



**US Army Corps
of Engineers**
Rock Island District

OPERATION AND MAINTENANCE MANUAL

**BERTOM AND McCARTNEY LAKES
REHABILITATION AND ENHANCEMENT**

**UPPER MISSISSIPPI RIVER
ENVIRONMENTAL MANAGEMENT PROGRAM**

**POOL 11
RIVER MILES 599-603
GRANT COUNTY, WISCONSIN**

MARCH 1996

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ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN**

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1. INTRODUCTION.

a. Purpose and Scope.

(1) This manual has been prepared to serve as a guide for the operation and maintenance of Bertom and McCartney Lakes Rehabilitation and Enhancement project. Operation and maintenance instructions for the major features of the project are presented. These instructions are consistent with the general procedures presented in the Definite Project Report (DPR). This manual has been written for project and management personnel familiar with the project and does not contain detailed information which is common to site personnel or which is presented in other existing manuals or regulations.

(2) The intent of the operating instructions is to provide information which allows orderly and efficient use of the constructed features to meet project goals and objectives. The intent of the maintenance instructions is to present preventative maintenance information consisting of systematic inspections and subsequent corrective actions which should ensure long-term utilization of equipment and features. A timely preventative maintenance program reduces and virtually eliminates breakdown of essential equipment and prevents major damage to constructed features by early corrective action.

(3) This manual provides the general standards of maintenance and establishes an initial frequency of maintenance inspections which should ensure satisfactory project performance.

b. Use of Manual.

(1) This manual is divided into the following sections: Section 1: Introduction; Section 2: Historical Summary; Section 3: Description of Project Features; Section 4: Inspections; Section 5: Operation and Maintenance of Project Features; and Section 6: Performance Monitoring and Assessment.

(2) Sections 2 and 3 present historical summaries and descriptions of actual features constructed for this project. Section 4 presents project inspection procedures and Section 5 presents operation and maintenance instructions for each project feature. Section 6 provides a summary of monitoring activities conducted through construction and provides an overview of continued monitoring actions. Performance monitoring is considered necessary to properly evaluate effects of the constructed project features.

(3) The attached drawings have been included to provide general project "as-built" views, typical sections, and plans.

2. HISTORICAL SUMMARY.

a. Authorization and Location.

(1) The authority for this project was provided by the 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The project was funded and constructed under this authorization by the U.S. Army Corps of Engineers, Rock Island District, in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the State of Wisconsin, Department of Natural Resources (WDNR).

(2) The Bertom and McCartney Lakes Backwater Complex is located on the east bank of Pool 11, approximately 3 river miles south of Cassville, Wisconsin. The project features lie entirely within an area of the Upper Mississippi River National Wildlife and Fish Refuge.

b. Planning and Construction Activities.

(1) Table 2.1 provides a summary of planning and construction activities.

(2) Goals and objectives were formulated during the design phase. Table 2.2 summarizes project objectives.

(3) The project was designed by the U.S. Army Corps of Engineers, Rock Island District, in cooperation with the USFWS and the WDNR. Design considerations and investigations are presented in the Definite Project Report. The construction contract was supervised by the U.S. Army Corps of Engineers, Rock Island District.

(4) A construction contract, number DACW90-C-0020, was awarded to J. F. Brennan Company, La Crosse, Wisconsin, on 5 January 1990 in the amount of \$1,866,277.50. This bid was 72% of the Government estimate.

(5) Construction Problems. One construction problem encountered was mounding of heavier materials at the dredge pipe inlet of the dredged material containment facility. This resulted in a reduced settling efficiency of the containment area. To remedy this problem, the contractor constructed spur dikes to increase the linear flow length of the dredged water and therefore avoided short circuiting.

Another construction problem encountered was an insufficient quantity of silt clay material available within the containment site to dress the containment dike slopes. To rectify this problem, the contractor used material from the outside toe of the containment dike to dress the slopes.

TABLE 2.1
SUMMARY OF PLANNING AND CONSTRUCTION ACTIVITIES

Project Phase	Purpose	Responsible Agency	Significant Events	Date	Remarks
Pre-project	Identify and define problems and establish need of project.	WDNR/USFWS	Fact Sheet		
			Submitted to Corps	Sep 86	--
			Approved by Corps	Jun 87	--
Design	Quantify project objectives, perform preliminary design, satisfy NEPA and permit requirements, develop performance evaluation plan, obtain project approval for construction.	CORPS	Definite Project Report		
			Draft	Jan 89	--
			Final	Jun 89	--
			Approved	Nov 89	--
			NEPA Compliance		
			SHPO Concurrence	Feb 89	--
			Public Review	Apr 89	--
			FONSI for EA	Jun 89	1/
			Permits		
			Section 401	Feb 89	--
Construction	Finalize plans and specifications, obtain operation and maintenance agreement, advertise and award construction contract, construct project.	CORPS	Plans and Specifications		
			Final	Oct 89	--
			Approved	Nov 89	--
			Real Estate		
			Lands Available from USFWS	Jun 89	--
			Contributed Funds Received	N/A	--
			O&M Agreement	Nov 89	Reference
					Appendix A

TABLE 2.1 (Continued)
SUMMARY OF PLANNING AND CONSTRUCTION ACTIVITIES

Project Phase	Purpose	Responsible Agency	Item	<u>Significant Events</u>	Date	Remarks
Construction (continued)			Dredging Contract Advertised Awarded Substantially Complete		Nov 89 Jan 90 Oct 91	-- -- --
Post- Construction	Operate and maintain project.	USFWS	--		--	Reference Sections 4 and 5.
	Post flood inspection	CORPS	Great Flood of 93 Damage Assessment		Feb 94	--
	Perform evaluation monitoring.	CORPS	Performance Evaluation		May 95	Reference Section 6.
1/ A FONSI was completed by both the Corps and the USFWS.						

TABLE 2.2 PROJECT OBJECTIVES		
Goal	Objective	Project Feature
Enhance Aquatic Habitat	Restore deep (6 feet) aquatic habitat.	Dredging
	Restore lentic-lotic habitat access cross-sectional area.	Side channel excavation
	Increase rock substrate aquatic habitat.	Fish and mussel rock habitat
	Establish mussel bed.	Fish and mussel rock habitat
	Reduce movement of bedload sediment into Bertom Lake.	Partial closing structure
	Improve dissolved oxygen concentration during critical seasonal stress periods	Dredging
Enhance Migratory Waterfowl Habitat	Establish aquatic vegetation bed.	In-water confined dredged material placement site

c. **Actual Project Costs.** The actual cost of the project is presented in Table 2.3 on the following page.

**TABLE 2.3
ACTUAL PROJECT COSTS**

06. FISH AND WILDLIFE FACILITIES

Line Item Number	Description	Qty	UM	Cost	Extended
0001	Temporary Field Office River Miles 599-603, Upper Mississippi River System, Environmental Management Program, Grant County, WI	1	LS	\$ 20,000.00	\$ 20,000.00
0002	Hydraulic Dredging, Mobilization and Demobilization	1	LS	\$ 175,000.00	\$175,000.00
0003	Hydraulic Dredging, Removal and Disposal of Stumps, First 200 Each	200	EA	\$ 120.00	\$ 24,000.00
0004	Hydraulic Dredging, Removal and Disposal of Stumps, Over 200 Each	100	EA	\$ 90.00	\$ 9,000.00
0005	Hydraulic Dredging, Dredging	396100✓	CY	\$ 1.30	\$514,930.00
0006	Dredged Material Containment Facility	1	LS	\$ 565,000.00	\$565,000.00
0007	Clearing and Grubbing	1	LS	\$ 56,000.00	\$ 56,000.00
0008	Channel Excavation	4200✓	CY	\$ 8.10	\$ 34,020.00
0009	Submerged Habitat Structures, Heavy Timber	4	EA	\$ 5,000.00	\$ 20,000.00
0010	Submerged Habitat Structures, Concrete Rock Substrate/Bank Protection	24 4350	EA TN	\$ 425.00 \$ 22.00	\$ 10,200.00 \$ 95,700.00
0012	Rock Substrate/Bank Protection Stone/Rock Fill/Bedding, Gradation A	6900	TN	\$ 22.50	\$155,250.00
0013	Rock Substrate/Bank Protection Stone/Rock Fill/Bedding, Gradation B	1375	TN	\$ 23.00	\$ 31,625.00
0014	Rock Substrate/Bank Protection Rock Substrate/Bank Protection	650 625	TN TN	\$ 21.00 \$ 28.30	\$ 13,650.00 \$ 17,687.50
0016	Stone/Rock Fill/Bedding, Gradation E1 Rock Substrate/Bank Protection	825	TN	\$ 21.00	\$ 17,325.00
0017	Stone/Rock Fill/Bedding, Gradation E2 Rock Substrate/Bank Protection	1950	TN	\$ 18.20	\$ 35,490.00
	Rock Substrate/Bank Protection Stone/Rock Fill/Bedding, Gradation G	600	TN	\$ 19.00	\$ 11,400.00
0019	Seeding, Type A	1	LS	\$ 10,000.00	\$ 10,000.00
0020	Seeding, Type B	1	LS	\$ 50,000.00	\$ 50,000.00
06.	TOTAL, FISH AND WILDLIFE FACILITIES			Total	\$1,866,277.50
30.	PLANNING, ENGINEERING, AND DESIGN				\$242,000.00
31.	CONSTRUCTION MANAGEMENT				\$136,000.00
				TOTAL PROJECT COSTS	\$2,244,277.50

d. **Project References.** Table 2.4 provides a summary of related project references.

TABLE 2.4 PROJECT REFERENCES		
Title	Date	Purpose
Definite Project Report, Bertom & McCartney Lakes Rehabilitation & Enhancement, U.S. Army Corps of Engineers, Rock Island District	June 1989	Provided planning, engineering, and sufficient construction details of the selected plan for project approval purposes.
Construction As-Builts	May 1993	Provides as-built construction drawings.
Contractor Submittals/ Manufacturer's Data/ Shop Drawings	varies	Provides construction product data to aid in project maintenance.

3. DESCRIPTION OF PROJECT FEATURES.

a. **Project Data.** Table 3.1 presents a summary of project data.

TABLE 3.1 PROJECT DATA SUMMARY		
Item	Quantity	U/M
<i>Partial Closing Structure</i>		
Main Structure		
Rock Fill	3,000 (1,875)	Tons (CY)
Length	100	Feet
Top Width	5	Feet
Top Elevation	599	MSL
Side Slopes	1:5	H:V
Rock Protection Wings		
Rock Fill	1,500	Tons
Riprap	1,500	Tons
Bedding	200	Tons
Top Width	5	Feet
Top Elevation	605	MSL
Side Slopes	2:1	H:V
		From elevation 605-599
	1:1	H:V
		From elevation 599 to channel bottom
<i>Fish and Mussel Rock Habitat</i>		
Length	1,500	Feet
Minimum Bottom Width	50	Feet
Average Depth of Rock Substrate	2	Feet
Minimum Water Depth	4	Feet
Side Slopes	2:1	H:V
Rock Substrate	9,000	Tons
<i>McCartney Lake Dredging</i>		
Approximate Length	8,200	Feet
Bottom Width	60 or 130	Feet
Bottom Elevation	594 or 590	MSL
Volume of Excavation	400,000	CY
<i>Dredged Material Placement Site</i>		
Area	22	Acres
Average Material Depth	8	Feet
Minimum Capacity	450,000	CY
Containment Levee		
Volume of Levee	160,000	CY
Top Elevation	610	MSL
Top Width	10	Feet
Minimum Side Slopes	3.5:1	H:V

b. Partial Closing Structure.

