US Army Corps
of Engineers ®
Rock Island District

OPERATION AND MAINTENANCE MANUAL

LAKE CHAUTAUQUA
REHABILITATION AND ENHANCEMENT

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM

LA GRANGE POOL
ILLINOIS WATERWAY, RIVER MILES 124-128
MASON COUNTY, ILLINOIS

APRIL 2005

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DRAWINGS

1. GENERAL

1.1 Introduction

a. Purpose and Scope

(1) This manual will serve as a guide for the operation and maintenance of the Lake Chautauqua Rehabilitation and Enhancement project. These instructions are consistent with the general procedures presented in the approved Definite Project Report. 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 several sections: It includes historical summaries and descriptions of actual features constructed for this project. Project goals, objectives, and performance measurement are included. Maintenance and operations requirements and inspection checklists are included to assist the refuge staff. Emergency operations and reference information are also identified.

(2) A set of as-built drawings are included in a separate binding. The as built drawings combine four Corps of Engineers construction contracts and United States Fish and Wildlife Service (USFWS) construction projects into a single set of drawings.

1.2 Historical Summary

a. Planning and Construction Activities

(1) Table 1.1 provides a summary of planning and construction activities.

(2) Goals and objectives were formulated during the design phase. Table 1.2 provides a summary of project objectives.

Table 1.1. Summary of Planning and Construction Activities

Project Phase	**Purpose**	**Responsible Agency**	**Significant Events**		**Remarks**
			Item	**Date**	
Pre-project	Identify and define problems and establish need of project	USFWS	Meeting with USFWS, ILDNR, and Corps	15 Nov 88	Develop Project scope
	Sedimentation Problem Analysis	USFWS	Average Lake sedimentation .39 inches per year	See Jun 91 DPR para. 3j, page 21	
	Baseline Monitoring	CORPS	Water Quality Sampling	May-Sep87 Jun-Oct 89 Feb 90	
Design	Memorandum of Agreement	CORPS/ USFWS	Formal definition of responsibilities	4 Aug 92	
	Quantify project objectives, perform preliminary design, satisfy NEPA and permit requirements, develop performance evaluation plan, obtain project approval for construction.	CORPS	**Definite Project Report** Approved	Jun 91 31 Mar 92	HQUSACE
			NEPA Compliance FONSI for EA	18 Jun 91	
			Permits Section 401 Section 404 State Flood Plain	 13 Jun 91 18 Jun 91 27 Feb 92	
			1996 Flood Repair Design Memorandum Approved	Mar 97 7 Mar 97	
			NEPA Compliance FONSI for EA	7 Mar 97	
			Permits Section 401 Section 404 State Flood Plain State Dam Safety	 13 Jun 97 N/A 20 May 98	

Project Phase	Purpose	Responsible Agency	Significant Events		Remarks
			Item	**Date**	
Construction	Finalize plans and specifications, obtain operation and maintenance agreement, advertise and award construction contract, construct project	CORPS	Plans and Specifications approval	31 Apr 92	
			Stage I Contract		
			Advertised		
			Awarded	31 May 92	
			Completed	31 Jul 92	
				30 Nov 96	
			Stage II Contract		
			Advertised		
			Awarded	30 Apr 97	
			Completed	31 Jul 97	
				30 Apr 99	
			Stage III Contract		
			Awarded		Job Order Contract
			Completed	3 Apr 00	
				31 Oct 00	
			Stage IV Contract		Job Order Contract
			Awarded		
			Completed	10 Jul 01	
				8 Dec 03	
Post- Construction	Operate and maintain project.	USFWS	Control of project to USFWS (approx.)	Nov 98	Reference Sections 4 and 5
	Biological Response Monitoring	CORPS/USFWS			
	Perform Evaluation Monitoring	CORPS/USFWS			

Table 1.2. Project Goals and Objectives

Goal	Objective	Unit of Measure	Enhancement Potential	
			Existing	Target
Enhance Migratory Waterfowl Habitat	Increase reliable food production area (moist soil species)	Acres	200	3,250
Enhance Fisheries Habitat	Reduce sedimentation	Annual Acre-Feet	100	50

(3) The upper lake or north pool provides aquatic vegetation, invertebrates, and fish for diving ducks and other migratory birds. As a secondary benefit, the upper lake provides improved fish habitat. The lake is open to the public for fishing from January 15 through October 15 in accordance with refuge and state regulations. At times the upper lake may be stocked with fish that are less destructive to submergent vegetation. When the upper lake is flooded to minimize levee over-top erosion, there is an exchange of fish into the Illinois Waterway. The upper lake may be drawn down on an infrequent basis to solidify bottom sediments, reduce carp populations, or for other maintenance purposes. The decision to draw down the upper lake is made by refuge staff in coordination with ILDNR and other agencies as applicable.

(4) The lower lake or south pool provides moist soil plants, invertebrates, and fish for dabbling ducks and other migratory birds. The lower lake is usually drawn down annually in the late spring during low river flow to provide the moist soil habitat. Water levels are gradually increased in the fall and winter. In addition to moist soil habitat, the lower lake is an important spawning habitat for fish. The lower lake can be managed with deeper water on an infrequent basis to control undesirable willow growth or for other management purposes. The decision to draw down the upper lake is made by refuge staff in coordination with ILDNR and other agencies as applicable.

(5) The Rock Island District, Corps of Engineers designed the project in cooperation with the USFWS. Refer to the Definite Project Report and the 1996 Flood Repair Design Memorandum for design considerations and investigations. The Corps of Engineers, Rock Island District administered and supervised the construction contracts.

b. Actual Project Costs. Table 1.3 shows a summary of the project costs by various phases. The actual project costs are presented in Tables 1.4 through 1.9.

Table 1.3. Summary of Project Costs

PHASE	AMOUNT
Stage I	$ 5,813,059.18
Stage II	$ 4,413,325.94
Stage III	$ 41,520.15
Stage IV	$ 437,642.73
Miscellaneous	$ 23,589.65
Engineering and Construction Management	$ 3,620,285.64
TOTAL	**$ 13,989,423.29**

Table 1.4. Actual Project Costs

FISH AND WILDLIFE FACILITIES, Stage I Contract No. DACW25-92-C-0079

ITEM	DESCRIPTION	QTY	U/M	U/P	AMOUNT
0001	Performance Bond	1	LS	XXXXX	30,000.00
0002	Temporary Field Office	1	LS	XXXXX	30,000.00
0003	Mobilization and Demobilization	1	LS	XXXXX	500,000.00
0004	Clearing and Grubbing	1	LS	XXXXX	25,000.00
0005	Lower Lake Channel Excavation, 1+00D to 40+00D and 0+00E to 35+00E				
0005AA	First 30,000 Cubic Yards	19,400	CY	5.00	97,000.00
0005AB	Over 30,000 Cubic Yards	4,100	CY	5.00	20,500.00
0006	Liverpool Ditch Excavation				
0006AA	First 30,000 Cubic Yards	30,000	CY	5.00	150,000.00
0006AB	Over 30,000 Cubic Yards	23,406	CY	5.00	117,030.00
0007	Culverts				
0007AA	18-Inch Diameter CMP	200	LF	18.00	3,600.00
0007AB	Aprons for 18-Inch Diameter CMP	10	EA	100.00	1,000.00
0008	Cross Dike Levee Embankment				
0008AA	First 90,000 Cubic Yards	90,000	CY	5.00	450,000.00
0008AB	Over 90,000 Cubic Yards	60,000	CY	5.00	300,000.00
0009	Northern Levee Embankment				
0009AA	First 150,000 Cubic Yards	145,262	CY	5.00	726,308.30
0009AB	Over 150,000 Cubic Yards	0	CY	5.00	0
0010	Access Road Embankment				
0010AA	First 2,500 Cubic Yards	2,500	CY	3.00	7,500.00
0010AB	Over 2,500 Cubic Yards	1,695	CY	3.00	5,085.00
0011	Modify Existing Radial Gate Structure	1	LS	XXXXX	100,000.00
0012	Stoplog Structure	1	LS	XXXXX	200,000.00
0013	Work to be Performed by the Menard Electric Cooperative Utility Company	1	LS	XXXXX	65,000.00
0014	Pump Station	1	LS	XXXXX	600,000.00
0015	Boat Ramp	0	LS	XXXXX	0
0016	Guardrail, Boat Ramp and Parking Area	1	LS	XXXXX	6,500.00
0017	Stone Protection, Bedding				
0017AA	First 1,000 Tons	712.04	TN	11.00	7,832.44
0017AB	Over 1,000 Tons	0	TN	11.00	0
0018	Stone Protection, Filter Fabric	6,367	SY	2.00	12,734.00
0019	Stone Protection, Riprap				
0019AA	First 2,200 Tons	1,780.14	TN	18.00	32,042.52
0019AB	Over 2,200 Tons	0	TN	18.00	0
0020	Riprap Closure Structure				
0020AA	First 700 Tons	700	TN	22.00	15,400.00
0020AB	Over 700 Tons	665.96	TN	22.00	14,651.12
0021	Granular Surfacing				

