUM OF AGREEMENT							
% Contingencies	O						
30.D.2.- ENVIRONMENTAL AND REGULATORY							
% Contingencies	P		20.00				
30.H.-.- PLANS AND SPECIFICATIONS							
30.H.-.-H.1.- PLANS & SPECS - SWAN LAKE							
% Contingencies	P		20.69				
30.H.-.-H.2.- PLANS & SPECS - DAMS, SEDIMENT							
% Contingencies	P		20.00				
30.J.-.- ENGINEERING DURING CONSTRUCTION							
30.J.-.-J.H.- VECP's							
% Contingencies	P		20.00				
30.J.-.-J.H.2 PERIODIC INSPECTIONS							
% Contingencies	P		20.00				
30.J.-.-J.H.8 EDC - DAMS, SEDIMENT CONTROL							
% Contingencies	P		25.00				
30.J.-.-J.H.9 ALL OTHER EDC							
% Contingencies	P		20.00				
30.M.-.- COST ENGINEERING							
% Contingencies	P		20.00				
30.N.-.- CONSTRUCTION AND SUPPLY CONTRACT							
% Contingencies	P		20.00				

** OWNER SETTINGS **

		AMOUNT	PERCENT	*ESCALATN DATE* BEGIN	END	*ESCALATN INDEX* BEGIN	END
30.P.-.- PROJECT MANAGEMENT							
% Contingencies	P		20.00				
30.Z.-.- MISCELLANEOUS ACTIVITIES							
% Contingencies	O						
31 CONSTRUCTION MANAGEMENT							
31.B.-.- CONTRACT ADMINISTRATION							
31.B.-.-B.-.1 CONTRACT ADMIN - SWAN							
% Contingencies	P		16.67				
31.B.-.-B.-.2 CONTRACT ADMIN - DAMS, SEDIMENT							
% Contingencies	P		20.00				
31.C.-.- BENCHMARKS AND BASELINES							
% Contingencies	P		16.67				
31.D.-.- REVIEW OF SHOP DRAWINGS							
31.D.-.-D.-.1 REVIEW OF SHOP DRAWINGS-SWAN							
% Contingencies	P		19.05				
31.D.-.-D.-.2 REVIEW OF SHOP DRAWINGS-DAMS,							
% Contingencies	P		19.66				
31.E.-.- INSPECTION AND QUALITY ASSURANCE							
31.E.-.-E.-.1 INSPECTION & QA-SWAN							
% Contingencies	P		16.67				
31.E.-.-E.-.2 INSPECTION & QA-DAMS, SEDIMENT							
% Contingencies	P		19.66				
31.F.-.- PROJECT OFFICE OPERATION							
31.F.-.-F.-.1 PROJECT OFFICE OPERATION-SWAN							
% Contingencies	P		10.74				
31.F.-.-F.-.2 PROJECT OFFICE OPERATION-DAMS,							
% Contingencies	P		11.58				
31.H.-.- CONTRACTOR INITIATED CLAIMS AND							
% Contingencies	P		100.00				
31.P.-.- PROJECT MANAGEMENT							
31.P.-.-P.-.1 PROJECT MANAGEMENT-SWAN							
% Contingencies	P		40.00				
31.P.-.-P.-.2 PROJECT MANAGEMENT-DAMS,SEDIMENT							
% Contingencies	P		25.00				

** CONTRACTOR SETTINGS **

		AMOUNT	PCT	PCT S	RISK	DIFF	SIZE	PERIOD	INVEST	ASSIST	SUBCON
OHOVERHEAD/MOB/IOOC/PROFIT/BOND											
FIELD OFFICE OVERHEAD/MOB & DEMOB	C										
HOME OFFICE OVERHEAD	P		4.00								
INTEREST ON OPERATING CAPITAL	A	13,200									
PROFIT	C		8.07		0.060	0.060	0.040	0.120	0.070	0.120	0.105
BOND	P		1.00								

APPENDIX DPR-U

VALUE ENGINEERING WORKSHOP

FOREWORD

APPENDIX DPR-U provides a summary description of a value engineering workshop held in October 1990 for the purpose of developing potential cost savings proposals for the Swan Lake HREP project.