(1) A submerged rock partial closing structure was placed across the mouth of the slough entrance immediately upstream from Coalpit Slough. The top elevation of the structure is 599 MSL, which provides 4 feet of water above the top of the structure at flatpool conditions. This water depth above the top of the structure allows sufficient flow over the structure such that its construction will not significantly impact the overall flow requirements of the backwater complex.

(2) The closing structure has 1:1 side slopes with a 5-foot bench on the riverside slope. The closing structure is tied into the banks with riprap protection wings extending along the riverbank.

c. Fish and Mussel Rock Habitat. There are three components to the fish and mussel rock habitat: rock substrate; concrete pipe submerged habitat; and submerged timber structures.

(1) **Rock Substrate.** Graded rock was placed to provide habitat diversity for aquatic invertebrate, including mussels. The fishery benefits also will be realized with provision of this stable rock substrate in flowing water. The length of the rock habitat channel is approximately 1,500 feet and has been divided into discrete sections. The existing channel was excavated by dragline prior to rock placement.

(2) **Submerged Concrete Pipe.** Select sections of concrete pipe also were placed in this reach to enhance fishery habitat. Twenty-five pipe sections varying in diameter from 12 to 36 inches were placed.

(3) **Submerged Timber Structures.** These structures consist of submerged planking which allows fishery streambank resting, feeding, and escape. These structures have been anchored into the streambed with rock backfill placed behind and on top of the structure. There are four individual structures which provide underwater openings of approximately 20 feet in length by 3 feet in height.

d. McCartney Lake Dredging. McCartney Lake was dredged to provide additional side channel and slough aquatic habitat. The dredging provides lentic-lotic access to the oxygen deficient spring-fed bank line areas. The dredging also provides increased side channel flow into slough areas. The bottom width of the dredging varied by reach from either 60 or 130 feet with bottom elevations of either 594 or 590.

e. Confined Dredged Material Placement Site.

(1) A confined dredged material placement site was constructed to contain the dredged material from McCartney Lake. The construction consisted of the placement of a sand ring levee using hydraulic dredging methods. To construct the sand ring, the contractor cleared clayey overburden from an area in the center of the containment facility

using mechanical dredging methods. The cleared overburden material was used to construct temporary containment berms. The contractor then mobilized a small hydraulic dredge into the contained cleared area and built the final sand containment levee. The contractor staged containment levee work to allow subsequent overburden clearing to take place within the contained areas, thereby allowing use of the hydraulic dredge for all subsequent overburden removal and sand borrow operations. After the ring levee was constructed, material from McCartney Lake dredging was placed in this structure.

(2) The approximate size of this area is 22 acres with a perimeter shoreline of approximately 4,500 feet. The riverside slopes of the structure were completed with the placement of a sediment topping to facilitate seeding.

4. INSPECTIONS.

a. General.

(1) An active maintenance program is based on inspections and subsequent servicing, adjustment, or repair. The objective of inspections is to obtain a balance between inspection costs and the cost of repairs and replacements that could be avoided by timely and thorough inspections.

(2) There are two types of inspections for the project: (1) Project Inspection by the Upper Mississippi River National Wildlife and Fish Refuge Manager and (2) Joint Inspection with the Wildlife Refuge Manager and personnel from the U.S. Army Corps of Engineers, Rock Island District.

b. Project Inspection by Site Manager.

(1) The Project Inspection should be performed by the Upper Mississippi River National Wildlife and Fish Refuge Manager or appropriate representative for the purpose of noting routine deficiencies and initiating corrective actions. This inspection should be performed at periods not exceeding 12 months and should follow inspection guidance presented in subsequent sections of this manual. It is suggested that the inspection be conducted every May, which is representative of after spring flood conditions. Other Project Inspections should occur as necessary after other high water events or as scheduled by the Site Manager.

(2) A checklist report covering inspection, operation, and maintenance of the habitat project shall be submitted each year to the District Engineer. A sample copy of the checklist can be found in Appendix B. Besides completion of the inspection checklist, each individual report should briefly summarize the condition of the entire system, including any maintenance work done during the past 1-year period. The USFWS may send the Bertom and McCartney report in conjunction with reports on other habitat projects for which it has responsibility. If so desired, these reports can be sent to the Corps with the

annual Cooperative Agreement Report which is done every April by the USFWS. Reports should be furnished to the U.S. Army Corps of Engineers, Rock Island District, ATTN: CENCR-OD-S, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61204-2004.

c. Joint Inspection by Site Manager and Corps of Engineers.

(1) Routine. A Joint Inspection by the Site Manager and the Corps of Engineers will be scheduled by the Corps in accordance with ER 1130-2-339. The purpose of this inspection is to assure that adequate maintenance is being performed as presented in the DPR and this manual. The District Engineer or Authorized Representatives should have access to all portions of the constructed project upon coordination with the Site Manager for this purpose. Copies of this inspection will be furnished to the Site Manager stating project maintenance conditions. Corrective actions from these inspections should be accomplished by the Site Manager as provided by USFWS Operation, Maintenance, and Rehabilitation Agreement, reference Appendix A.

(2) Catastrophic. A Joint Inspection by the Site Manager and the Corps of Engineers should be formally requested by the Site Manager immediately following a specific storm or flood event which causes damage exceeding the annual operation and maintenance as specified in this manual and the DPR. The Project Inspections by the Site Manager and Joint Inspection results will be the basis for determining maintenance responsibility and potential rehabilitation by the Corps of Engineers.

5. OPERATION AND MAINTENANCE OF PROJECT FEATURES.

a. General.

(1) This section presents operation and maintenance instructions for the major project features which were designed and constructed to minimize operation and maintenance requirements.

(2) Project features should be continuously maintained and operated to obtain maximum benefits. No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project should be permitted upon the constructed features. No improvement should be passed over, under, or through the constructed features, nor should any excavation or construction be permitted within these features without prior approval by the U.S. Army Corps of Engineers, Rock Island District. Such improvements or alterations which are desirable and permissible should be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice should be obtained from the District Engineer or, if otherwise obtained, should be submitted for approval. Drawings or prints showing improvements or alterations as finally constructed should be furnished to the District Engineer after completion of such work.

(3) The capability of the USFWS to carry out the maintenance responsibilities described below will be contingent upon the passage of sufficient appropriations for that purpose by Congress.

b. Partial Closing Structure.

(1) Operation. There are no operational requirements attached to the partial closing structure.

(2) Maintenance. During and after flood periods, the closing structure and riprap protection wings should be inspected to locate possible rock movements or localized scour points.

(a) The Site Manager should provide at all times such maintenance as may be required to ensure serviceability of the partial closing structure.

(b) Project inspection should be made by the Site Manager to ensure that the partial closing structure and riprap protection wings are performing effectively and that no riprap has been displaced, washed out, or removed. Should additional riprap be required to protect eroding banks, the material presented in Table 5.1 or equivalent should be used.

**TABLE 5.1
RIPRAP REPLACEMENT MATERIAL**

Stone Weight, Pounds	Minimum Percent Larger Than
250	0
90	50
5	90

(c) Steps should be taken to correct conditions disclosed by such inspections. Regular maintenance repair measures should be accomplished during the appropriate season as scheduled by the Site Manager.

c. Fish and Mussel Rock Habitat.

(1) Operation. No specific actions are required for operation of the fish and rock habitat.

(2) Maintenance.¹

(a) Inspection. The fish and mussel rock habitat should be inspected for serviceability and accumulation of debris which impacts the hydraulic capacity of the channel. The side slope riprap should be inspected for movement or localized erosion damage.

(b) Maintenance. No maintenance of the fish and mussel rock habitat channel was anticipated during the planning and design phases of the project. If inspections reveal an accumulation of debris impacting the hydraulic capacity of the channel, the USFWS and the Corps will mutually agree whether the required repair constitutes minor unanticipated maintenance or if it constitutes major rehabilitation and is a Corps responsibility per Section 7, p. 14.

d. McCartney Lake Dredging.

(1) Operation. There are no operational requirements attached to this project component.

(2) Maintenance.

(a) Inspection. The dredge cuts in McCartney Lake should be inspected visually and by sufficient pole soundings.

(b) Maintenance. No maintenance of the McCartney Lake dredge cuts was anticipated during the planning and design phases of the project. Unanticipated siltation of the McCartney Lake dredge cut to the degree warranting maintenance dredging would be considered major rehabilitation per Section 7, p. 14.

e. Confined Dredged Material Placement Site.

(1) Operation. There are no operational requirements attached to this project component.

(2) Maintenance.

(a) Inspection. Project inspections of the dredged material placement site should be made by the Site Manager to record usage of the site consistent with management practices.

(b) Maintenance. No maintenance of the dredged material placement site is required.

¹ Responsibility for maintenance of the fish and mussel habitat structures shall be in accordance with previous agreements between the USFWS and the WDNR.

6. PERFORMANCE MONITORING AND ASSESSMENT.

a. The purpose of this section is to summarize monitoring and data collection aspects of the project. Table 6.1 presents the principal types, purposes, and responsibility of monitoring and data collection. Table 6.2 provides a summary of actual monitoring and data parameters grouped by project phase, responsible agency, and data collection intervals. Changes to the monitoring plan should be coordinated with the USFWS, the WDNR, and the U.S. Army Corps of Engineers.

b. Table 6.3 presents the post-construction performance evaluation plan. The monitoring parameters were developed to measure the effectiveness of the stated goals. The Site Manager should follow Table 6.3, as shown, to make annual field observations. The annual field observations and the quantitative monitoring parameters will form the basis of project evaluation.

7. PROJECT REHABILITATION OR ABANDONMENT

a. As stated in the Memorandum of Agreement between the USFWS and the Corps, the Corps will be responsible for any mutually agreed upon repair and rehabilitation of the Bertom and McCartney Lakes project that exceeds the annual maintenance requirements and that may be needed as a result of a specific storm or flood. The project will be inspected as previously described, following flood events or specific storms.

b. Should inspection of the project area following a major flood or natural disaster disclose substantial damage to any of the major components of the project that appears to exceed the annual operation and maintenance as specified in this manual and the Definite Project Report, the Corps and the USFWS should meet and discuss the appropriate course of action in light of the original project design. The inspections by the District Manager (as summarized in the submittal checklist) and the joint inspections with the Corps will be the basis for determining maintenance responsibility by the USFWS versus potential rehabilitation by the Corps. Repair of damage attributable to lack of maintenance is a USFWS responsibility. The options of rehabilitation or abandonment of the project may be considered at this time. Any decision would be carried forth only upon written mutual agreement of the USFWS and the Corps. Included in such agreement would be a description of the agreed upon course of action and funding responsibilities, if any.