ITEM	DESCRIPTION	QTY	U/M	U/P	AMOUNT
0021AA	First 3,000 Tons	3,000	TN	12.00	36,000.00
0021AB	Over 3,000 Tons	1794.75	TN	12.00	21,537.00
0022	Seeding	0.55	LS	XXXXX	33,000.00
0023	Photocopy Machine	1	LS	XXXXX	1,000.00
0024	Monthly Telephone Bills				
0024AA	First $500.00	500.00	DL	1.25	625.00
0024AB	Over $500.00	4,746.09	DL	1.25	5932.61
0025	Gates	1	LS	XXXXX	2,500.00
	VE – Reduce Filter Fabric Anchor			XXXXX	(168.30)
0026	Depth	1	LS		
	Topsoil and Excelsior Blanket for			XXXXX	
0027	Access Rd	1	LS		20,168.12
0028	Repair Cross Dike Break	1	LS	XXXXX	12,277.24
0029	Laboratory Capability Recheck	1	LS	XXXXX	(2,000)
0030	Repair Access Road	1	LS	XXXXX	7,829.35
0031	Access Road Cut & Fill Diff	2,599	CY	3.00	7,997.00
0032	Repair Access Road Slide	1	LS	XXXXX	6,070.55
0033	Haul Embankment Material	17,000	CY	0.50	8,500.00
0034	Survey	1	EA	848.00	848.00
0035	Radial Gate Bedding Stone				
0035AA	First 50 Tons	0	TN	21.00	0
0035AB	Over 50 Tons	0	TN	21.00	0
0036	Radial Gate Riprap				
0036AA	First 150 Tons	0	TN	28.00	0
0036AB	Over 150 Tons	0	TN	28.00	0
0037	Additional Pump Plant Work	1	SUM	N/A	124,578.00
	Stoplog Structure Construction				
0038	Joint Modification	1	LS	XXXXX	8,386.50
0039	Dewatering Pump	1	LS	XXXXX	69,885.61
	Pump Station Discharge Pipe				
0040	Extension	1	LS	XXXXX	3,297.50
0041	Radial Gate Structure Modification	1	LS	XXXXX	22,352.71
0042	Backfill Stoplog Structure Access	1	LS	XXXXX	67,829.30
	Dredge Lower Lake Channel				
0043	0+00E to 35+00E	10,306	CY	4.775	49,210.20
0044	Mobilization	1	LS	XXXXX	60,000.00
0045	Setup & Maintenance	1	LS	XXXXX	75,000.00
0046	Dewatering	1	LS	XXXXX	63,270.00
0047	Repair 1995 Flood Damage	1	LS	XXXXX	211,319.27
0048	Debris Removal	1	LS	XXXXX	8,518.95
0049	Construct Embankment	1	LS	XXXXX	13,304.75
0050	Pump Station & Culvert Backfill	1	LS	XXXXX	39,800.00
0051	Impact Compensation	1	LS	XXXXX	99,700.00
0052	Install Angles	1	LS	XXXXX	2,506.44
	Partial Contract Termination and				
0053	REA Settlement	1	LS	XXXXX	1,215,000.00

Stage I Subtotal **$5,813,059.18**

Table 1.5. Actual Project Costs

FISH AND WILDLIFE FACILITIES, Stage II Contract No. DACW25-97-C-0036

ITEM	DESCRIPTION	QTY	U/M	U/P	AMOUNT
0001	Bonds	1	LS	XXXXX	41,100.00
0002	Removal and Disposal of Old Radial Gate Structure Obstructions	1	LS	XXXXX	75,000.00
0003	Removal and Disposal of Steel Debris	1	LS	XXXXX	1,950.00
0004	Clearing and Grubbing	1	LS	XXXXX	105,000.00
0005	Pump Station Wall Mounted Hand Rung, Ladder Extensions, Platform Bracing, and Stoplog Slot Modifications	1	LS	XXXXX	23,150.00
0006	Dewatering, Pump Station Usage Expenses				
0006AA	First $3,000.00	2,763.58	DL	3.25	8,981.64
0006AB	Over $3,000.00	0.00	DL	3.30	0.00
0007	Cellular Structure	1	LS	XXXXX	2,470,957.12
0008	Boat Ramp	1	LS	XXXXX	15,125.00
0009	Perimeter Levee Embankment				
0009AA	First 40,000 Cubic Yards	40,000	CY	10.50	420,000.00
0009AB	Over 40,000 Cubic Yards	59,734	CY	8.20	489,818.00
0010	Cross Dike Levee Embankment				
0010AA	First 15,000 Cubic Yards	15,000	CY	12.90	193,500.00
0010AB	Over 15,000 Cubic Yards	11,000	CY	9.20	101,200.00
0011	Bedding Stone				
0011AA	First 2,000 Tons	2,000	TN	21.65	43,300.00
0011AB	Over 2,000 Tons	1,717.9	TN	21.00	36,075.90
0012	Riprap				
0012AA	First 4,000 Tons	4,000	TN	29.00	116,000.00
0012AB	Over 4,000 Tons	2,797.89	TN	26.00	72,745.14
0013	Seeding				
0013AA	First 20 Acres	20	AC	1,535.00	30,700.50
0013AB	Over 20 Acres	12.02	AC	1,535.00	18450.70
0014	Granular Surfacing, CA6				
0014AA	First 800 Tons	800	TN	19.75	15,800.00
0014AB	Over 800 Tons	654.07	TN	19.00	12,427.33
0015	Granular Surfacing, Gradation No. 2				
0015AA	First 400 Tons	133.56	TN	18.40	2,457.50
0015AB	Over 400 Tons	0	TN	19.60	0.00
0016	Temporary Field Office	1	LS	XXXXX	8,360.00
0017	Monthly Telephone Bills				
0017AA	First $200.00	200	DL	1.50	300.00
0017AB	Over $200.00	1,052.54	DL	1.25	1.315.68
0018	Suspension of Work and Maintenance	1	LS	XXXXX	54,216.14
0019	Galvanized Stoplog Slots	1	LS	XXXXX	2,857.39

ITEM	DESCRIPTION	QTY	U/M	U/P	AMOUNT
0020	Sand Fill for ArcCells	1	LS	XXXXX	30,237.79
0021	PC – Beam Overlay	1	LS	XXXXX	566.88
0022	Grade and Shape Levee and Build Turnarounds	1	LS	XXXXX	55,859.40
0023	Cross Dike Filter Fabric	1	LS	XXXXX	6,881.48
0024	Cross Dike Riprap	5,037.35	TN	32.92	187,644.00
0025	Cross Dike Bedding	1,458.55	TN	28.40	41,422.82
0026	Repair Pump Station Floats	1	LS	XXXXX	13,080.00
0027	Remove Debris	1	LS	XXXXX	2,462.01
0028	Stoplog Locking Bar	1	LS	XXXXX	240.90
0029	Additional Excavation and Rock at Ramp	1	LS	XXXXX	10,128.91
0030	Cable Support System	1	LS	XXXXX	4,965.94
0031	Cell D Debris Removal	1	LS	XXXXX	15,561.91
Stage II Subtotal					**$4,413,325.94**

Table 1.6. Actual Project Costs

FISH AND WILDLIFE FACILITIES, Stage III Contract No. DACA25-00-D-0001-004

ITEM	DESCRIPTION	QTY	U/M	U/P	AMOUNT
0001	Lake Chautauqua Riprap Placement on N. Perimeter Levee	1	LS	XXXXX	41,520.15
Stage III Subtotal					**$41,520.15**

Table 1.7. Actual Project Costs

FISH AND WILDLIFE FACILITIES, Stage IV Contract No. DACW25-01-C-0013

ITEM	DESCRIPTION	QTY	U/M	U/P	AMOUNT
0001	Clearing and Grubbing	1	LS	XXXXX	25,000.00
0002	Drainage Channel Excavation				
0002AA	First 25,000 Cubic Yards	25,000	CY	9.18	229,500.00
0002AB	Over 25,000 Cubic Yards	17,013	CY	8.06	137,124.78
0003	Ford Stone				
0003AA	First 150 Tons	150	TN	87.00	13,050.00
0003AB	Over 150 Tons	150	TN	87.00	13,050.00
0004	Portable Engine Operator	1	EA	2,975.00	2,975.00
0005	Portable Electric Pump with Hose	1	EA	2,240.00	2,240.00
0006	Sluice Gate Stem Cover Repairs	3	EA	1,500.00	4,500.00
0007	Handrail Repair	1	LS	XXXXX	1,450.00
0008	Ladder Safety Harness	1	LS	XXXXX	750.00
0009	Pump Station Gate Pedestal Anchor Repairs	1	LS	XXXXX	3,900.00
0011	Repairs to Pump Station Gate Pedestal	1	LS	XXXXX	4,102.95
Stage IV Subtotal					**$437,642.73**

Table 1.8. Actual Project Costs

FISH AND WILDLIFE FACILITIES, Miscellaneous Contracts

CONTRACT NO.	TYPE	DESCRIPTION	AMOUNT
NCR-97-092	MIPR	For flood repair of cross dike levee and seeding	3,630.77
96514783167979	MIPR	For pump station electric bills during Stage II construction and flood debris clearing on cross dike levee (USFWS estimate)	13,282.14
DACW25-97-P-0003	Seed Supply Contract	Flood damage repair of cross dike levee	3,891.42
DACW25-98-M-0552	Seed Supply Contract	Flood damage repair of cross dike levee	2,785.32
Miscellaneous Subtotal			**$23,589.65**

TOTAL, FISH AND WILDLIFE FACILITIES **$10,729,137.65**

Table 1.9. Actual Project Costs

U.S. ARMY CORPS OF ENGINEERS, ENGINEERING COSTS

PHASE	COST
Lands and Damages	616.74
Definite Project Report	823,815.86
Plans and Specifications	547,585.35
Engineering and Design	453,816.71
Construction Management	1,434,450.98
Engineering and Construction Management Subtotal	**$3,260,285.64**

TOTAL, PROJECT COSTS **$13,989,423.29**

c. Project References. Table 1.10 provides a summary of related project references.

Table 1.10. Project References

Title	Date	Purpose
Definite Project Report with Integrated Environmental Assessment, Lake Chautauqua Rehabilitation and Enhancement, U.S. Army Corps of Engineers, Rock Island District	Jun 91	Provided planning, engineering, and sufficient construction details of the selected plan for project approval purposes.
Definite Project Report with Integrated Environmental Assessment, Lake Chautauqua Rehabilitation and Enhancement, Technical Appendices, U.S. Army Corps of Engineers, Rock Island District	May 91	Design analysis and technical information and data collection to support main report.
Design Memorandum, Lake Chautauqua Rehabilitation and Enhancement, 1996 Flood Repair	Mar 97	Provided planning, engineering, and sufficient construction details to develop plan for radial gate replacement.
Construction As-builts	Apr 04	Provides as-built construction drawings
Manufacturers' Data (Shop Drawings)	Various Dates	Provides detailed operation and maintenance instructions for specific pieces of equipment as recommended by the manufacturer.

2. AUTHORIZATION

The U.S. Army Corps of Engineers, Rock Island District, in cooperation with the U.S. Fish and Wildlife Service (USFWS) constructed this project with authority granted in the 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). Financing for this project was 100 percent federal expense.

3. LOCATION

Lake Chautauqua is a 4,200 acre waterfowl refuge located within the floodplain of the Illinois River north of Havana, Illinois within the LaGrange pool between river miles 124 and 130 (See Sheet X20). Lake Chautauqua is formed by a 9 mile perimeter levee and a cross dike that divides the area into an upper lake and a lower lake. The US Fish and Wildlife Service (USFWS) operates the lakes for migratory waterfowl as part of the Chautauqua National Wildlife Refuge.

4. PERTINENT INFORMATION

Table 4.1 presents a summary of project data.