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (SL-5)

SWAN LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

APPENDIX DPR-U

VALUE ENGINEERING WORKSHOP

SECTION I. INTRODUCTION

A value engineering workshop was held on 9-10 October 1990 for the purpose of examining the Swan and Stump Lake, Illinois HREP projects for potential cost reduction measures, and to share ideas with other EMP participants (USFWS, IDOC, NCD, NCR). The meeting was hosted by the Illinois Department of Conservation (Mr. Bill Donels), at Springfield, Illinois. This appendix describes the results of the Swan Lake Portion of that workshop.

SECTION II. ATTENDEES

Meeting attendees were as follows:

Name	Organization
Bill Donels	Illinois Department of Conservation
Neil Booth	Illinois Department of Conservation
John Poullain	Corps of Engineers, St. Louis District
Ron Dieckmann	Corps of Engineers, St. Louis District
Dave Gates	Corps of Engineers, St. Louis District
Sharon Cotner	Corps of Engineers, St. Louis District
Patti Meyers	U.S. Fish & Wildlife Service, MTNWR
Dan Holmes	Corps of Engineers, Rock Island District
Clyde Hopple	Corps of Engineers, St. Louis District
Michael Bornstein	U.S. Fish & Wildlife Service, MTNWR
Bob Clevenstein	Corps of Engineers, Rock Island District
Jerry Skalak	Corps of Engineers, Rock Island District
Chuck Rhoads	Corps of Engineers, St. Louis District
Gene Degenhardt	Corps of Engineers, St. Louis District
Joan Havrilla	Corps of Engineers, North Central Division

SECTION III. PRESENTATIONS/DISCUSSIONS

The meeting was initiated by Bill Donels, followed by Gene Degenhardt providing an overview of the value engineering process. This was followed by a presentation of the Swan Lake project features and costs by the project study manager, Dave Gates. Discussions on Swan Lake then followed, with a summary of cost savings proposals being presented by Dan Holmes on 10 October.

SECTION IV. WORKSHOP RESULTS

Each of the workshop proposals were given careful consideration prior to the finalizing of the District's recommended project plan. A number of the proposals were incorporated into the recommended plan by the Swan Lake interdisciplinary planning team (IPT). A description of each workshop proposal, the District's analysis of each proposal, and the action taken by the District on each proposal is provided below:

Dike/Levee:

1. **Proposal: Change levee side slopes to 1 on 3 from 1 on 6 in areas where the structure is being built from clamshell dredged lake sediments.**

Analysis: The District agrees from a comparison of its existing borings data with that of the Peoria Lake project, that the material may be stiff enough to pile at least as steep as 1 on 4. Whether the material could be placed as steep as 1 on 3 will have to await the results of a vane shear analysis. This data will not be available until after the Draft DPR.

Action: Tentatively increase dike/levee slope to 1 on 4 for the clamshelled portion of the structure. This action reduces the cost of the project.

2. Proposal: Eliminate the retention dike intended to retain lakeside runoff from the clamshelled segment of dike/levee.

Analysis: The District concurs that the material should stand up pretty well after placement, and that dropping the retention dike would avoid the potential for pockets of water forming along the levee/retention dike interface.

Action: Retention dike concept has been dropped. Instead, bales of straw will be placed along the lakeside toe of the levee to act as a silt screen during the construction and early post-construction periods. This action results in a reduction of project costs.

3. Proposal: Tight language should be included on the placement of dredged material into the plans and specifications (example: "Gentle placement," "excess water," specifying bucket size).

Analysis: The District concurs.

Action: Suggested P&S language to be included.