TABLE 6.1
MONITORING AND PERFORMANCE EVALUATION MATRIX

Project Phase	Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Implementation Instructions
Pre-Project	Sedimentation Problem Analysis	System-wide problem definition. Evaluates planning assumptions.	WDNR	USFWS (EMTC)	LTRM 1/	--
	Pre-project Monitoring	Identifies and defines problems at HREP site. Establishes need of proposed project features.	WDNR	USFWS	USFWS	--
	Baseline Monitoring	Establishes baselines for performance evaluation.	Corps	Field station or sponsor thru Cooperative Agreements or Corps.	LTRM	See Table 6.2.
Design	Data Collection	Includes quantification of project objectives, design of project, and development of performance evaluation plan.	Corps	Corps	HREP 2/	See Table 6.2.
Construction	Construction Monitoring	Assesses construction impacts; assures permit conditions are met.	Corps	Corps	HREP	See State Section 401 Stipulations.
Post Construction	Performance Evaluation Monitoring	Determines success of project as related to objectives.	Corps (quantitative) sponsor (Field Observations)	Field station or sponsor thru Cooperative Agreement, sponsor thru O&M, or Corps.	LTRM	See Table 6.3.
	Analysis of Biological Responses	Evaluates predictions and assumptions of habitat unit analysis. Studies beyond scope of performance evaluation, or if projects do not have desired biological results.	USFWS	USFWS (EMTC)	LTRM	--

1/ Long-Term Resource Monitoring of the Environmental Management Program (P.L. 99-662).
2/ Habitat Rehabilitation and Enhancement Project of the Environmental Management Program (P.L. 99-662).

TABLE 6.2
RESOURCE MONITORING AND DATA COLLECTION SUMMARY

TYPE MEASUREMENT	WATER QUALITY DATA						ENGINEERING DATA			NATURAL RESOURCE DATA			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post Const. Phase		Pre-Project Phase	Design Phase	Post. Const. Phase	Pre-Project Phase	Design Phase	Post. Const. Phase		
	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR								
POINT MEASUREMENTS													Corps	WDNR #20
<u>Station W-M600.3C</u>														
Turbidity	-		-	-	2W	1M								
Secchi Disk Transparency	-		-	-	2W	1M								
Dissolved Oxygen	-		-		2W	1M								
Specific Conductance	-		-		2W	1M								
Water Temperature	-		-		2W	1M								
Velocity	-		-		2W	1M								
Water Depth	-		-		2W	1M								
Water Elevation	-		-		2W	1M								
Ice Depth	-		-	-	-	1M								
Snow Depth	-		-	-	-	1M								
Total Alkalinity	-		-		2W	1M								
pH	-		-		2W	1M								
Chlorophyll	-		-		2W	1M								
Suspended Solids	-		-		2W	1M								
Wind Direction	-		-		2W	1M								
Wind Velocity	-		-		2W	1M								
Wave Height	-		-		2W	1M								
Cloud Cover					2W	1M								

TABLE 6.2 (Continued)
RESOURCE MONITORING AND DATA COLLECTION SUMMARY

TYPE MEASUREMENT	WATER QUALITY DATA						ENGINEERING DATA			NATURAL RESOURCE DATA			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post Const. Phase		Pre-Project Phase	Design Phase	Post. Const. Phase	Pre-Project Phase	Design Phase	Post. Const. Phase		
	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR								
Stations W-M599.5D, W-M599.2C													Corps	WDNR #20
Turbidity	-		-	-	2W	1M								
Secchi Disk Transparency	-		-	-	2W	1M								
Dissolved Oxygen	-		-		2W	1M								
Specific Conductance	-		-		2W	1M								
Water Temperature	-		-		2W	1M								
Velocity	-		-		2W	1M								
Water Depth	-		-		2W	1M								
Water Elevation	-		-		2W	1M								
Ice Depth	-		-	-	-	1M								
Snow Depth	-		-	-	-	1M								
Total Alkalinity	-		-		2W	1M								
pH	-		-		2W	1M								
Chlorophyll	-		-		2W	1M								
Suspended Solids	-		-		2W	1M								
Wind Direction	-		-		2W	1M								
Wind Velocity	-		-		2W	1M								
Wave Height	-		-		2W	1M								
Cloud Cover					2W	1M								

TABLE 6.2 (Continued)
RESOURCE MONITORING AND DATA COLLECTION SUMMARY

TYPE MEASUREMENT	WATER QUALITY DATA						ENGINEERING DATA			NATURAL RESOURCE DATA			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post Const. Phase		Pre-Project Phase	Design Phase	Post Const. Phase	Pre-Project Phase	Design Phase	Post Const. Phase		
	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR								
Stations W-598.9E, W-M599.8B													Corps	22
Turbidity	-		-	-	2W	1M							(Springfed sites)	
Secchi Disk Transparency	-		-	-	2W	1M								
Dissolved Oxygen	-		-		2W	1M								
Specific Conductance	-		-		2W	1M								
Water Temperature	-		-		2W	1M								
Velocity	-		-		2W	1M								
Water Depth	-		-		2W	1M								
Water Elevation	-		-		2W	1M								
Ice Depth	-		-	-		1M								
Snow Depth	-		-	-		1M								
Total Alkalinity	-		-		2W	1M								
pH	-		-		2W	1M								
Chlorophyll	-		-		2W	1M								
Suspended Solids	-		-		2W	1M								
Wind Direction	-		-		2W	1M								
Wind Velocity	-		-		2W	1M								
Wave Height	-		-		2W	1M								
Cloud Cover	-		-		2W	1M								

TABLE 6.2 (Continued)
RESOURCE MONITORING AND DATA COLLECTION SUMMARY

TYPE MEASUREMENT	WATER QUALITY DATA						ENGINEERING DATA			NATURAL RESOURCE DATA			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post Const. Phase		Pre-Project Phase	Design Phase	Post Const. Phase	Pre-Project Phase	Design Phase	Post Const. Phase		
	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR								
<u>Station W-M602.2E</u> Velocity Water Depth Water Elevation Suspended Solids														WNR #34
<u>Station 6/</u> Bulk Sediment Analysis				1									Corps	
<u>Station 7/</u> Elutriate Analysis			1	-									Corps	
<u>Station 8/</u> Ambient Water Analysis			1	-									Corps	
<u>Station 9/</u> Column Setting Analysis			-	1									Corps	
<u>Station W-M600.5C</u> Dissolved Oxygen Water Temperature			7C	-	7C	-							WNR	WNR #18 (rock)
			7C	-	7C	-								
<u>Station W-M601.0H</u> Dissolved Oxygen Water Temperature			7C	-									WNR	WNR #2 (channel above rock)
			7C	-										
Light Data			7C	-										
<u>Station W-M600.3C</u> Dissolved Oxygen Water Temperature					7C	-							WNR	WNR #20
					7C	-								
<u>Stations</u> F-M										X	X	X	WNR	
										Need WNR Input				
<u>Fish Structures</u> Perform Condition Survey									5Y				Corps	

TABLE 6.2 (Continued)
RESOURCE MONITORING AND DATA COLLECTION SUMMARY

TYPE MEASUREMENT	WATER QUALITY DATA						ENGINEERING DATA			NATURAL RESOURCE DATA			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post Const. Phase		Pre-Project Phase	Design Phase	Post. Const. Phase	Pre-Project Phase	Design Phase	Post. Const. Phase		
	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR	APR-SEP	OCT-MAR								
TRANSECT MEASUREMENTS														
Transects 2/ Hydrographic Soundings									5Y				Corps	
Transects 3/ Profile									5Y				Corps	
Transects 4/ Hydrographic Soundings									5Y				Corps	
Transects 5/ Vegetation Survey												5Y	Corps	
AREA MEASUREMENTS														
Fish and Mussel Habitat Area Mussel M-M602.1G Survey												5Y	Corps	
Bertom/McCartney Lake Vertical Stereo Aerial Photography (1:5000)											1	5Y	Corps	

LEGEND

W = WEEK, 2W = ONCE EVERY TWO WEEKS
M = MONTH
Y = YEAR, 5Y = ONCE EVERY FIVE YEARS
nW = n-WEEK INTERVAL
nY = n-YEAR INTERVAL
1,2,3,--- = NUMBER OF TIMES DATA IS COLLECTED WITHIN DESIGNATED PROJECT PHASE
C = CONTINUOUS
1,2,3, ...nC = x-DAY CONTINUOUS

TABLE 6.2 FOOTNOTES

1/ Post Construction monitoring sites/transects are shown on Plates 1 and 2. See the DPR for Pre-Project and Design Phase station locations. The following monitoring was performed by the Corps of Engineers/Construction Contractor during the construction phase for the purpose of meeting Permit requirements.

<u>Station</u>	<u>Frequency</u>
<u>Dredge Carriage Water Inside of Discharge Weir</u>	
Suspended Solids	3/W*
Dissolved Oxygen	3/W
Temperature	3/W
pH	3/W
Ammonia Nitrogen	3/W
<u>500 Feet Downstream of Discharge of Weir</u>	
Suspended Solids	3/W
Dissolved Oxygen	3/W
Temperature	3/W
pH	3/W
Ammonia Nitrogen	3/W
<u>Vicinity Sample</u>	
Suspended Solids	W**
Dissolved Oxygen	W
Temperature	W
pH	W
2/ Transects (Lake Dredging)	
S-M601.2B	DPR T13
S-M600.8B	DPR T16
S-M600.2B	DPR T19
S-M599.6B	DPR T23
3/ Transects (Substrate Channel)	
S-M602.1G	DPR EE
S-M602.1D	DPR FF

4/ Transects (Bertom Lake)

S-M602.1J	DPR DD
S-M602.2J	DPR CC
S-M602.3B	DPR TO
S-M602.2B	DPR T2
S-M602.0B	DPR T6

5/ Transects (Aquatic Bed)

V-M599.5B	DPR T26
V-M599.2B	DPR T28

6/ Stations (Design Phase Bulk Sediment Analysis)

DPR BM-1
DPR BM-2
DPR BM-4
DPR BM-5
DPR ML-1
DPR ML-2
DPR ML-3

7/ Stations (Design Phase Elutriate Analysis)

DPR ML-1
DPR ML-2
DPR ML-3

8/ Station (Ambient Water Analysis)

DPR BM-1
DPR M-1

9/ Stations (Column Settling Analysis)