Table 4.1. Project Data Summary

Item	Quantity/ Measurement	Remarks
Cross Dike Levee		Divides upper and lower lake
Embankment Fill	150,000 Cubic yards	
Length	4,950 Feet	
Crown elevation	449.1 Feet (NGVD)	Surfaced with crushed stone
Side Slopes	6:1	Lower Lake side of levee
	4:1	Upper Lake side of levee
Northern Perimeter Levee		Separates upper lake from river
Embankment Fill	200,000 Cubic yards	Strengthened and raised existing levee
Length	15,500 Feet	Station 25+00B to 55+00B. Remainder of levee was constructed higher to control area of overtop and provide for expected consolidation.
Effective Crown elevation	447.0 Feet	
Side Slopes	4:1	Constructed to inside or lake side or existing levee
Sheet Pile Cellular Water Control Structure		Provides water control for upper lake
Main Cells	4 each	74.0 ft diameter, top elevation 452.0 ft, driven to bedrock, EL 400
Arc Cells	3 each	Top elevation 430.0 ft, Supports flood wall and gates
Heavy duty Sluice gates	3 each	10 ft by 10 ft operator controlled sluice gates, sill EL 430.5 ft.
Aluminum Stop Logs/Jib crane		Purchased for one gate only to control upper lake level and assist with gate maintenance
Top elevation of bridge decks	454.0 ft	3 concrete beam and deck bridges
Bridge load capacity	HS 20	
Pump Station		Provides water control for both upper and lower lakes and is connected to the river
Submersible pump	1 each	41,000 GPM at 8.2 TDH. 25,000 GPM at 21.0 TDH Pumps from lower floor to upper floor of pump station
Sluice gates	6 each	5 feet x 5 feet. Control pump inlet and outlet locations
Operating elevations		
Upper Lake	430 to 440 MSL	
Lower Lake	430 to 440 MSL	
Sump floor elevation	424.0 MSL	
Electric power source with equipment on raised platform	250 HP	3 phase, buried in cross dike levee
Intake tubes/Trash racks	3 each	3 ea. 5ft by 5ft cast in place concrete tubes supply the pump station and connect the upper lake, lower lake, and the river

Item	Quantity/Measurement	Remarks
Stoplog Water Control Structure		Provides water control for the lower lake
Concrete with Stoplog slots	4 bays	Each bay is 5 ft wide
Invert or sill	429.0 ft	
Top elevation of bridge deck	442.6 ft	
Bridge deck	HS-20 load capacity	
Drainage Channels		
Lower lake	19,000 LF, bottom elevation 429.0 ft	Channel facilitates lake dewatering to the stop log structure and the pump station
Upper Lake	4,000 LF, bottom elevation 425.0 ft	Facilitates dewatering of the upper lake. North side cross dike levee
Liverpool Ditch	2,500 LF, bottom elevation 419.4 ft	Feeds pump station and provides deep water habitat
Access Road, parking area, and boat ramp		
Road length	1,220 ft	Provides access to boat ramp and pump station. Crushed stone surface
Width	30 ft including shoulders	
Parking area	50 ft by 300 ft	Located on cross dike levee near boat ramp
Boat ramp	Concrete, 16 ft wide, 13.6% slope	Provides boat access into upper lake
Riprap closure structure		Reduces flow into Liverpool Ditch and reduces sediment inflow
Riprap	1,366 tons	
Weir width	15 ft	
Weir sill elevation	426.0 ft	Flat pool is EL 429.4 ft (Gage zero = EL 424.4 ft)
Riprap levee reinforcement		
Access road	600 LF	Protects sand embankment from lower lake wave wash
Parking area, boat ramp	Levee protection both sides of levee	Protects boat ramp, parking area and guard rail from erosion damage
Pump Station	Intake areas and around sumps	Minimizes erosion into sump areas
Perimeter levee near closure structure	300ft by 60ft band along outside of levee	Prevents levee scour along erosion prone area near river inlet
Stoplog structure/cellular structure	Protects adjacent levee	
Cross Dike Levee upper lake side	18 ft band, EL 437 to 441, 3H:1V, Riprap placed on filter fabric	Protects levee and eliminated additional earth work to flatten slopes.
Cross Dike Levee lower lake side	10 ft band near upper portion of levee, Riprap placed on bedding	Protects levee from wave wash erosion
Perimeter levee down from cellular structure	400 ft by 30 ft, Riprap placed on nonwoven geotextile fabric	Protects area of levee from north wind. Area does not have tree growth to break wind fetch

5. DESCRIPTION OF PROJECT FEATURES

5.1 General Description. There are several features to the Lake Chautauqua project. The project increased the stability and height of the cross dike and northern perimeter levees. A new 41,000 GPM pump station was constructed to dewater the lower or upper lake or to allow inflow from the upper lake into the lower lake or from the river into the lower lake. The pump station allows gravity feed or forced flow. A new stoplog water control structure in the lower lake allows gravity drainage of the lower lake and incremental water control. The sheet pile cellular water control structure in the upper lake affords upper lake water control. The cellular structure can quickly flood the upper lake in the event of expected levee overtop and can also be used to gravity drain the upper lake or provide incremental water control. The lower lake provides a low level of protection from the river (2 year event) and will usually be operated as a moist soil unit. The upper lake provides a higher level of protection (5 year event) and will usually be operated as a stable lake habitat. Flooding of the lower lake but not the upper lake during the growing season may reverse the normal operating plan. The USFWS has the capability to dewater the upper lake and operate it as a moist soil unit. See the site plan, Sheet X30.

5.2 Cross Dike Levee. The 10-year flood elevation for the project site is elevation 449.1 feet MSL, which represents the elevation of the cross dike levee. The design profile for the cross dike levee allows relatively safe access to the pump station up to this elevation. The top width is 15 feet wide to provide sufficient room for frequent vehicular access. Granular surfacing provides access during wet conditions. The lower lake side slope is constructed at a 6H to 1V side slope and seeded to minimize wave wash erosion. The upper lake side slope is constructed at a 4H to 1V side slope. The upper lake side has slightly less wind fetch and is somewhat sheltered from the predominant wind direction. The lake bottom gradually rises near the levee toe to about elevation 435. The levee is approximately 14 feet high. Borrow for the cross dike levee was obtained from the upper lake borrow ditch which feeds the pump station. Some borrow was also obtained from areas in the lower and upper lakes near the pump station. The cross dike levee was constructed from sand. Shortly after it was originally built, a flood over topped the levee and scoured a breach in the levee. The contractor filled the breach with adjacent sand. The levee fill that encapsulates the sand core is clay material and is more resistant to erosion. See Sheets C50 and C60.

5.3 Northern Perimeter Levee. The 5-year flood elevation for the project site is elevation 447.0 feet MSL, which represents the elevation of the overflow reach of the levee from station 25+00B to station 55+00B (3000 feet). The design profile for rest of the levee system varies from 447.6 feet to 452.0 ft as shown in the design profile elevations, Sheet C10. The project is designed to allow a future raise of the perimeter levee to the 10 year level. The 1996 Flood Repair design memorandum recommended lowering the levee to the 5 year event as a cost saving feature. The top width of the perimeter levee is 12 feet. The interior side slope is 4H to 1V. The exterior side slope was left in its natural state to minimize disturbance and construction induced erosion. Because of erosion caused by a flood event, riprap was placed on the riverside of the northern perimeter levee west of the cellular water control structure. (Approximate Sta. 129+00 to 133+00) The USFWS placed riprap on the landside of the entire northern perimeter levee. The original levee consists of clay and sand fill. The new construction consists of clay fill. Most of the fill was obtained from adjacent lake bottom borrow as shown on the drawings. Some fill was hauled in from the coal transfer plant near Havana. This fill was used since it was relatively dry and easier to work and compact. The average height of the perimeter levee is approximately 13 feet. See Sheets C10 to C40 and C120.

5.4 Sheet Pile Cellular Water Control Structure. This structure provides water control for the upper lake. It consists of 4 main sheet pile cells approximately 74 feet in diameter with a top elevation of 452.0 feet. The main cells are connected with 3 arc cells. The arc cells are built at a lower elevation of 430.5 feet. Within each arc cell, an H-pile supported concrete cap supports a 10 ft by 10 ft heavy duty sluice gate and associated flood wall. One of the 3 gates is also fitted with aluminum stop logs. A truck mounted jib crane was provided to be used to install and remove the aluminum stop logs. The crane was mounted on a USFWS flat bed truck. The stop logs are used to control upper lake water levels. During an impending flood, the gates would be opened and the interior flooded to equalize water levels and prevent costly erosion damage. The sheet pile consists of PSX32 sheets for the main cells and PS32 sheets for the arc cells. St. Louis District, Corps of Engineers had used sheet piling from the construction of Lock and Dam 26 and agreed to let Rock Island District use it for this project. New sheet pile for this project would have cost $1,000,000.00. See Sheets C90, C100, S30, S80, S110, and S120.

5.5 Pump Station. The pump station is located on the cross dike levee at the intersection of the upper lake, lower lake and the river. See Sheets S150 to S170, S210, E10, E30, and E50. The power lines that feed the pump station are buried in the cross dike levee. The gate controlled pump station allows dewatering or filling capability from or to the upper lake, lower lake, or the river. Water flows through 1 of 3 trash racks, a 5 ft by 5 ft concrete box culvert, and a 5 ft by 5 ft sluice gate into the lower floor of the pump station. The culverts, gate openings, and pump station sill are at elevation 424.0 feet. The pump is a 41,000 GPM @ 8.2 TDH (25,000 GPM @ 21.0 TDH), single stage, submersible, propeller pump driven by an integral 250 Hp 3-phase motor. It pumps the sump inflow to the upper floor where it exits through an upper gate into 1 of the 3 box culverts. The pump is manually initiated and will operate automatically to maintain either lake in a dewatered condition between elevations 428.0 and 430.0. The pump was sized to evacuate the lower lake in approximately 30 days. The gates and culverts also allow gravity fill. Typically the gates should be closed to prevent silt laden waters from entering the pump station fill culverts. However, if sufficient head exists to allow gravity fill, this will not only save on electric power costs, but may also assist in flushing the culverts of any accumulated sediments. The gates are operated by 1 of 3 methods. An electric operator fits the operator stems and can be powered from an outlet on the electrical platform or run off a portable generator. A gas powered operator can be used. Or, a hand crank can be placed on the stem socket to operate the gates manually.