4. Proposal: Use initial clamshell dredged material to create islands in lake.

Analysis: Not feasible, materials cannot be transported to an area of the lake not yet dredged.

Action: Proposal not included.

5. Proposal: Dike/levee road bedding material has not been included.

Analysis: Road rock was inadvertently omitted from the preliminary cost estimate for the project.

Action: Road bedding costs are now included in project plan. This action results in an increase in project costs.

6. Proposal: Road on top of dike/levee could be made narrower than 10 feet wide.

Analysis: District concurs, the road could be reduced to as little as 8 feet wide and still meet its intended O&M function.

Action: Road width changed to 8 feet wide. This action results in a dollar savings to the project.

Lower Closure:

7. Proposal: Rock cap top and lakeside of lower closure should be eliminated.

Analysis: Even with a 1 on 4 side slope and 1-foot of crown elevation superiority, the IPT did not feel comfortable with the idea of removing the rock protection. Since this feature also includes the water control/fish passage unit, it was considered vital to ensure the integrity of the structure. However, it was considered appropriate to reduce the level of top and lakeside protection from B-stone to C-stone.

Action: Rock will not be eliminated, but reduced in total volume. This action will result in a dollar savings to the project.

8. Proposal: Need to determine specific location and design for a lower overtopping area.

Analysis: The District agrees. A 2,000 foot long overflow section was determined to be adequate to ensure only a 1-foot head differential prior to dike/levee overtopping. This structure would be placed along the lower most 2,000 feet of peninsula dike/levee and would be rock protected.

Action: Proposal has been included, but results in a dollar increase in project costs.

9. Proposal: Use adjacent borrow rather than hauled material for constructing the lower closure.

Analysis: The District agrees. After further consideration, it has been found to be more cost-effective to use clamshelled material to construct this structure. We agree that the dredge cut could also help to dampen wave action in this area.

Action: Lower closure core will be constructed of clamshelled material. This action will provide a dollar savings to the project.

Real Estate:

10. Proposal: Determine number of tracts/ownerships affected by interior water level changes induced by the project.

Analysis: Sixteen ownerships.

Action: None required.

11. Proposal: Condemnation of lands should be avoided.

Analysis: The USFWS will be acquiring all privately owned lands lying outside the Federal boundary that are needed to offset the project's water level management impacts. The Service would have pursued acquisition of these same lands for National Wildlife Refuge management even if the EMP project had not been developed. Any decisions regarding condemnation resides with the USFWS.

Action: No action required.

12. Proposal: Have USFWS purchase the required real estate for project operation.

Analysis: See response to Proposal 11.

Action: No action required.

Middle Closure:

13. Proposal: Remove rock cap and flatten side slopes.

Analysis: The closure is sufficiently close to the water surface that the team was not sure that the C-stone covering should be removed. The structure will, at times, be subjected to potential scour action during floods, and to the discharge of an adjacent tributary. The FWS was also concerned about the closure stability, commenting that a similar unprotected structure at Lake Chautauqua had failed.

Action: Proposal was rejected.

14. **Proposal: Use dredged material to construct the middle closure rather than hauled material.**

Analysis: The District has determined that construction of the closure using clamshelled material would be more cost-effective than using hauled material. We have assumed that the material will be stiff enough to place with 1 on 3 side slopes.

Action: Proposal has been accepted. This action will result in a dollar savings.

15. **Proposal: Vegetate the top of the middle closure structure.**

Analysis: The proposal is not applicable, since the structure will be rock capped.

Action: Proposal is rejected:

16. **Proposal: For placement of pipes in dredged material, overbuild a zone. Let set for 6-9 months. Then bring contractor back after material has consolidated, excavate center area, and use surrounding ring as a cofferdam.**

Analysis: Because of access problems, this technique cannot be applied.

Action: Proposal is rejected.