DPR BM88-6-1
DPR BM88-6-2

* 3/W = three per week

** W = one per week

TABLE 6.3
PERFORMANCE EVALUATION PLAN

Goal	Objective	Enhancement Feature	Unit	Enhancement Potential			Feature Measurement 1/	Annual Field Observations by Site Manager
				Year 0 Without Alternative	Year 2 With Alternative	Year 50 Target With Alternative		
Enhance aquatic habitat	Improve dissolved oxygen concentration during critical seasonal stress periods	McCartney Lake dredging	mg/l	<5.0	≥5.0	≥5.0	Perform water quality tests at Stations W-M600.3C, W-M598.9E, W-M599.8B	Observe aquatic life changes (i.e., fish kills, sport fishing)
Enhance aquatic habitat	Restore deep (≥ 6 feet) aquatic habitat	McCartney Lake dredging	AC-FT	0	250	200	Perform hydrographic soundings	Observe sedimentation effects by pole soundings or depth gauging
	Restore lentic lotic habitat access cross-sectional area	McCartney Lake dredging	SQ-FT	300	not measured	1800	Perform hydrographic soundings	Observe sedimentation erosion changes
	Increase rock substrate aquatic habitat	Fish and mussel rock	SQ-YD	0	partially measured	10,000	Perform profile of rock substrate transect	Observe changes in rock substrate (i.e., movement, sedimentation, organic growth)

TABLE 6.3 (Continued)
PERFORMANCE EVALUATION PLAN

Goal	Objective	Enhancement Feature	Unit	Enhancement Potential			Feature Measurement 1/	Annual Field Observations by Site Manager
				Year 0 Without Alternative	Year 2 With Alternative	Year 50 Target With Alternative		
Enhance aquatic habitat	Establish mussel bed	Fish and mussel rock habitat	Number Per SQ-YD	0	Unknown	10	Perform area mussel survey	Observe mussel changes
	Reduce movement of bedload sediment into Bertom Lake	Partial closure structure	IN/YR	0.7	Unknown	0.55	Perform hydrographic soundings of transect	Observe condition of dam and localized effects
							Perform water quality tests at Station W-M602.2E	
Enhance migrating waterfowl habitat	Establish aquatic vegetation bed	In-water confined dredged material placement site	AC	0	Unknown	10	Perform aerial survey of vegetation	Observe aquatic bed changes

1/ See Table 6.2

APPENDIX A

OPERATION, MAINTENANCE, AND REHABILITATION AGREEMENT



United States Department of the Interior

FISH AND WILDLIFE SERVICE
FEDERAL BUILDING, FORT SNELLING
TWIN CITIES, MINNESOTA 55111



IN REPLY REFER TO:

FWS/ARW

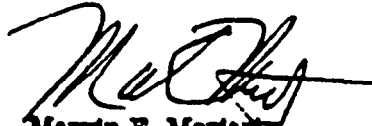
NOV 21 1989

Colonel John R. Brown
District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building
Rock Island, Illinois 61204-2004

Dear Colonel Brown:

Enclosed is the signed Memorandum of Agreement (Agreement) for the Berton and McCartney Lakes rehabilitation and enhancement project. While this Agreement has been signed in support of the Environmental Management Program, it should be pointed out that the Fish and Wildlife Service (Service) will handle the operation and maintenance responsibilities as outlined in the Upper Mississippi River System - Environmental Management Program Fourth Annual Addendum, which differs with Section B of the enclosed agreement. The Addendum outlines the procedure agreed to by the Service and General Van der Els which basically states: 1) for projects on National Wildlife Refuge lands, the Service will assume all operation and maintenance responsibilities and, 2) for projects on General Plan lands where the Service has entered into an agreement with a State, the State should continue to be responsible for operation and maintenance.

Sincerely,


Marvin E. Moriarty
Acting Regional Director

Enclosure

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 BERTOM AND MCCARTNEY LAKES, WISCONSIN

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 (DA) will operate in constructing, operating, maintaining, repairing, and rehabilitating the Bertom and McCartney Lakes, WI, separable element of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP). All project lands are owned by the United States and are managed by the FWS as part of the Upper Mississippi River National Fish and Wildlife Refuge.

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 on Bertom and McCartney Lakes 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 creating 250 acre-feet of deep aquatic habitat, creating 6 acres of rock substrate aquatic habitat, and providing a wind sheltered area for aquatic bed establishment at Bertom and McCartney Lakes.

IV. RESPONSIBILITIES

A. DA is responsible for:

1. Construction: Construction of the project which consists of creating 250 acre-feet of deep aquatic habitat, creating 6 acres of rock substrate aquatic habitat, and providing a wind sheltered area for aquatic bed establishment at Bertom and McCartney Lakes.

2. Major Rehabilitation: Any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements identified in the Definite Project Report and that is needed as a result of specific storm or flood events.

3. Construction Management: Subject to and using funds appropriated by the Congress of the United States, DA will construct the Bertom and McCartney Lakes Fish and Wildlife Enhancement Project as described in the Definite Project Report, "Bertom and McCartney Lakes Rehabilitation and Enhancement," dated June 1989, applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The FWS 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. If DA encounters potential delays related to construction of the project, DA will promptly notify FWS of such delays.

4. Maintenance of Records: DA will keep books, records, documents, and other evidence pertaining to costs and expenses incurred in connection with construction of the project to the extent and in such detail as will properly reflect total costs. DA 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 therefrom, and shall make available at its offices at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the FWS.

B. FWS is responsible for:

1. Operation, Maintenance, and Repair: Upon completion of construction as determined by the District Engineer, Rock Island, the FWS shall accept the project and shall operate, maintain, and repair the project as defined in the Definite Project Report entitled "Bertom and McCartney Lakes Rehabilitation and Enhancement," dated June 1989, in accordance with Section 906(e) of the Water Resources Development Act, Public Law 99-662.

2. Non-Federal Responsibilities: In accordance with Section 906(e) of the Water Resources Development Act, Public Law 99-662, the FWS shall obtain 25 percent of all costs associated with the operation and maintenance of the project from the Wisconsin Department of Natural Resources.

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:

FWS: Regional Director
U.S. Fish and Wildlife Services
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

DA: District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004


VII. EFFECTIVE DATE OF MOA

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


THE DEPARTMENT OF THE ARMY

THE U.S. FISH AND WILDLIFE
SERVICE

BY:


COLONEL JOHN R. BROWN
District Engineer
U.S. Army Engineer District,
Rock Island
Corps of Engineers

BY:


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

DATE: 11 DECEMBER 1989

DATE: NOV 21 1989

APPENDIX B
SITE MANAGER'S
PROJECT INSPECTION AND MONITORING RESULTS

**OPERATION AND MAINTENANCE MANUAL
BERTOM AND McCARTNEY LAKES REHABILITATION AND ENHANCEMENT**

**UPPER MISSISSIPPI RIVER
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN**

SITE MANAGER'S PROJECT INSPECTION AND MONITORING RESULTS

Inspected by _____ Date _____

Type of Inspection: () semi-annual () emergency-disaster () other

1. PROJECT INSPECTION.

<u>Item</u>	<u>Comment</u>
a. <u>Partial Closing Structure</u>	
() Wavewash, scouring	_____
() Overtopping erosion	_____
() Displaced/missing riprap	_____
() Burrowing animals	_____
() Encroachments	_____
b. <u>Fish and Mussel Rock Habitat</u>	
() Displaced/missing riprap	_____
() Blockage of inlet and outlet channels	_____
() Erosion adjacent to rock substrate	_____
() Concrete pipe condition	_____
() Lunker fish structures condition	_____
c. <u>McCartney Lake Dredging</u>	
() Sedimentation/erosion changes	_____
d. <u>Confined Dredged Material Placement Site</u>	
() Waste materials/unauthorized structures	_____
() Bank erosion	_____

2. PROJECT MONITORING.

a. Partial Closing Structure

() Sediment changes in Bertom Lake

b. Fish and Mussel Rock Habitat

() Sedimentation/erosion changes

() Changes in rock substrate

() Presence of mussels

() Fishery usage of fish structures

c. McCartney Lake Dredging

() Fish population/species changes

d. Dredged Material Placement Site

() Specie usage

Site Manager

APPENDIX C

DISTRIBUTION

DISTRIBUTION ^{1/}

Mr. William F. Hartwig
Regional Director, Region 3
U.S. Fish and Wildlife Service
Federal Building, Ft. Snelling
Twin Cities, Minnesota 55111

Mr. Jim Fisher
U.S. Fish and Wildlife Service
51 E. 4th Street, Room 101
Winona, Minnesota 55987

Mr. Keith Beseke
U.S. Fish and Wildlife Service
51 E. 4th Street, Room 101
Winona, Minnesota 55987

Mr. Doug Mullins
U.S. Fish and Wildlife Service
P.O. Box 460
McGregor, Iowa 52157

Mr. Rick Nelson
Rock Island Field Office
U.S. Fish and Wildlife Service
4469 48th Avenue Court
Rock Island, Illinois 61201

Mr. Robert Delaney
Environmental Management
Technical Center
575 Lester Avenue
Onalaska, Wisconsin 54650

Mr. Russ Gent
LTRM Bellevue Field Station
206 Rose Street
Bellevue, Iowa 52031

Ms. Holly Stoerker
Upper Mississippi River Basin Association
415 Hamm Building
408 St. Peter Street
St. Paul, Minnesota 55102

Mr. Terry Moe
Wisconsin Department of Natural Resources
3550 Morman Coulee Road
La Crosse, Wisconsin 54601

Mr. Jeff Janvrin
Wisconsin Department of Natural Resources
3550 Morman Coulee Road
La Crosse, Wisconsin 54601

Mr. Kurt Welke
Wisconsin Department of Natural Resources
Satter Building
111 W. Dunn
Prairie du Chien, Wisconsin 53821

Division Engineer
U.S. Army Engineer Division, North Central
ATTN: CENCD-PD/CENCD-CO (4)
111 N. Canal Street - 12th Floor
Chicago, Illinois 60606

District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004
ATTN:

CENCR-ED	CENCR-OD-M
CENCR-ED-DN (3)	CENCR-PD-E
CENCR-ED-G	CENCR-PD-W
CENCR-ED-H	CENCR-OD-S
CENCR-ED-D	CENCR-CD
CENCR-PP-M	CENCR-ED-DG


^{1/} All addresses receive one copy of the document except where noted in parentheses.