5.6 Stop Log Water Control Structure. The stop log water control structure is located at the south end of the lower lake. It is shown on Sheet S240. The water control structure consists of four 5 ft wide stop log bays. The sill of the structure is at elevation 429.0 feet. The upper level of protection is elevation 442.0 ft. The primary purpose of the water control structure is to incrementally control lower lake water levels. It is also used to gravity drain the lower lake which is why the sill is lower than the bottom of the lake. During an impending levee overtop, stop logs can be removed to expedite filling of the lower lake. Refuge personnel can remove stop logs with up to 3 feet of over-topping water.

5.7 Drainage Channels. Two drainage channels were constructed during the first two stages of construction in the lower lake to facilitate dewatering. Later, the channels were improved during Stage IV construction. The channels were reshaped and connected. The new channel is approximately 19,000 feet long and connects the stoplog structure at the south end of the lake and the pump station at the north end of the lake at the cross dike. The channel is 15 feet wide with a dredged bottom elevation of 429.0 ft.

a. The upper lake has a drainage channel along the north side of the cross dike levee. This channel is 25 feet wide with a bottom elevation of 425.0 feet. This channel provided much of the borrow for building the cross dike levee.

b. Liverpool Ditch was excavated to provide a direct feed from the river to the pump station. The channel was excavated 35 feet wide with a bottom elevation of 419.4 ft.

5.8 Access Road, Parking Area, and Boat Ramp. The access road consists of approximately 1,200 lineal feet of a 24-foot-wide service road. See Sheets C70, C80, and S290. The access road connects a refuge road to the cross dike levee for both site access and maintenance activities. The initial part of the cross dike levee was widened to 50 feet to provide a parking area connected to a new boat ramp to allow access into the upper lake. Two turn-around circles facilitate boat launching and parking along the edge of the levee. Both the access road and cross dike levee consist of granular surfacing to allow all-weather access and minimize maintenance.

5.9 Rock Weir and Riprap Reinforcing. The entrance to Liverpool Ditch at its junction with the river channel was reinforced and reduced in size with the construction of a rock weir and bank protection. See Sheet C170. The weir has a sill 15 ft wide at elevation 426.0 ft. The upper portion of the weir is approximately 50 ft wide at elevation 429.4 ft. The purpose is to minimize river channel silt from entering the channel and to control the amount of flow into Liverpool Ditch. It has a secondary purpose of stabilizing the river banks where the river enters Liverpool Ditch.

a. Riprap reinforcing was added to the levee across from the weir. This area was eroded due to the incoming flow from the river during high river stages. The riprap area is approximately 300 ft long by 60 ft wide.

b. Riprap was also placed around the boat ramp and parking area on the cross dike levee to minimize maintenance and protect these structures. Riprap around the pump station area is intended to minimize wave wash erosion to prevent excess sediment from entering the pump station sump. Riprap was also placed at the cellular structure and the stop log structure to tie the structures into the levees. In addition, the stop log structure has riprap placed at the inlet and outlet to minimize erosion from water flow through the structure. Riprap was placed on the riverside of the northern perimeter levee for scour protection from flood events in stage III of construction. The approximate location of this scour protection is sta. 129+00 to 133+00. The USFWS later placed riprap on the landside of the entire northern perimeter levee.

6. CONSTRUCTION HISTORY

a. The construction activities that have taken place are described in this O&M Manual and are shown on the attached drawings. The Corps of Engineers administered 4 construction contracts as delineated in Section 1.2. USFWS accomplished significant construction to improve the lower lake levee and the 2 over flow structures. They also improved the upper lake levee by placing riprap along erosion prone areas.

b. During the Stage I construction contract, excessive flooding on the Illinois River significantly delayed project completion and increased construction costs. The Corps partially terminated the Stage I contract and awarded the Stage II contract to construct the cellular water control structure and finish incomplete features of work.

c. Prior to construction activities, the cross dike levee was overtopped during a flood event. This flood event caused a section of the levee to wash out. In the northeast corner of the perimeter levee was an existing 60 year old radial gate. Since the cross dike levee was breached, the radial gate was not needed to flood the upper lake. The Stage I contract included modifications to the radial gate to make it functional to a higher level and repair of the cross dike levee. The radial gate structure consisted of 4 12 ft by 12 ft radial gates. During construction, a river flood in May and June 1996, caused the adjacent levee to fail. The structure was displaced into a resultant scour hole. The Corps completed a design memorandum to study repair alternatives. Levee height was lowered to elevation 447.0 ft and project objectives were updated and redefined. The new structure is a steel sheet pile cellular structure containing 3 10 ft by 10 ft heavy duty sluice gates.

d. The Stage II contract also experienced some flood delays. To help compensate for these delays and complete the project in November 1998, the earthwork on the cross dike levee was changed. Rather than complete the upper lake levee slope and drainage channel excavation, reinforcing slopes with riprap was pursued. The contractor graded the slope and placed riprap bands in vulnerable locations on both the upstream and downstream slopes of the cross dike levee. The drainage ditch was not completed. There was no net increase in project cost for this change. USFWS agreed to complete the drainage channel if and when needed.

e. Stage III consisted of placing approximately 400 feet of riprap along the northern perimeter. See Sheet C180 for the locations of the riprap.

f. Stage IV consisted of excavation of a lower lake dewatering channel. See Sheets C130 to C150 and F270 to F390. Pump station repairs were also performed under this contract. See Sheet S290 and S300.

7. PERFORMANCE MONITORING AND ASSESSMENT

a. The purpose of this section is to summarize monitoring and data collection aspects of the project. The primary project objectives are to: (1) increase reliable food production area (moist soil species); (2) improve water quality; and (3) construct and/or improve perimeter levee and cross dike. Vegetation monitoring is the primary element in determining the success in meeting these objectives. Post construction aerial photographs and ground-truthing of the refuge will be compared to vegetation maps prepared prior to the project.

b. Table 7-1 presents the principal types, purposes, and responsibility of monitoring and data collection. Table 7-2 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, ILDNR, and COE.

c. Table 7-3 presents the post-construction evaluation plan. The monitoring parameters were developed to measure the effectiveness of the stated goals and objectives. The Site Manager should follow Table 7-3, as shown, to make annual field observations. The annual field observations and the quantitative monitoring parameters will form the basis of project evaluation.

Table 7.1. 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. Evaluate planning assumptions	USFWS	USFWS (EMTC)	HREP	--
	Pre-project Monitoring	Identifies and defines problems at HREP site. Establish need of proposed project features.	USFWS	USFWS	USFWS	--
	Baseline Monitoring	Establishes baselines for performance evaluation	Corps	Field Station or USFWS thru cooperative agreements or Corps	HREP	See Table 7-2
Design	Data Collection for Design	Includes quantification of project objectives, design of project, and development of performance evaluation plan.	Corps	Corps	HREP	See Table 7-2
Construction	Construction Monitoring	Assess construction impacts; assures permit conditions are met	Corps	Corps	HREP	See State Section 401 Stipulations
Post Construction	Performance Evaluation Monitoring	Determine success of project as related to objectives	Corps (quantitative) USFWS (Field Observation)	Field Station or USFWS thru cooperative agreement, USFWS thru O&M, or Corps	HREP	See table 7-3
	Biological Response Monitoring	Evaluate predictions and assumptions of habitat unit analysis. Studies beyond scope of performance evaluation.	Corps	Corps	HREP	--

Table 7.2. Resource Monitoring and Data Collection Summary 1/

	Water Quality Data					**Engineering Data**			**Natural Resource Data**				
	Pre - project Phase[3]		Design Phase[4]		Post Const Phase[5]	Pre - project Phase	Design Phase	Post Const Phase	Pre – project Phase	Design Phase	Post Const Phase		
TYPE OF MEASUREMENT	**Apr-Sep**	**Oct-Mar**	**Apr-Sep**	**Oct-Mar**	**Oct-May**							**Sampling Agency**	**Remarks**
POINT MEASUREMENTS												Corps	
Turbidity	2W	M	2W	M	2W								
Secchi Disk Transparency	2W	M	2W	M	2W								
Dissolved Oxygen	2W	M	2W	M	2W								
Specific Conductance	2W	M	2W	M	2W								
Water Temperature	2W	M	2W	M	2W								
Velocity	M	M	M	M	M								
Water Depth	2W	M	2W	M	2W								
Water Elevation	2W	M	2W	M	2W								
Percent Ice Cover		M		M									
Ice Depth		M		M									
Percent Snow Cover		M		M									
Snow Depth		M		M									
PH	2W	M	2W	M	2W								
Total Alkalinity	2W	M	2W	M	2W								
Chlorophyll	2W	M	2W	M	2W								
Suspended Solids	2W	M	2W	M	2W								
Wind Direction	2W	M	2W	M	2W								
Wind Velocity	2W	M	2W	M	2W								
Wave Height	2W	M	2W	M	2W								

TABLE 7.2. RESOURCE MONITORING AND DATA COLLECTION SUMMARY 1/

	Water Quality Data			**Engineering Data**			**Natural Resource Data**				
	Pre - project Phase	Design Phase	Post Const. Phase	Pre - project Phase	Design Phase	Post Const. Phase	Pre - project Phase	Design Phase	Post Const. Phase		
TYPE OF MEASUREMENT										**Sampling Agency**	**Remarks**
POINT MEASUREMENTS											
Bulk Sediment and Elutriate[6]		1								Corps	
Boring Stations											
Soil Borings[2]				1	1					Corps	
TRANSECT MEASUREMENTS											
Lake Sedimentation Transects[7]					1	5Y				Corps	
Vegetation Transects[7]									2Y		
Levee System Transects Cross section at 500 ft intervals and profile of cross dike and perimeter levee					1	5Y				Corps	
Hydrographic Soundings						5Y					
AREA MEASUREMENTS											
Vertical Stereo Photographs (1:5000)								1	4Y	Corps	
Land Topographic Mapping (1 ft contours)					1					Corps	

C = Continuous — nC = n-Day continuous
W = Weekly — nW = n-Week interval
M = Monthly — nY = n-Year interval
Y = Yearly — 1,2,3…= Number of times data is collected within designated project phase

END NOTES FOR TABLE 7.2

1/ See monitoring plan, Sheet C200, for locations of sampling points, transects, areas except as noted.

2/ See soil boring location as-built drawings.