17. **Proposal: Move entire middle closure further north to a more constricted lake location.**

Analysis: Moving the structure north would save up to 15 percent in the volume of materials needed for a structure. However, the project sponsor considered the resulting change in management acreages between the middle and lower lake compartments as an unacceptable trade off.

Action: Proposal was rejected.

18. **Proposal: What was basis for selection of 2-year event within a 5-day period for water regulation? Could a longer duration, say a 10-day period be used?**

Analysis: The basis is for the survival of moist-soil and aquatic plant beds during the growing season. However, a 12 October 1990 discussion between Dave Gates and Patti Meyers indicated that the service is willing to live with a release rate of 10-days. With this change, some of the water control structures can be down sized.

Action: Water regulation will target a 2-year storm event for a 10-day release.

19. **Proposal: Why aren't fish passage structures a consideration at Fuller Lake?**

Analysis: Fuller Lake is already closed off from the river, and its management for dabbling ducks is not compatible with fish needs. Swan Lake proper is presently connected to the river and, therefore, currently provides important habitat to the fisheries resource.

Action: None required.

20. Proposal: Reduce size of the two stop-log structures.

Analysis: The deletion of two stop-log bays would reduce very little the cost of the water control units. The structures are considered to be very important as an overflow device and, at times, for fish passage.

Action: Proposal was rejected.

21. Proposal: Eliminate 2 sluice gates.

Analysis: Due to the accepted change in water release rate from a 2-year storm event, the elimination of 2-72 inch sluice gates was found to be feasible. In addition, it was felt that one, rather than two, 48 inch sluice gates through the middle closure would be adequate for raising the lower compartment water level prior to pump activation.

Action: Proposal was accepted, a project cost savings would result.

22. Proposal: Use one pump rather than two, at each compartment.

Analysis: This idea had been given some consideration prior to the VE workshop meeting. It has merit. The District has found that a belt-driven vertical couch pump can be modified for reversible input and output of water between the lake and river.

Action: Proposal accepted, a cost savings results.

23. Proposal: Eliminate some power sources.

Analysis: Compatible with the need for just three pumps, only three power sources will be needed.

Action: Proposal accepted, a cost savings results.

24. Proposal: Perform life cycle cost analysis on portable power versus electric.

Analysis: The project sponsors have reacted negatively to the suggestion on an electric power source. Neil Booth pointed out that he has experienced corrosion problems with electrical sources.

Action: Proposal was rejected.

Islands:

25. Proposal: Use two dredge passes.

Analysis: Two dredge passes was originally intended for the construction of the islands.

Action: None required.

26. Proposal: Vegetate islands.

Analysis: Original intent was to vegetate these islands, the islands will initially be grass covered. Subsequently, the vegetation will either be allowed to change to bottomland forest, or it will be held in grass cover via other management controls (such as burning).

Action: None required.

27. **Proposal: Vary height of islands.**

Analysis: The District agrees, this will provide a more natural appearance to the islands and provide a more diverse habitat. In addition to varying the height of the islands, the spacing, length, and width of the islands will also be varied.

Action: Proposal accepted, no effect on cost would result.

Sediment Traps:

28. **Proposal: Include location and typical cross-sections for sediment traps in report.**

Analysis: The District agrees, the DPR includes an appendix of SCS provided information. Included in that information is the location and typical cross-sections for the recommended hillside sediment control traps.

Action: Proposal accepted.

29. **Proposal: Resolve question regarding whether COE has capability to get money to SCS or local soil district.**

Analysis: This policy issue was addressed in the Sixth Annual Addendum. The District believes that the Final DPR for Swan Lake is in full compliance with that policy.

Action: No action required.

30. **Proposal: In the project reporting process, sediment traps should be treated as a separately constructible item, so if there is a policy problem, the entire project won't be held up.**

Analysis: The project sponsor (USFWS) and the St. Louis District Engineer have indicated a preference for a single report. This is based on the position that the program is integral to the future desired output of the project.

Action: Proposal rejected.