PLATES



Revisions		
Symbol	Description	Date Approved
3	PHOTOGRAPHIC BASE UPDATE	7/10/88 JSS/DJM
2	MINOR REVISIONS	12/11/88 BLK/DJM
1	MINOR REVISIONS	12/11/88 BLK/DJM

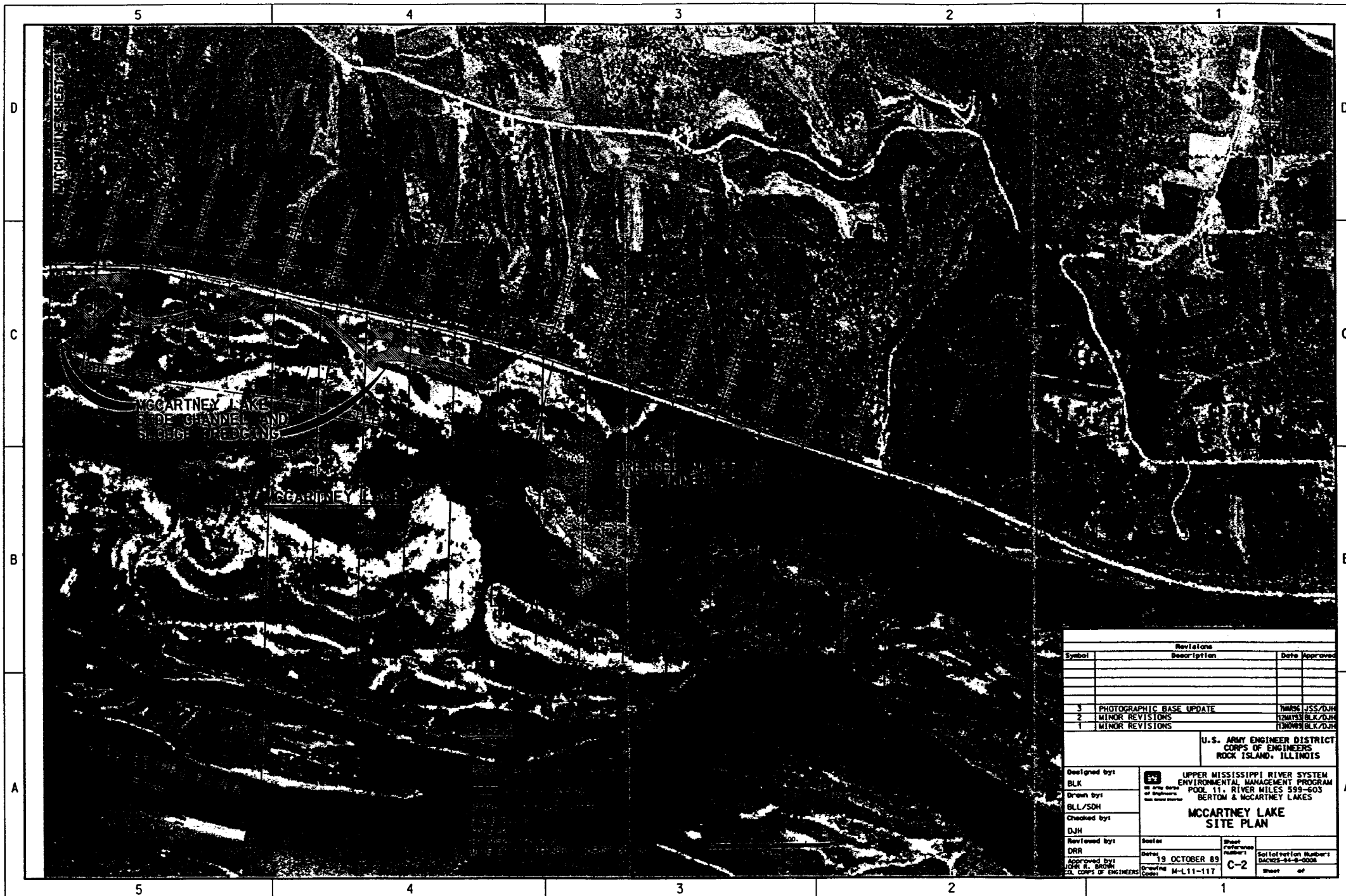
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

Designed by BLK	 UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 599-603 BERTON & MCCARTNEY LAKES		
Drawn by BLK/SDH			
Checked by DJH			
Reviewed by DNR			
Approved by DAVID R. GORDON CHIEF, CORPS OF ENGINEERS	Date 19 OCTOBER 89	Sheet M-L11-117	Collection Number BOMES-94-S-0008

**BERTON LAKE
SITE PLAN**

C-1


11-00000-111-117
11-00000-111-117
11-00000-111-117



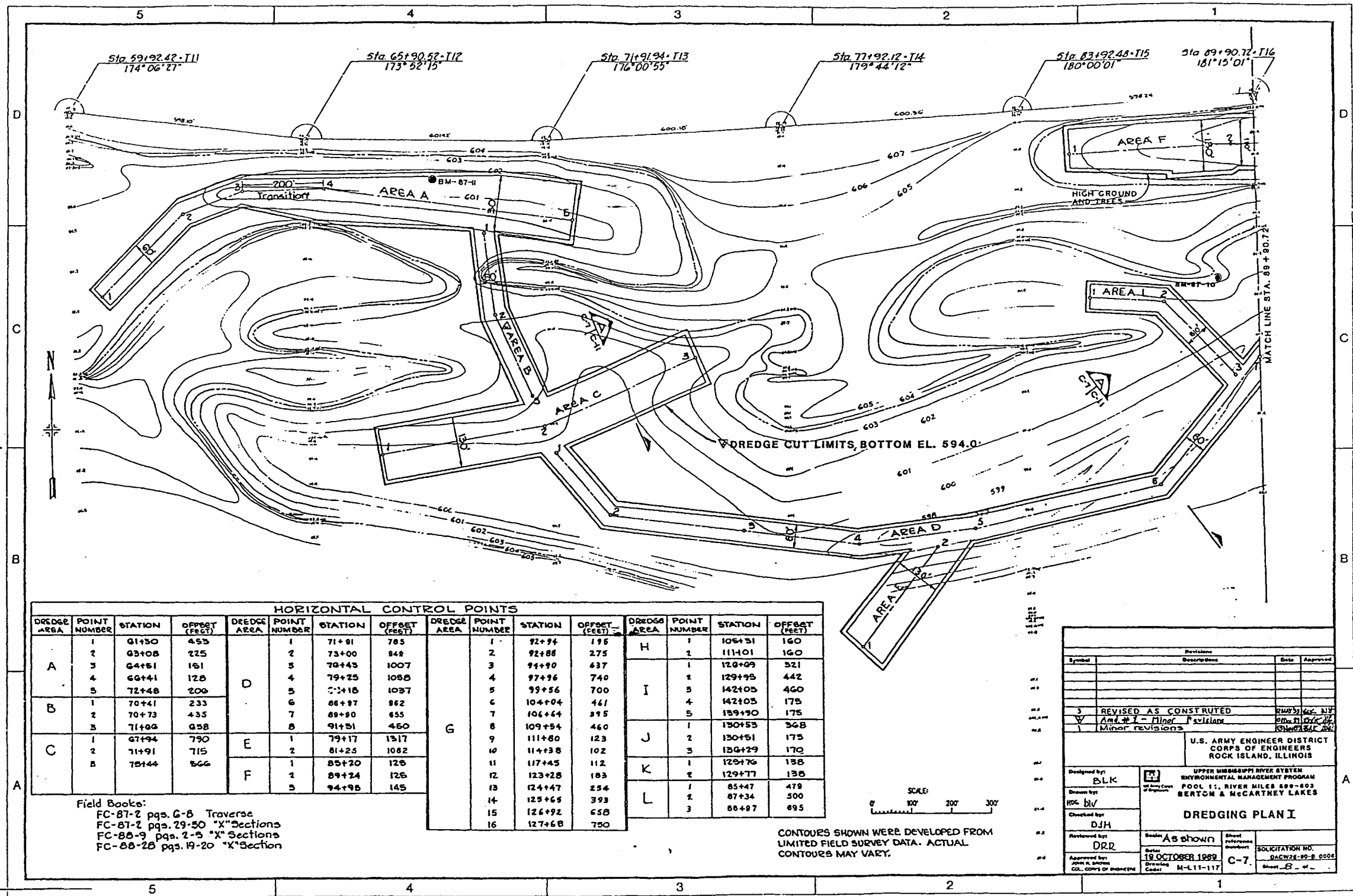
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Revisions			
Symbol	Description	Date	Approved
3	PHOTOGRAPHIC BASE UPDATE	10/19/89	JSS/DJH
2	MINOR REVISIONS	12/15/89	BLK/DJH
1	MINOR REVISIONS	12/15/89	BLK/DJH

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

Designed by: BLK	 UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 599-603 BERTON & MCCARTNEY LAKES MCCARTNEY LAKE SITE PLAN		
Drawn by: BLL/SDH			
Checked by: DJH			
Reviewed by: DRR			
Approved by: JOHN R. GORDON COL, CORPS OF ENGINEERS	Date: 19 OCTOBER 89	Sheet C-2	Sheet of