	Current Station Code	**Previous Designation**	
3/ Water Quality Stations, Pre-Project Phase	W-I126.8T	LCL-1	1987 only
	W-I130.8W	UCL-3	1989 only
4/ Water Quality Stations, Design Phase	W-I124.8R		Initiated 1990
	W-I128.7W	UCL-1	Initiated 1989
	W-I128.8F	LD-1	Initiated 1990
	W-I129.2V	UCL-2	Initiated 1989
5/ Water Quality Station, Post Construction Phase	W-I129.4T	UCL-2	
6/ Water Quality Bulk Sediment & Elutriate Stations	W-I126.6P	LCL-2	Lower Lake
	W-I126.8T	LCL-1	Lower Lake
	W-I128.7W	UCL-1	Upper Lake
	W-I129.4T	UCL-2	Upper Lake
	W-I129.6F	MD-1	Meyer's Ditch
7/ Corps Lake Sedimentation/Vegetation Transects	S-I124.8PV	Lower Lake	
	S-I126.0PV	Lower Lake	
	S-I127.9PV	Lower Lake	
	S-I128.8PV	Upper Lake	
	S-I129.0PV	Upper Lake	
	S-I129.4PV	Upper Lake	

Table 7.3. Post Construction Evaluation Plan

Goal/Objective	**Enhancement Feature**	**Unit**	**Year 0 without Alternative**	**Year X with Alternative**	**Year 50 Target with Alternative**	**Feature Measurement Reference Table 7.2**	**Annual Field Observation by Site Manager**
Enhance Migratory Waterfowl Habitat							
Increase areal extent of submergent and emergent vegetation for waterfowl through water control	Aquatic vegetation bed	Acres	200	--	3,250	Perform Vegetation Transects note 7, Table 7.2 and aerial photography	Estimate acres of emergent/submergent and floating vegetation
	Improved water quality	Mg/l suspended solids	200	--	50	Perform water quality tests at station. See note 5, table 7.2	Describe presence of resuspended sediments due to rough fish/wind
	Perimeter levee and cross dike	Linear feet of eroded levee	20,400		0	Perform levee system transects and profiles	Describe effects of erosion, distinguishing between wave and overtopping erosion

8. MEMORANDUM OF AGREEMENT

The memorandum of agreement attached as Appendix A describes responsibilities of the Corps of Engineers and the USFWS. The USFWS is responsible for maintenance and operation of the project. In addition, the MOA states that the USFWS is suppose to cost share the O&M costs with the State of Illinois. The Federal government is to pay 75% of the costs and the State government 25% of the costs.

9. OPERATION AND MAINTENANCE OF PROJECT FEATURES

9.1 General

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

b. Steps will be taken by the Site Manager to correct conditions disclosed by Project Inspections or Joint Inspections. Lake Chautauqua is a USFWS managed refuge and the Site Manager is a USFWS employee. Regular maintenance repair measures will be accomplished during the appropriate season as scheduled by the Site Manager to insure serviceability. A project inspection checklist can be found in Appendix B.

A water level management sheet and pump station inspection checklist are also provided in Appendix B. The water level management sheet should be used to record activities that pertain to operating the pump station and control structure to achieve various water levels. The first line on this sheet is an example of the different possibilities of what to write in when an action occurs. This sheet does not need to be turned in with the semi-annual report mentioned in the paragraph below.

It shall be the duty of the Site Manager to submit a **semi-annual report** to the Corps. The report shall cover inspection and maintenance of the project and should include dated copies of the inspection checklist and report sheets found in Appendix B.

c. 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 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.

d. The State Flood Plain Permit granted authorization to raise the perimeter levee surrounding the upper lake to elevation 449.1 ft. The State has been notified that the levee could be raised to this approved elevation in the future if funding becomes available. If the USFWS desires to

raise this portion of levee, the Corps of Engineers, Rock Island District should be notified. The State DNR also requires notification.

9.2 Cross Dike and Perimeter Levee

a. Operation

(1) During flood periods, the levee should be inspected to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(a) There are no indications of slides or sloughs developing;

(b) Wave wash or scouring action is not occurring;

(c) No low reaches of levee below design grade exist which may be overtopped;

(d) No other conditions exist which might endanger the structure.

(2) Appropriate advance measures should be taken to insure the availability of adequate labor and materials to meet contingencies. Steps should be taken to control any condition which endangers the levee and to repair the damaged section. If additional riprap is needed to protect eroding banks, the material presented in Table 9-1, or equivalent material should be used.

Table 9.1. Lake Chautauqua Refuge Riprap Size [1]

Stone Weight Pounds	Minimum % Larger Than
600	0
170	50 +/- 20
6	8 +/- 8

[1] Illinois DOT Gradation No. 6. Bedding complies with Gradation No. 2. Levee riprap at the boat ramp, parking area, and pump station may be reduced to Gradation No. 5. The contractor obtained riprap from Valley City Quarry, owned by Callender Construction. Material Service supplied bedding and cellular fill from Yard 10, Lincoln Quarry. Riprap and bedding stone should be obtained from Corps approved quarries. The list is available by contacting Rock Island District, Geotechnical Engineering Branch. The approved list at the time of construction is included in the contract specifications.

b. Maintenance

(1) The Site Manager should provide at all times such maintenance as may be required to insure serviceability of the levee in time of flood. Measures should be taken to promote the growth of sod and control burrowing animals. This includes routine mowing or burning (a minimum of twice per year) on the levees extending 10 feet horizontally from the toe of the levee, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces.

(2) Project inspections should be made by the Site Manager to insure that the above maintenance measures are being effectively carried out and to be certain that:

(a) no unusual settlement, sloughing, or material loss of grade or levee cross-section has taken place;

(b) no caving has occurred on either the land side or the riverside of the levee which might affect the stability of the levee section;

(c) no seepage, saturated areas, or sand boils are occurring;

(d) no revetment work or riprap has been displaced, washed-out, or removed;

(e) no action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sods;

(f) the crown of the levee is shaped to drain readily;

(g) there is no unauthorized grazing or vehicular traffic on the levee;

(h) encroachments are not being made on the levee which might endanger the levee structure or hinder its proper and efficient functioning during times of flood. Trees should not be allowed to grow within 100 feet of the pump station, stop log structure, or the cellular structure.

(3) Such inspections should be made prior to the beginning of the flood season, immediately following major high-water periods, and otherwise at intervals necessary to insure the best care of the levee or 1 time per year as stated in section 4b. 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.

9.3 Sheet Pile Cellular Water Control Structure

a. Operation

(1) During normal operation 2 sluice gates shall be closed and 1 gate with the stop logs shall be left open. The stop logs shall be adjusted to maintain the upper lake at the desired elevation.

(2) When upper lake dewatering is desired and the river is low, all gates can be opened to allow gravity dewatering.

(3) During flood operations, cellular structure operation is critical in minimizing flood damage to the levees. When the Illinois River is rising and has the potential to overtop the levees, all three gates should be closed and the stoplogs removed. The river should be monitored during the flood to predict if overtop is imminent. It is recommended that during construction conditions and when the lake is operated as a Moist Soil Unit (with water surface of the upper lake around elevation 431.5 ft) special attention be paid to the timing of gate opening as the lake will require more than 1.5 days to fill. The following operational plan has been developed based on historical flooding events to assist in predicting a levee overtop with crest elevation of 447.0 ft:

Step 1) Is the stage at the Havana gage 19 ft (elevation 443.4 ft) or higher?
IF YES: Check step 2 below
IF NO: Gates remain closed

Step 2) Is the stage at the Henry gage 26.62 ft (elevation 452.5 ft) or higher?
IF YES: Open the gates at Chautauqua
IF NO: Check step 3 below

Step 3) At the Havana gage, has the Illinois River risen 0.8 ft or more in the last 24-hour period?
IF YES: Wait 8 hours and check step 4 below
IF NO: Monitor the stage at Havana several times a day.
Open the gates if the stage rises to 20.6 ft (elevation 445.0 ft) or higher. Also, open the gates if the river forecast at Havana shows a predicted rise in stage to 21.4 ft (elevation 445.8 ft) or higher.
If the above 2 cases are not met, the gates may remain closed.

Step 4) At the Havana gage, has the Illinois River risen 0.7 ft or more in the last 8-hour period?
IF YES: Open the gates at Chautauqua
IF NO: Monitor the stage at Havana several times a day.
Open the gates if the stage rises to 20.6 ft (elevation 445.0 ft) or higher. Also, open the gates if the river forecast at Havana shows a predicted rise in stage to 21.4 ft (elevation 445.8 ft) or higher.
If the above 2 cases are not met, the gates may remain closed.

(4) Stage information for the Havana and Henry gages can be found on the internet at http://rivergages.com. Once at this site, choose "Rock Island District" from the "Water Levels By:" pulldown menu. Then choose "Illinois River Basin" from the "Choose a Rock Island District Basin" pulldown menu. Scroll down to find information on the Havana and Henry gages. River stage forecasts and precipitation forecasts are available at the station link. If assistance is needed, call the U.S. Army Corps of Engineers Water Control Section at (309) 794-5258, 7am - 4pm Mon - Fri, and 8am - 10am Sat, Sun & Holidays.

(5) Gate operation The gates can be operated with the operators fitted for the pump station. These include an electric operator, gas engine operator or hand crank. Hand crank is not recommended due to the number of turns required to move the gate. The electric operator will require a refuge supplied generator to provide electrical power.

(6) Stoplog operation The stop logs can be removed or installed with truck mounted jib crane. A lifting beam is used to move the stop logs. This operation can be done when the sluice gate is closed to prevent flowing water from interrupting the stop log removal or installation. The truck mounted jib crane can be positioned to remove or install stop logs at each gate. The stop logs come with a locking bar to secure them in place.

b. Maintenance

(1) The drainage structure should be inspected during floods to determine whether excessive seepage is taking place. If gates are open, inspect water flow through the structure to ensure levee material is not eroding. Steps should be taken to correct any adverse condition.

(2) The gates of the structure should be examined, lubricated, and trial-operated at least once a year. Gate operation and equipment should be checked once a year and before anticipated flood events. Also inspect and/or examine anchorages and seals of each gate. Follow the manufacturer's instructions for lubrication.

(3) Project inspections of the control structure should be made by the Site Manager to be certain that:

a. Steel sheet piling, concrete, gates, operating mechanism, riprap, bridges, fencing, and surfacing are in good condition; check cellular fill for settlement. Additional rock may be required. Excessive settlement may be an indication of material loss below the waterline.

b. Inlet and outlet channels are open;

c. Care is being exercised to prevent the accumulation of trash and debris near the structures;

d. Erosion is not occurring adjacent to the structure which might endanger its function.