Soil Contention Number:
DACW25-84-S-0008

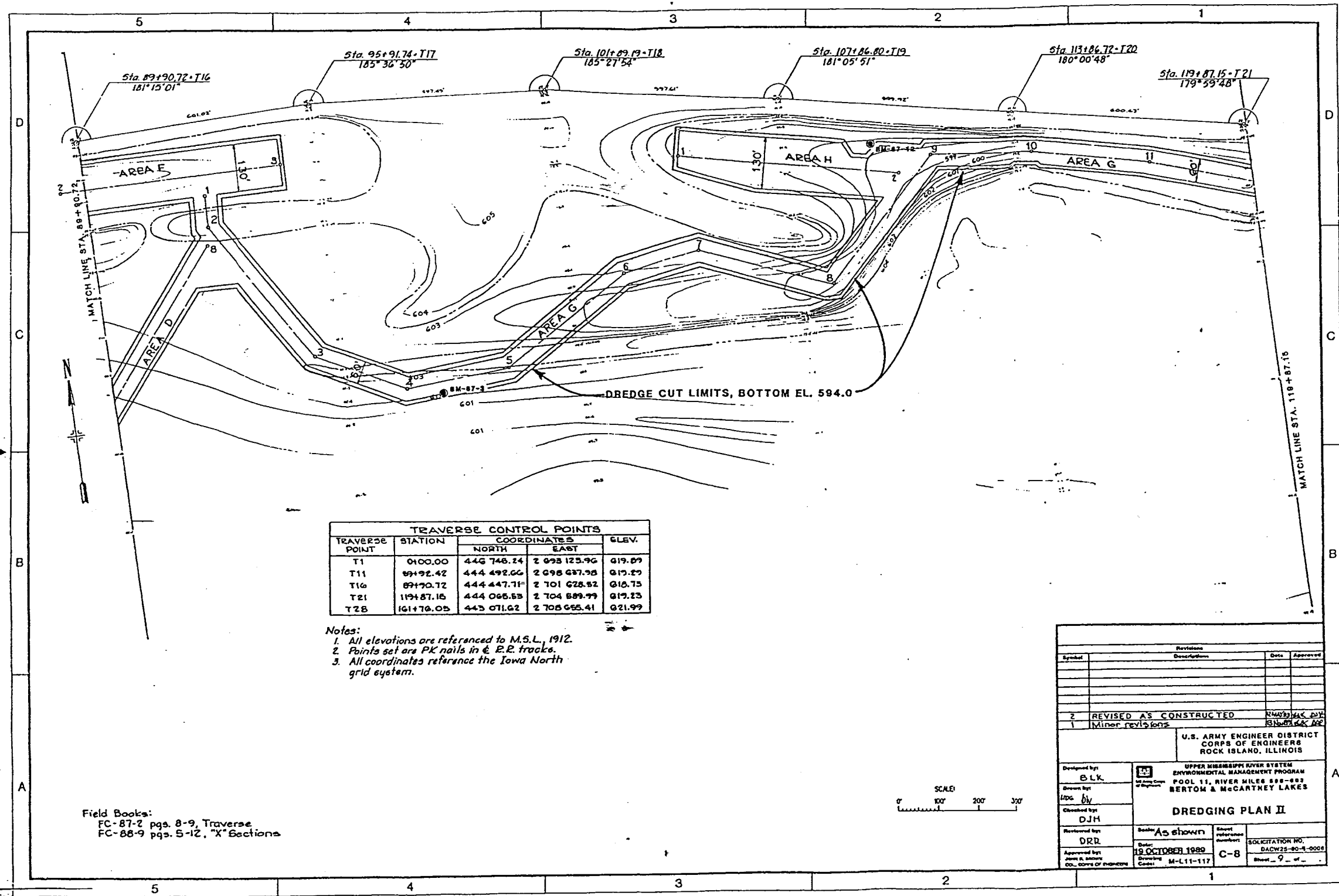


HORIZONTAL CONTROL POINTS											
DREDGE AREA	POINT NUMBER	STATION	OFFSET (FEET)	DREDGE AREA	POINT NUMBER	STATION	OFFSET (FEET)	DREDGE AREA	POINT NUMBER	STATION	OFFSET (FEET)
A	1	Q1+30	453	D	1	71+81	785	G	1	92+94	196
	2	Q3+08	225		2	73+00	848		2	92+88	275
	3	Q4+51	181		3	74+43	1007		3	94+90	637
	4	Q6+41	128		4	79+25	1088		4	97+96	740
B	5	72+48	200	E	5	73+18	1037		5	99+56	700
	1	70+41	233		6	86+97	962		6	104+04	441
	2	70+73	435		7	89+90	655		7	106+44	315
C	3	71+09	958		8	91+51	460		8	109+54	460
	1	Q7+94	790	F	1	79+17	1317		9	111+80	123
	2	71+91	715		2	81+25	1082		10	114+38	102
	5	75+44	566		1	85+20	125		11	117+45	112
					2	89+24	125		12	123+28	183
					3	94+95	145		13	124+47	254
									14	125+65	393
									15	126+92	658
									16	127+68	750

Field Books:
FC-87-2 pgs. G-8 Traverse
FC-87-2 pgs. 29-50 "X" Sections
FC-88-9 pgs. 2-5 "X" Sections
FC-88-26 pgs. 19-20 "X" Section

CONTOURS SHOWN WERE DEVELOPED FROM LIMITED FIELD SURVEY DATA. ACTUAL CONTOURS MAY VARY.

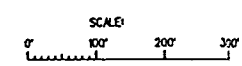
Revisions			
Symbol	Descriptions	Date	Approved
3	REVISED AS CONSTRUCTED	2/25/51	W. H. H. H.
4	As shown - Final Revision	10/19/51	W. H. H. H.
1	Minor revisions	10/19/51	W. H. H. H.
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS			
Designed by:	BLK	UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 599-603 BERTON & MCCARTNEY LAKES	
Drawn by:	HOG blv		
Checked by:	DJH		
Reviewed by:	DRR		
Approved by:	JOHN R. GUNTER COL, CORPS OF ENGINEERS	As shown Date: 19 OCTOBER 1989 Drawing Code: M-L11-117	Sheet reference number: C-7 SOLICITATION NO. DACW26-89-B-0006 Sheet 13 of 14



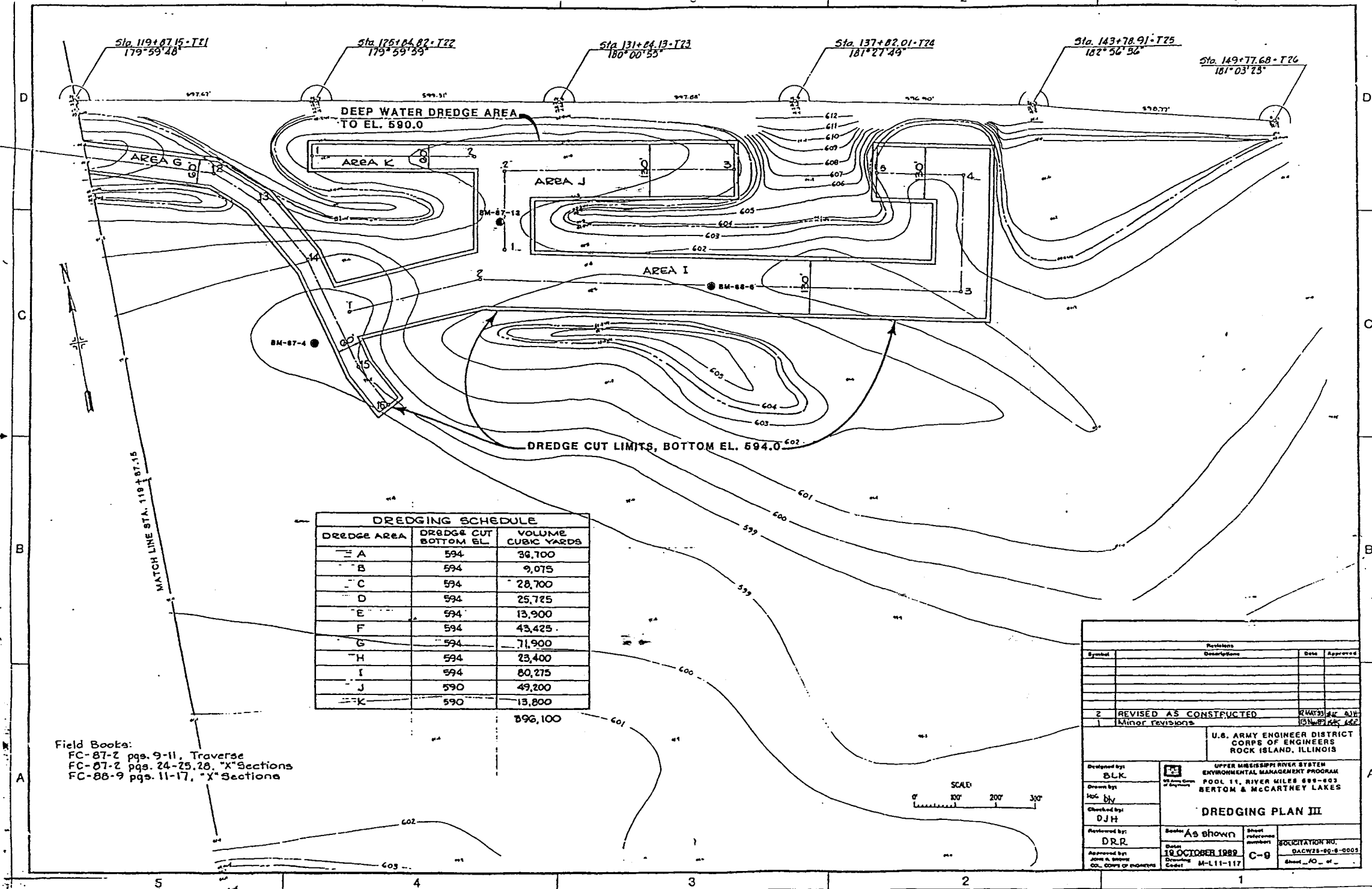
TRAVERSE POINT	STATION	COORDINATES		ELEV.
		NORTH	EAST	
T1	0+00.00	446 748.24	2 023 123.96	Q19.87
T11	89+92.42	444 492.66	2 098 627.55	Q15.27
T16	89+90.12	444 447.11	2 701 628.52	Q18.75
T21	119+87.15	444 065.53	2 704 589.77	Q15.23
T28	161+70.05	443 071.62	2 705 655.41	Q21.99

- Notes:
1. All elevations are referenced to M.S.L., 1912.
 2. Points set are PK nails in E. & P. tracks.
 3. All coordinates reference the Iowa North grid system.

Field Books:
 FC-87-2 pgs. 8-9, Traverse
 FC-88-9 pgs. 5-12, "X" Sections



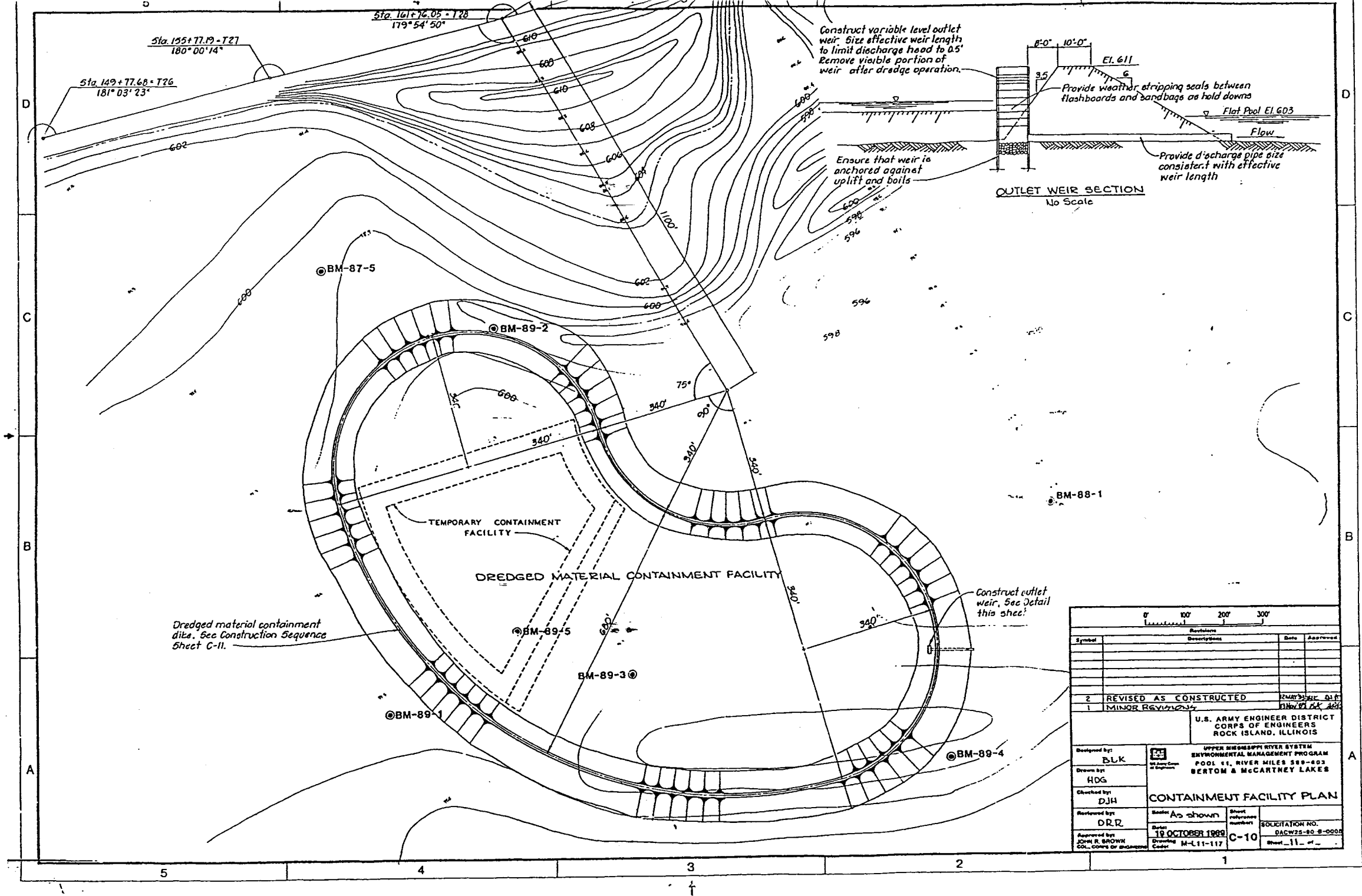
Revisions		Date	Approved
Symbol	Description		
2	REVISED AS CONSTRUCTED	MAY 22, 1989	DRJ
1	Minor revisions	SEP 22, 1988	DRJ
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS			
UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 88-89 BERTON & MCCARTNEY LAKES			
DREDGING PLAN II			
Designed by: BLK	Drawn by: LDG	Checked by: DJH	Reviewed by: DRJ
Scale: As shown Date: 19 OCTOBER 1989 Drawing Code: M-L11-117		Report reference number: C-8 SOLICITATION NO. DACW28-80-4-0000 Sheet 9 of 11	