(4) Steps should be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

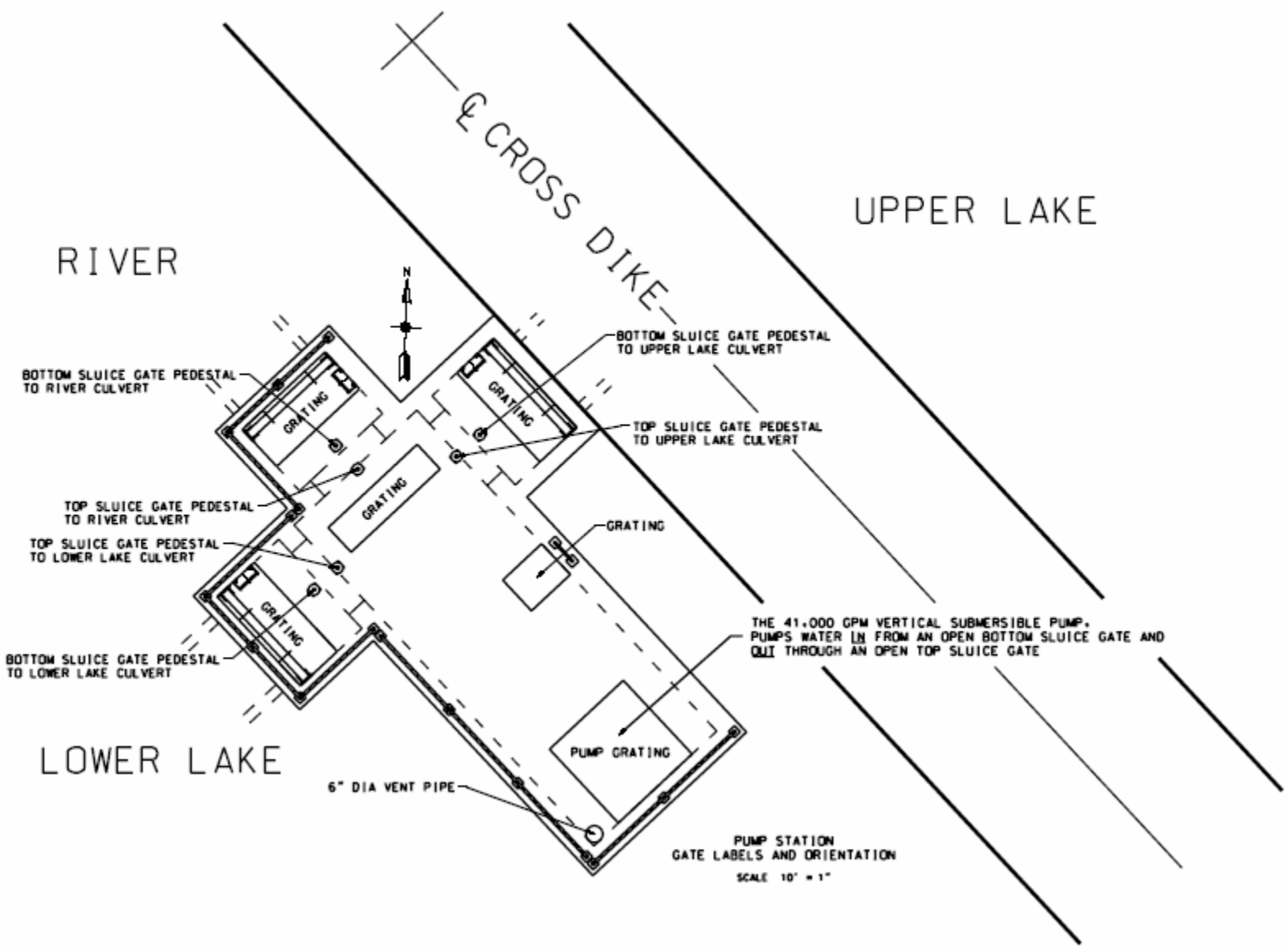
9.4. Pump Station

a. Operation. The gates of the pump station should normally be closed. During an impending flood, the pump station should remain closed unless flushing of the culverts is desirable as described below. The 5 ft by 5 ft box culverts do not contribute a high percentage of lake fill compared to the cellular structure in the upper lake and the overflow weirs in the lower lake. The

limited contribution is not worth the potential damage of silt accumulation, erosion, and debris accumulation. Figure 9-2 shows the layout of the pump station and the labels for the sluice gate pedestals.

(1) During desired drawdown periods, the pump station can be used for either gravity or pump operation. Examples to draw down the upper lake are provided; however the same procedure can be applied to the lower lake.

(2) The following figure illustrates general operation of the pump station, followed by a chart describing the operation.


℄ CROSS DIKE
UPPER LAKE
RIVER
N
BOTTOM SLUICE GATE PEDESTAL TO UPPER LAKE CULVERT
BOTTOM SLUICE GATE PEDESTAL TO RIVER CULVERT
GRATING
GRATING
TOP SLUICE GATE PEDESTAL TO UPPER LAKE CULVERT
GRATING
TOP SLUICE GATE PEDESTAL TO RIVER CULVERT
TOP SLUICE GATE PEDESTAL TO LOWER LAKE CULVERT
GRATING
GRATING
THE 41,000 GPM VERTICAL SUBMERSIBLE PUMP, PUMPS WATER IN FROM AN OPEN BOTTOM SLUICE GATE AND OUT THROUGH AN OPEN TOP SLUICE GATE
BOTTOM SLUICE GATE PEDESTAL TO LOWER LAKE CULVERT
PUMP GRATING
LOWER LAKE
6" DIA VENT PIPE
PUMP STATION
GATE LABELS AND ORIENTATION
SCALE 10' = 1"

DESIRED ACTION	INLET	OUTLET
To draw down the upper lake by gravity drainage	Open bottom gate in culvert leading to upper lake.	Open either the bottom gate in the culvert leading to the lower lake or the river.
To draw down the upper lake by using the pump	Open bottom gate in culvert leading to upper lake.	Open the top gate in the culvert leading to the lower lake or the river. And then, turn on the pump.
To add water to the lower lake from the river using the pump	Open bottom gate in culvert leading to river.	Open the top gate in the culvert leading to the lower lake and then, turn on the pump.
To draw down the lower lake by using the pump and automatically maintain it in a dewatered condition using the pump	Open bottom gate in culvert leading to lower lake.	Open the top gate in the culvert leading to the river. And then, turn on the pump.
To maintain upper and lower lake simultaneously	First, open bottom gate to upper lake culvert. Then when water levels equalize between lakes (pump is on), open bottom gate to lower lake and continue pumping.	Open top gate to river culvert, then turn on pump.

(3) During pump operation there is a **caution: Normally, the pump station should not be operated to lower the upper lake if the river is above the pump discharge tube, elevation 441.3 ft. If there is a strong desire to lower the upper lake when the river is above elevation 441.3 ft, the following caution exists: Back flow through the pump is possible because the top of the discharge tube, 441.3 ft, is lower than the river. The top of the discharge tube can be seen in the upper floor of the pump station. (The bottom gate to the upper lake should be opened). If the river is higher than the tube, the pump must be activated prior to opening the top gate to the river. The pump must be run in the manual mode, monitored closely, and turned off after closing the top gate to the river. If the pump should be shut down or turned off prior to closing the top gate, back flow will reverse the flow of water and begin to fill the lake. The pump can not be activated during back flow or damage to the pump will occur. Make sure the top gate is closed before restarting the pump.**

(4) Anytime the pump is started and at periods not exceeding 24 hrs, it should be observed for indications of improper operation or damage. Avoid operation of the pump during sump cavitation or ice conditions. The pump will automatically shut down through the pump control circuitry located in the electrical panel on high stator winding temperature, stator casing leakage, or high bearing temperature. The indicator light for these shutdown conditions should be verified "OFF" before attempting to start the pump. Periodically check the sump for proper water depth, especially prior to extended operation. Mud in the sump may be a cause for cavitation during operation and cycling of the pump due to premature activation of the pump stop float which shuts down the pump. Before starting the pump, ensure that the sump is clean of silt and mud and the top of the discharge tube is visible in the upper floor of the pump station.

(5) When activated by manual operation of the pump selector switch to "AUTO" and pushing the "START" button, the pump will be placed in the automatic draw-down mode via two floats located in the sump. The pump will activate if water in the sump is at elevation 430.0 ft. or higher. It will automatically shut off when water in the sump reaches elevation 428.0 ft. The pump will then cycle to maintain the sump water elevation at 428.0 ft., but only after the sump reaches elevation 430.0. If the pump shuts off for any reason between these two elevations, it will not start again unless the sump reaches 430.0 ft. or the float corresponding to this elevation is jumpered around at the control panel terminal strips. An emergency shut off float is provided in the sump as protection to turn off the pump at a sump elevation of 427.0 ft. Lake levels will be somewhat higher than sump levels. The pump should never cycle more than 10 times per hour (every 6 minutes). If it does, it may overheat and damage the pump. The cause of cycling too often could be attributed to blockage of the inlet drainage channels or the trash racks. If excessive cycling occurs, the pump should not be operated until the cause is identified and corrected.

(6) Following drawdown and establishment of vegetation, the upper lake should be allowed to fill with natural spring water. The lower lake can be filled with excess water from the upper lake through the pump station, from water diverted from Quiver Creek through the existing pre-project 3 ft by 3 ft box culvert, or from the river through the stoplog structure. The stoplog structure should be operated to control levels in the lower lake through gravity drainage, and the stoplogs in the cellular structure should be operated to control levels in the upper lake through gravity drainage.

b. Maintenance. Pump station inspections will be performed by the site manager. Pump station inspection checklist should be sent in with the project inspection checklist. Both of these checklists can be found in Appendix B. Steps should be taken to correct conditions disclosed by such inspections. The pump station inspection should include the following:

(1) Concrete Structure. Visually inspect all surfaces to discover cracks, spalling of concrete, broken blocks or bricks, faulty joints, check around all opening for cracks and leaks, check metal for rusting, loose bolts, and other defects.

(2) Gates. When operating conditions will permit, operate through a portion of their travel to determine that gates are in satisfactory condition. Examine exposed parts of gates and anchorages for corrosion, cracking, deterioration of coating and other damage. Check rivets, bolts and welds. Repair when conditions will economically justify the work.