DREDGING SCHEDULE		
DREDGE AREA	DREDGE CUT BOTTOM EL.	VOLUME CUBIC YARDS
A	594	36,700
B	594	9,075
C	594	28,700
D	594	25,725
E	594	13,900
F	594	43,425
G	594	71,900
H	594	23,400
I	594	80,275
J	590	49,200
K	590	13,800
		396,100

Field Books:
 FC-87-2 pgs. 9-11, Traverse
 FC-87-2 pgs. 24-25, 28, "X" Sections
 FC-88-9 pgs. 11-17, "X" Sections

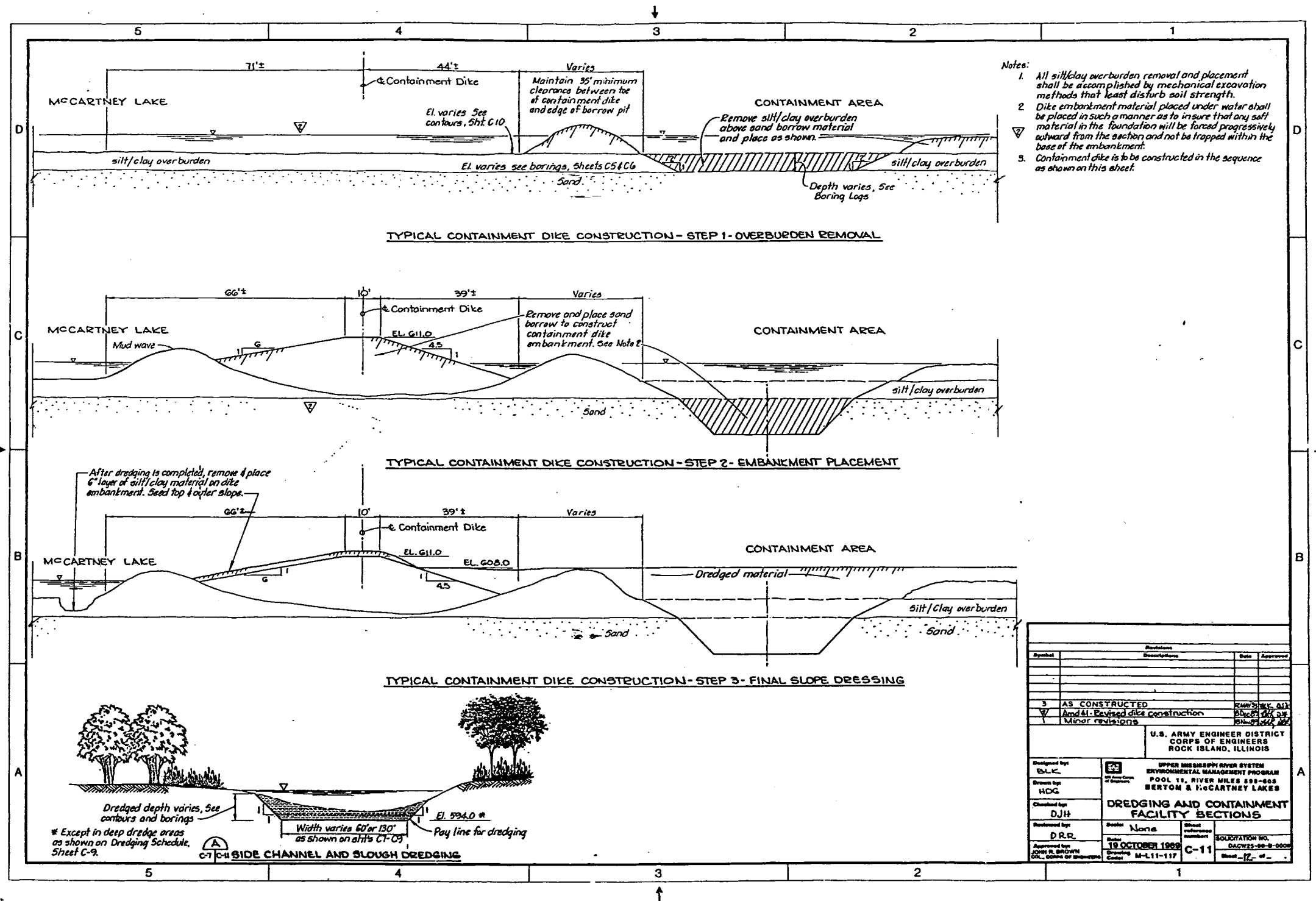
Revisions		Date	Approved
Symbol	Description		
2 REVISED AS CONSTRUCTED		2/11/93	AK AJH
1 Minor revisions		10/18/92	AK
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS			
Designed by: DLK	UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 888-893 BERTON & MCCARTHEY LAKES		
Drawn by: HAC	DREDGING PLAN III		
Checked by: DJH	Reviewed by: DRR	Scale: As shown	Sheet reference number: C-8
Approved by: JOHN A. BERTON CD, Corps of Engineers	Date: 19 OCTOBER 1989	Sheet: M-L11-117	SOLICITATION NO. DACW28-89-0-0003 Sheet 10 of 10

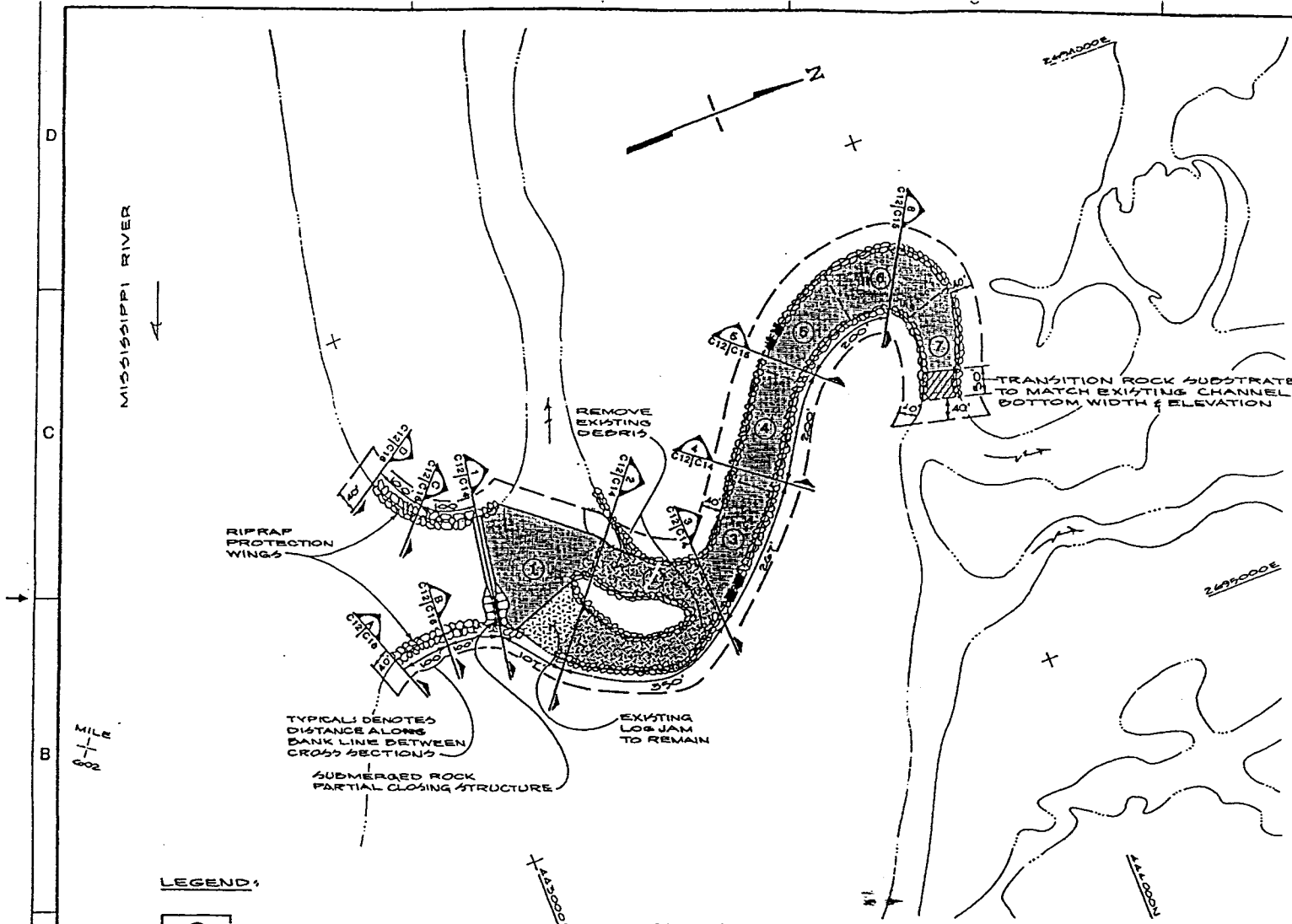


OUTLET WEIR SECTION
No Scale

0' 100' 200' 300'			
Symbol	Description	Date	Approved
2	REVISED AS CONSTRUCTED	22 MAR 2000	DJK
1	MINOR REVISIONS	22 MAR 2000	DJK

Designed by: DLK	Drawn by: HDG	Checked by: DJH	Reviewed by: DRR
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS			
UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL #1, RIVER MILES 589-603 BERTON & MCCARTNEY LAKES			
CONTAINMENT FACILITY PLAN		Scale: As shown	Sheet reference number: C-10
Approved by: JOHN R. BROWN COL, Corps of Engineers		Date: 19 OCTOBER 1999	SOUGHTION NO. DACW25-90-B-0005 Sheet 11 of 11





- LEGEND:**
- ② CHANNEL SEGMENT NO. 2
 - ROCK SUBSTRATE MATERIAL
 - EXISTING LOG JAM AND DEBRIS (LOCATION APPROXIMATE)
 - BANK PROTECTION MATERIAL
 - SUBMERGED TIMBER HABITAT STRUCTURE
 - CONTRACTOR WORK LIMITS