(3) Pump

a. Under ideal conditions, the pump should be run for at least an hour every month. However, due to the electrical demand charge, the cost of the run is not worth the benefit. Whenever the pump is used, observe for indications of improper pump operation or damage. Avoid operation of the pump during sump cavitation or ice conditions. Record voltage and current measurements. Ensure that the motor nameplate current rating is not exceeded.

b. Periodically check the sump for proper water depth, especially prior to extended operation. Mud in the sump may be a cause for cavitation during operation. Clean out silt and mud before operating the pump.

c. The Site Manager should have an authorized representative conduct pump inspections and maintenance and repair work in accordance with, "Installation, Operation, and Maintenance Manual for M&W Pump Corporation's Submersible Electric Pump." Ancillary equipment such as cables, level sensors, starter and monitoring equipment should also be periodically inspected. Damaged components should be repaired or replaced by a qualified mechanic or electrician.

d. To remove the pump, the grating should be removed and an appropriately sized crane should be used to pull the pump from the pit. To perform maintenance and repairs, the pump should be set on the top of the pump station so that it is secure. If the pump is to be repaired on site, the electrical cables do not need to be disconnected. An example of this would be repairs to the impeller. If the pump needs to be sent to the manufacturer for repairs, the electrical cables (power and control conductors) need to be disconnected from the control station panel and pulled through the conduit so as to not break the water tight seal where the electrical cables connect into the pump.

(4) Control Panel. Examine closely for overall condition. Examine weather stripping and replace as necessary. Also check the bottom interior of the enclosure for signs of standing water. Verify enclosure heating unit if functioning properly and ensure that the thermostat is set for 45° F.

(5) Trash Racks. Check for trash accumulation at racks and remove as necessary. Should operating conditions or observations indicate trouble is developing and operating conditions will permit, inspect sufficient racks to indicate general condition. Repair as necessary to maintain a satisfactory condition. Underwater inspection of racks may be more practical than removal of racks.

(6) Culverts / Sump. Check for silt accumulation. This can be accomplished by probing with a long pole. If sufficient head differential exists between the upper lake and the river or lower lake, lower gates can be opened and the rush of water can flush the culverts. If large debris manages to get inside of a trash rack and is then trapped inside, removal of the outlet trash rack could allow the debris to flush out of the tubes as well. If the pump station begins to cavitate and operate improperly, there is a possibility that debris is caught against the bottom of the pump discharge tube. Another possibility is that silt accumulation is in the immediate sump area surrounding the pump. To inspect this area and remove debris, all gates should be closed and the sump should be dewatered. A smaller dewatering pump will be required to draw down the water low enough for inspection and cleaning. Minimal seepage through the gates is normal. While dewatered, the inside of the gates can be inspected for damage and seal.

(7) Dewatering the box culverts for inspection and maintenance is difficult. This should not be required except during dredging and maintenance of the drainage channels. If the culverts require dewatering, it may be easier to dewater the entire lower lake or the upper lake depending on which culvert requires maintenance. If the river culvert requires dewatering, a cutoff wall or dewatering berm would be required.

9.5 Stoplog Control Structure

a. Operation. Stoplogs can be added or removed to provide incremental water level control of the lower lake. If all stop logs are removed, the lake can be allowed to gravity drain as long as the river is low. During an imminent overtop of the lower levee, stop logs can be removed to facilitate and speed up intentional flooding of the lower lake.

b. Maintenance. Stoplog structure inspections will be performed by the site manager. Steps should be taken to correct conditions disclosed by such inspections. The inspection should include the following:

(1) Stoplogs, stoplog slots, stoplog keepers, or the stoplog lifting hook

(2) Staff gages, steel rails, rail posts, grating, and fasteners

(3) Concrete

(4) Debris or sedimentation in the culverts, inlet channels, or outlet channels

(5) Erosion or seepage around the structures

(6) Displaced or missing riprap. If any riprap around the structures needs replacing, use IDOT Erosion protection stone Gradation 6 (RR6). See table 5-1 for proper gradation.

(7) Encroachments which might endanger or hinder its proper and efficient functioning

9.6 Drainage Channels

a. Operation. Drainage channels should be inspected when dewatering the lakes and immediately following major high water periods. As soon as practicable after high water events, all snags and other debris should be removed from the channels.

b. Maintenance. (1) Project inspections of the drainage channels should be made by the Site Manager to be certain that:

a. The channels are cleared of debris, weeds, wild growth, and accumulated silt;

b. The channels are not being restricted by the depositing of waste materials, building of unauthorized structures, or other encroachments;

c. Banks are not being damaged by rain or wave wash and that no sloughing of banks has occurred;

(2) Steps should be taken to correct conditions disclosed by such inspections.

9.7 Access Road, Parking Area, and Boat Ramp

a. The access road will require periodic maintenance to clear culverts and drainage ditches, add additional surface stone, and replenish embankment rip rap. The surface stone is Illinois DOT gradation CA 6. The rip rap size is RR5 or RR6 as shown in Table 9-1.

b. The boat ramp is constructed as shown on Plate 9. The concrete joints will require periodic sealing. Cracks in the concrete surface should also be sealed to prevent deterioration. Inspections should insure that erosion around or under the slab does not take place.

9.8 Rock Weir and Riprap Areas. Maintenance of the rock weir should be minimal. However, there may be some times where inspections reveal that replenishment of riprap is required to maintain the function of the weir. Other areas of riprap should also be inspected and maintained. Areas of excessive erosion along the levees can also be strengthened with the addition of riprap and bedding stone.

10. EMERGENCY OPERATIONS. Emergency operations may be required when the Illinois Rivers exceeds flood stage and is projected to over-top the levees. The lower lake levee does not require operation during a flood due to the 2 overflow spillways that provide sufficient capacity to equalize water levels so that significant erosion along the levee tops is prevented.

Water levels in the upper lake must be equalized by opening the sluice gates at the cellular water control structure. In order for this procedure to work properly, the USFWS must monitor river levels and weather conditions. A specific operating plan was developed to predict whether the river would over-top the levee. The plan is described at pages 31 and 32. This plan should be followed to minimize the potential for erosion damage to the levees as the river overtops the levee.

11. SURVEILLANCE

11.1 General

a. An active maintenance program is based on inspections and subsequent servicing, adjustment, or repair. There are 2 main objectives of inspections: (1) to insure project serviceability by timely and thorough inspections thereby avoiding or reducing maintenance costs, and (2) to document the condition of the project as a baseline for consideration of rehabilitation for project damage resulting from a major storm or flood event.

b. There are 2 types of inspections for the project: (1) Project Inspection by the Site Manager and (2) Joint Inspection by the Site Manager and personnel from the Corps of Engineers, Rock Island District.

11.2 Project Inspection by Site Manager

a. The Project Inspection should be performed by the Site Manager or appropriate representative for the purpose of noting routine deficiencies and initiating corrective actions. This inspection will be performed at periods not exceeding 12 months and will 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 high water events or as scheduled by the Site Manager.

b. A Project Inspection checklist has been developed as presented in Appendix B. It is suggested that a copy of the completed checklist be furnished to the Corps of Engineers, Rock Island District, ATTN: CEMVR-EM, P.O. Box 2004, Rock Island, Illinois, 61204-2004, immediately following each Project Inspection by the Site Manager.

11.3 Joint Inspection by Site Manager and Corps of Engineers

a. 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.

b. 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 Definite Project Report. 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.

12. REPAIR REPLACEMENT AND REHABILITATION.

Repair is considered to entail those activities of a routine nature that maintain the project in a well kept condition. Replacement covers those activities taken when a worn-out element or portion thereof is replaced. Rehabilitation refers to a set of activities as necessary to bring a deteriorated project back to its original condition. RR&R actions are to conform to the project as-built plans and specifications unless other arrangements are made with the district commander. These activities are the responsibility of the project sponsor. (Para. 5l of ER1110-2-401)

12.1 General. The USFWS is responsible for maintenance of constructed features per the memorandum of agreement. However, due to specific storm or flood events, significant project damage may be beyond normal maintenance and USFWS capability.

12.2 Project Rehabilitation. In the event of major damage, project rehabilitation or operational changes may be required. Any changes to the project or inability to maintain project

features as designed should be coordinated with the US Army Corps of Engineers, Rock Island District. If funding and authorization is in place, the Corps may be able to assist with major rehabilitation of the project.

13. NOTIFICATION OF DISTRESS. Evidence of distress of the levees and/or structures of the Lake Chautauqua EMP project along the Illinois River, near Havana, Illinois, as defined in ER 1110-2-101, must be immediately reported to the U.S. Army Corps of Engineers, Rock Island District. Per ER 1110-2-101, the following individuals should be contacted, in the order indicated.

1. Chief, Emergency Management Division	Rock Island District Office Clock Tower Building P.O. Box 2004 Rock Island, IL 61204-2004 (309) 794-5325
2. Chief, Regulatory Functions Branch	Rock Island District Office Clock Tower Building P.O. Box 2004 Rock Island, IL 61204-2004 (309) 794-5370
3. Chief, Operations Division	Rock Island District Office Clock Tower Building P.O. Box 2004 Rock Island, IL 61204-2004 (309) 794-5275
4. Deputy District Engineer	Rock Island District Office Clock Tower Building P.O. Box 2004 Rock Island, IL 61204-2004 (309) 794-5253
5. District Engineer	Rock Island District Office Clock Tower Building P.O. Box 2004 Rock Island, IL 61204-2004 (309) 794-5224

OPERATION AND MAINTENANCE MANUAL
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM

LAKE CHAUTAUQUA
REHABILITATION AND ENHANCEMENT
LA GRANGE POOL, ILLINOIS WATERWAY, RIVER MILES 124-128
MASON COUNTY, ILLINOIS

APPENDIX A

MEMORANDUM OF AGREEMENT

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

I. PURPOSE

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

The project lands of the Lake Chautauqua, Illinois, separable element are owned by the United States and are managed by the Department of the Interior, USFWS, as part of the Chautauqua National 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 the Lake Chautauqua, Illinois, 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 improving water level management capability for approximately 3,250 acres (Upper and Lower Lake Chautauqua).

IV. RESPONSIBILITIES

A. The DA is responsible for:

1. **Construction:** Construction of the project which consists of a pump station, boat ramp and access road, water control structure, modification of radial gate structure, cross dike raise, and drainage and channel excavation at Lake Chautauqua, Illinois.

2. **Major Rehabilitation:** The Federal share of 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, the DA will construct the Lake Chautauqua, Illinois, Fish and Wildlife Enhancement project as described in the Definite Project Report, *Lake Chautauqua Rehabilitation and Enhancement*, dated June 1991, applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The USFWS 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 the DA encounters potential delays related to construction of the project, the DA will promptly notify the USFWS of such delays.

4. **Maintenance of Records:** The 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. The DA shall maintain such books, records, documents, and other evidence for a minimum of 3 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 USFWS.