SITE PLAN

CONCRETE PIPE SCHEDULE		
QUANTITY	DIAMETER	LENGTH
8	12"	6'
8	24"	6'
8	36"	6'

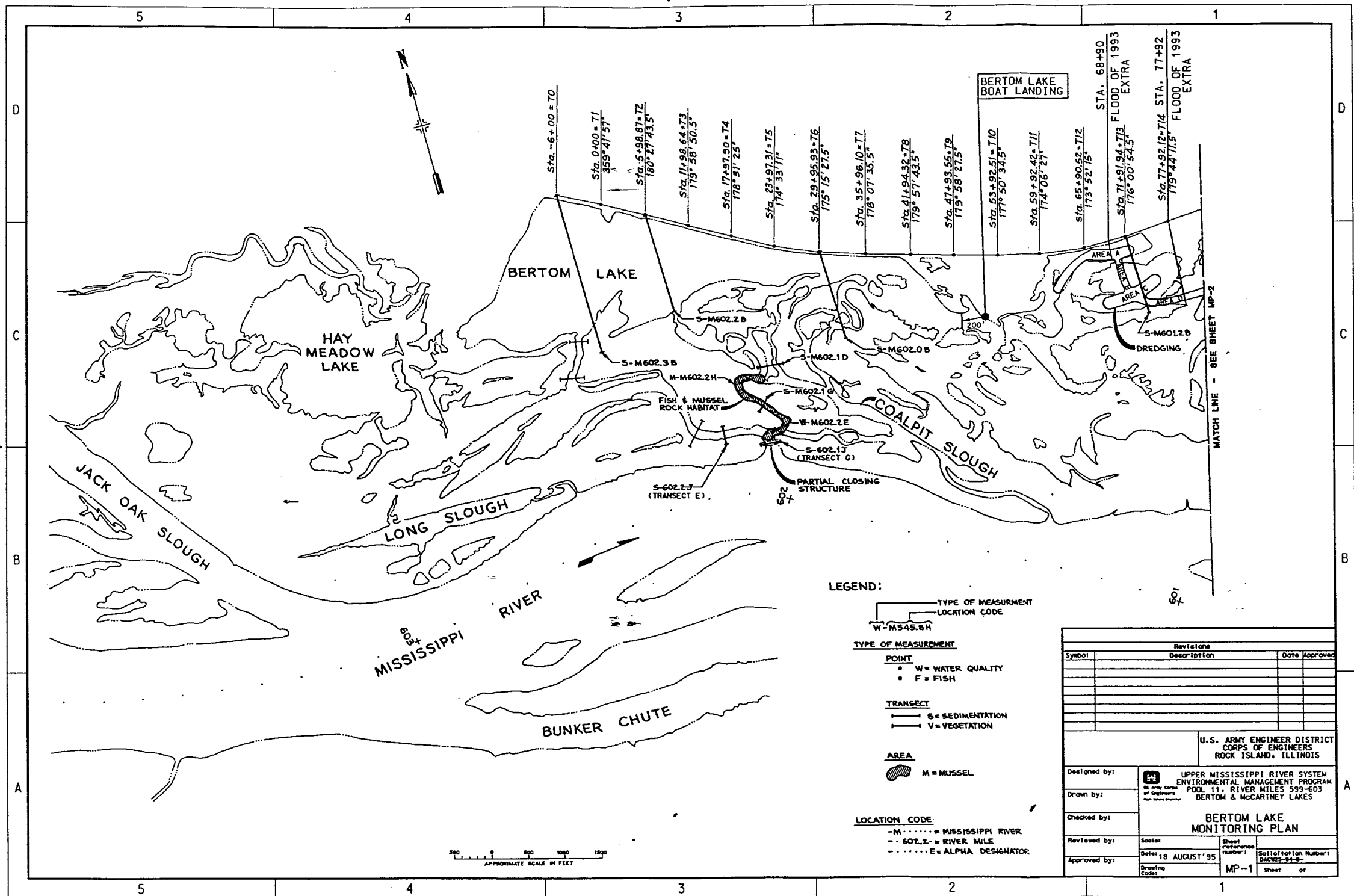
SEE SHEET C-13 FOR INSTALLATION DETAIL OF CONCRETE PIPE FISH HABITAT STRUCTURES.

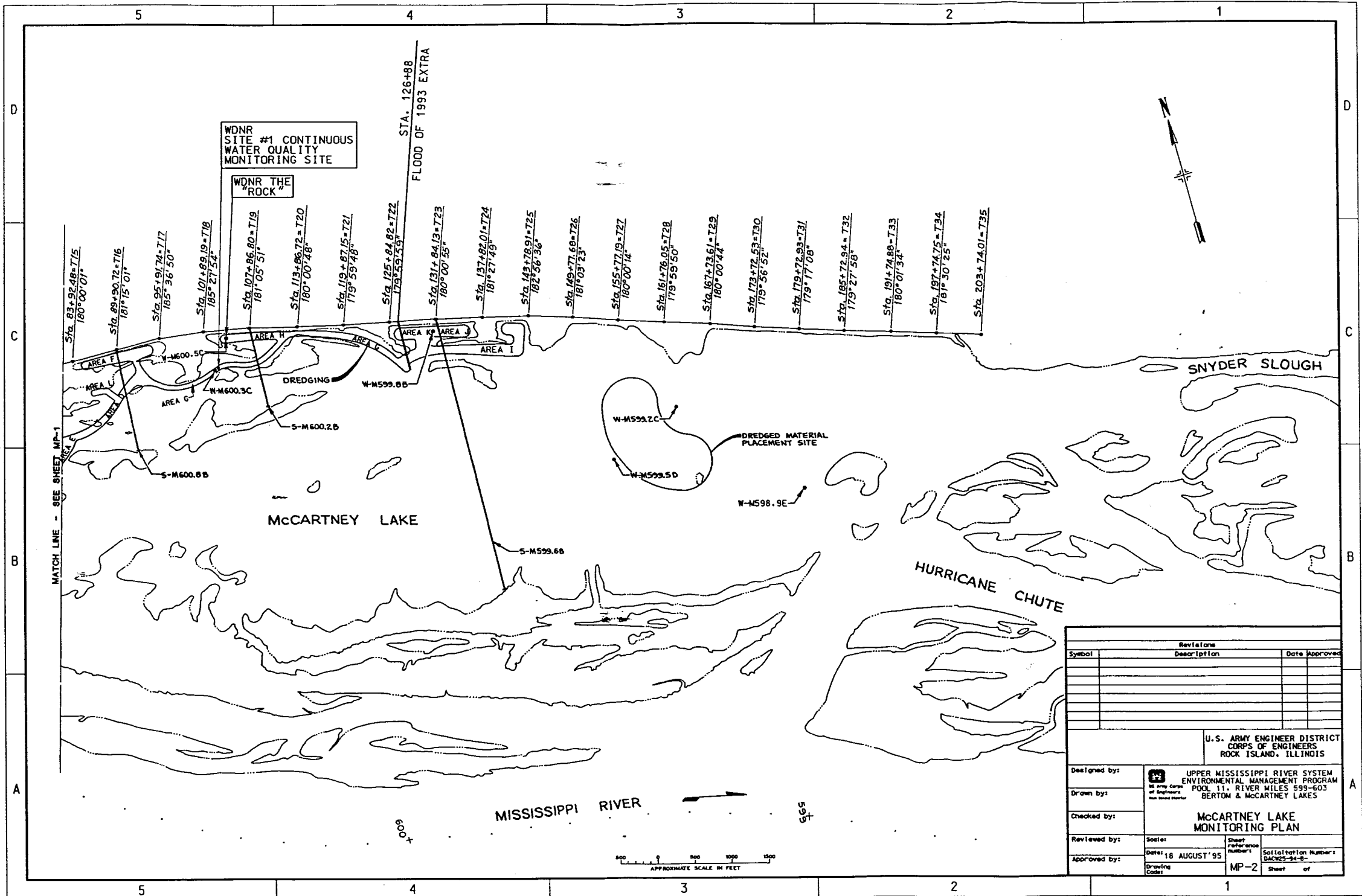
ROCK HABITAT CHANNEL CONSTRUCTION DATA						
CHANNEL SEGMENT NUMBER	MINIMUM EXCAVATION ELEVATION	ROCK SUBSTRATE GRADATION	ROCK SUBSTRATE THICKNESS	BANK PROTECTION GRADATION	BANK PROTECTION THICKNESS	CHANNEL SEGMENT LENGTH
1	557.0	A	24"	A	24"	200'
2	556.0	F	12"	B	18"	200'
3	556.0	C	12"	B	18"	200'
4	556.0	D	12"	B	18"	200'
5	556.0	E1	12"	B	18"	175'
6	556.0	E2	12"	B	18"	175'
7	557.5	B	18"	B	18"	175'

- NOTES:**
1. CHANNEL SEGMENT LENGTH IS AS MEASURED ALONG THE LONGITUDINAL CENTERLINE OF THE SEGMENT.
 2. LOCATIONS FOR THE CONCRETE PIPE FISH HABITAT STRUCTURES WILL BE AS DESIGNATED BY THE COR.
 3. ALL CONCRETE PIPE WILL BE FURNISHED BY THE GOVERNMENT.

Revisions		Date	Approved
Symbol	Description		
2	REVISED AS CONSTRUCTED	11/1/89	W. J. ...
1	MINOR REVISIONS	10/1/89	...
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS			
Designed by:	B.L.K.		
Drawn by:	bly		
Checked by:	D.J.H.		
Reviewed by:	D.R.R.		
Approved by:	JOHN R. BROWN COL, CORPS OF ENGINEERS		
Author:	AS SHOWN		
Date:	19 OCTOBER 1989		
Sheet reference number:	C-12		
SOLICITATION NO.:	DACW28-89-8-0005		
Sheet:	15 of 15		

<div style="text-align: center;"> </div>			
Narrations			
Symbol	Description	Date	Approved
3 ✓	AS CONSTRUCTED Added 2½ Amd#1 Minor revisions	7 MAY 63 11 MAR 63 13 APR 63	ALL NJT JFK LIA GAC BOZ
		U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	
Designed by Bk		UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 580-603 BENTON & MCCARTNEY LAKES	
Drawn by JDG			
Checked by DJH			
Reviewed by DDR		Seal "As shown"	
Approved by JOHN R. BROWN COC - Corps of Engineers		Date: 19 OCTOBER 1969 Drawing Code: M-L-11-117	Sheet reference numbers: C-13 SOLICITATION NO. DACW25-60-C-0006 Sheet -14- of -





Revisions		
Symbol	Description	Date Approved

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS		
Designed by:	UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 11, RIVER MILES 599-603 BERTON & MCCARTNEY LAKES	
Drawn by:		
Checked by:		
Reviewed by:	Date: 18 AUGUST '95	Sheet Number: 1
Approved by:	Drawing Code:	Solicitation Number: DACW25-94-8- MP-2 Sheet of