B. The USFWS is responsible for:

1. **Operation, Maintenance, and Repair:** Upon completion of construction as determined by the District Engineer, Rock Island, the USFWS shall accept the project and shall operate, maintain, and repair the project as defined in the Definite Project Report, *Lake Chautauqua Rehabilitation and Enhancement*, dated June 1991, 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 USFWS shall obtain 25 percent of all costs associated with the operation, maintenance, and repair of the project from the Illinois Department of Conservation (IDOC).

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:

USFWS: Regional Director
U.S Fish and Wildlife Service
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

EFFECTIVE DATE OF MOA

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

THE DEPARTMENT OF THE ARMY

BY: _____
ALBERT J. KRAUS
Colonel, U.S. Army
District Engineer

DATE: 8/4/92

THE U.S. FISH AND WILDLIFE SERVICE

BY: for _____
SAM MARLER
Regional Director
U.S. Fish and Wildlife Service

DATE: 7/30/92

OPERATION AND MAINTENANCE MANUAL
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM

LAKE CHAUTAUQUA
REHABILITATION AND ENHANCEMENT
LA GRANGE POOL, ILLINOIS WATERWAY, RIVER MILES 124-128
MASON COUNTY, ILLINOIS

APPENDIX B

SITE MANAGER'S
PROJECT INSPECTIONS AND MONITORING RESULTS

SITE MANAGER'S PROJECT INSPECTION AND MONITORING RESULTS

Inspected by _____ Date _____

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

1. PROJECT INSPECTION

Item **Comment/Condition**

a. Cross Dike and Perimeter Levee

( ) Settlement, sloughs, or loss of section _____
( ) Seepage, saturated areas, sand boils _____
( ) Wave-wash, scouring _____
( ) Overtopping erosion _____
( ) Vegetative cover (mowing) _____
( ) Displaced/missing riprap _____
( ) Burrowing animals _____
( ) Unauthorized grazing or traffic _____
( ) Encroachments _____
( ) Other _____

b. Sheet Pile Cellular Structure

( ) Seepage, saturated areas, sand boils _____
( ) Sheet piling, fencing, gates, and operating mechanisms _____
( ) Bridges, rock fill, granular surfacing _____
( ) Concrete _____
( ) Displaced/missing riprap _____
( ) Blockage of inlet and outlet channels _____
( ) Erosion adjacent to structure _____
( ) Other _____
( ) River Water Elevation _____
( ) Upper Lake Water Elevation _____

c. Pump Station

( ) Concrete Structure _____
( ) Gates _____
( ) Pump _____
( ) Control Panel _____
( ) Trash Racks _____
( ) Culverts/Sump _____
( ) Other _____

Item **Comment/Condition**

d. Stop Log Structure

( ) Stop logs, stoplog slots, keepers, lifting hook. _____
( ) Staff gages, steel rails, posts, grating, bolts. _____
( ) Concrete. _____
( ) Debris / sedimentation. _____
( ) Erosion / seepage. _____
( ) Riprap. _____
( ) Encroachments. _____
( ) Other. _____

e. Drainage Channels

( ) Debris _____
( ) Waste materials / unauthorized structures _____
( ) Excessive sedimentation / blockage _____
( ) Bank Erosion _____
( ) Other _____

f. Access Road, Parking Area, Boat Ramp

( ) Ditches _____
( ) Culverts _____
( ) Stone Surface _____
( ) Riprap _____
( ) Entrance gates _____
( ) Guard rail _____
( ) Boat ramp cracking / joint sealant _____
( ) Boat ramp erosion / undermining _____
( ) Debris _____
( ) Waste materials/unauthorized structures _____
( ) Bank Erosion _____
( ) Other _____

g. Rock Weir and Riprap Areas

( ) General Condition _____
( ) Extent of coverage _____
( ) Replenishment required _____
( ) Other _____

h. Additional Comments

_____

_____

_____

_____
Site Manager

WATER LEVEL MANAGEMENT INFORMATION

Date	Water Level	Action	Comment	Observations
1/31/05	442.12	Open Gate Close Gate Pump	Prior to overtop; increase depth; dewater lake	

PUMP STATION INSPECTION REPORT

Name of Project and Program (EMP, 1135, Etc.):

Date/Hour Inspection Began/Ended:
Date: Time:

Inspectors:
Corps Representatives:

Local Sponsor Officials:

River/Forebay Elevations:
River El.: _____ Stage El.: _____ Zero Gage El.: _____
Management Unit El.: _____ Stage El.: _____ Zero Gage El.: _____

Project Data:
Pumping Arrangement and Configuration:

Size of Moist Cell Unit(s) (Acres):

Fill Time (Days):

Empty Time (Days):

General Comments:

PUMP STATION MAINTENANCE INSPECTION GUIDE

General Instructions:

1. All items on this guide must be addressed and a rating given.
2. The lowest single rating given will determine the overall rating for the pump station.
3. Additional areas for inspection will be incorporated by the inspector into this guide if the layout or physical characteristics of the pump station warrant this.
   Appropriate entries will be made in the REMARKS block.
4. Rating Codes:
   A – Acceptable
   M - Minimally Acceptable
   U - Unacceptable

Specific Instructions:

SECTION I. Actual fill and emptying times for the project shall be compared with design data and size of management unit to assess

RATED ITEM	A	M	U	EVALUATION	REMARKS
SECTION I				**FOR INTERNAL USE AND EVALUATION**	
1. Pump Station Size				Pump station has adequate capacity (considering pumping capacity, ponding areas, Compare Fill/Empty times with Design, etc.). (A or U.)	
SECTION II				**FOR LOCAL SPONSOR USE**	
2. O&M Manual				O&M Manual is present and adequately covers all pertinent areas. (A or U.)	
3. Operating Log				Pump Station Operating Log is present and being used. (A or U.)	
4. Annual Inspection				Annual inspection is being performed by the local sponsor. (A or U.)	
5. Plant Building				A Plant building is in good structural condition. No apparent major cracks in concrete, no subsidence, roof is not leaking, etc. Intake louvers clean, clear of debris. Exhaust fans operational and Maintained. Safe working environment. M Spalling and cracking are present, or minimal subsidence is evident, or roof leaks, or other conditions are present that need repair but do not threaten the structural integrity or stability of the building. U Any condition that does not meet at least Minimum Acceptable standard.	

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	REMARKS
6. Pumps				A All pumps are operational. Preventive maintenance and lubrication are being performed. System is periodically subjected to Performance testing. No evidence of unusual sounds, cavitation, or vibration. M All pumps are operational and deficiencies/minor discrepancies are such that pumps could be expected to perform through the next period of usage. U One or more primary pumps are not operational, or noted discrepancies have not been corrected.	
7. Motors, Engines and Gear Reducers				A All items are operational. Preventive maintenance and lubrication being performed. Systems are periodically subjected to performance testing. Instrumentation, alarms, and auto shutdowns operational. M All systems are operational and deficiencies/minor discrepancies are such that pumps could be expected to perform through the next Expected period of usage. U One or more primary motors are not operational, or noted discrepancies have period of usage.	
8. Sumps/Trash Racks				**SPECIAL INSTRUCTIONS:** Measure silt accumulation in sumps and trash racks. Measure water depth at inlet and outlet. A Sumps/Trash Racks are free of concrete deterioration, protected from Permanent damage by corrosion and free of floating and sunken debris. Sumps are clear of Accumulated silt. Passing debris is minimized by spacing of trash rack bars. Periodic maintenance performed on trash racks and removal of accumulated silt in sumps is performed. M Trash racks and sumps have some accumulated silt or debris but are not currently inhibiting the pump(s) performance. No periodic maintenance has been performed. Present condition could be expected to perform through the next expected period of usage provided removal of floating debris is accomplished. U Proper operation can not be ensured through the next period of usage. Possible damage could result to the pumping equipment with continued operation.	

RATED ITEM	A	M	U	EVALUATION	REMARKS
9. Other Metallic Items				A All metal parts in plant/building are protected from permanent damage by corrosion. Equipment anchors and grout pads show no rust or deterioration. M Corrosion on metallic parts (except equipment anchors) and deterioration period of usage. U Any condition that does not meet at least Minimum Acceptable standards.	
10. Ancillary Equipment **i.e.** Compressed Air Siphon Breakers Fuel Supply Vacuum Priming Pump Lubrication Heating/Ventilation Engine Cooling Engine Oil Filtering				A All equipment operational. Preventive and annual maintenance being performed. Equipment operation understood and followed by pump station operators. M Ancillary equipment is operational and deficiencies/minor discrepancies are such that equipment could be expected to perform through the next period of usage. U One or more of the equipment systems is inoperable. The present condition of the inoperable equipment could reduce the efficiency of the pump station or jeopardize the pump station's role in flood protection.	
11. Backup Ancillary Equipment				A Adequate, reliable, and enough capacity to meet demands. Backup units/equipment are properly sized, operational, periodically exercised, and in an overall well maintained condition. M Backup ancillary equipment is operational and deficiencies/minor discrepancies are such that equipment could be expected to perform through the next period of usage. U Backup ancillary equipment not considered reliable to sustain operations during flooding conditions.	

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	REMARKS
12. Pump Control System				A Operational and maintained free of damage, corrosion, or other debris. M Operational with minor discrepancies. U Not operational, or uncorrected discrepancies noted from previous inspections.	
13. Intake and Discharge Outlets				Functional. No damaging erosion evident. Opening/closing devices for vertical gates, flap gates, etc. are functional in a well-maintained condition. (A or U.)	
14. Insulation Megger Testing (For pump stations with Electric pumps only)				A Megger test has been performed within the last 36 months. Results of Megger test show that insulation of primary conductors and electric motor meet manufacturer's or industry standard. M Results of Megger test show that insulation resistance is lower than manufacturer's or industry standard, but can be expected to perform satisfactorily until next testing or can be corrected. U Insulation resistance is low enough to cause the equipment to not be able to meet its design standard of operation.	
15. Final Remarks					

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APPENDIX C

PHOTOGRAPHS

Photograph C-1. Dewatered Lower Lake (August 2004)

Photograph C-2. Completed Cross Dike Levee with Riprap Protection

Photograph C-3. Cross Dike Levee (August 2004)

Photograph C-4. Northern perimeter levee riprap protection placed by USFWS (August 2004)

Photograph C-5 . Northern perimeter levee riprap protection placed by USFWS. (August 2004)

Photograph C-6. Melz Slough Area – Upper Lake (August 2004)

Photograph C-7. Cellular Structure on Upper Lake

Photograph C-8. Sluice Gate (During Construction)

Photograph C-9. Construction of Pump Station Looking Upstream

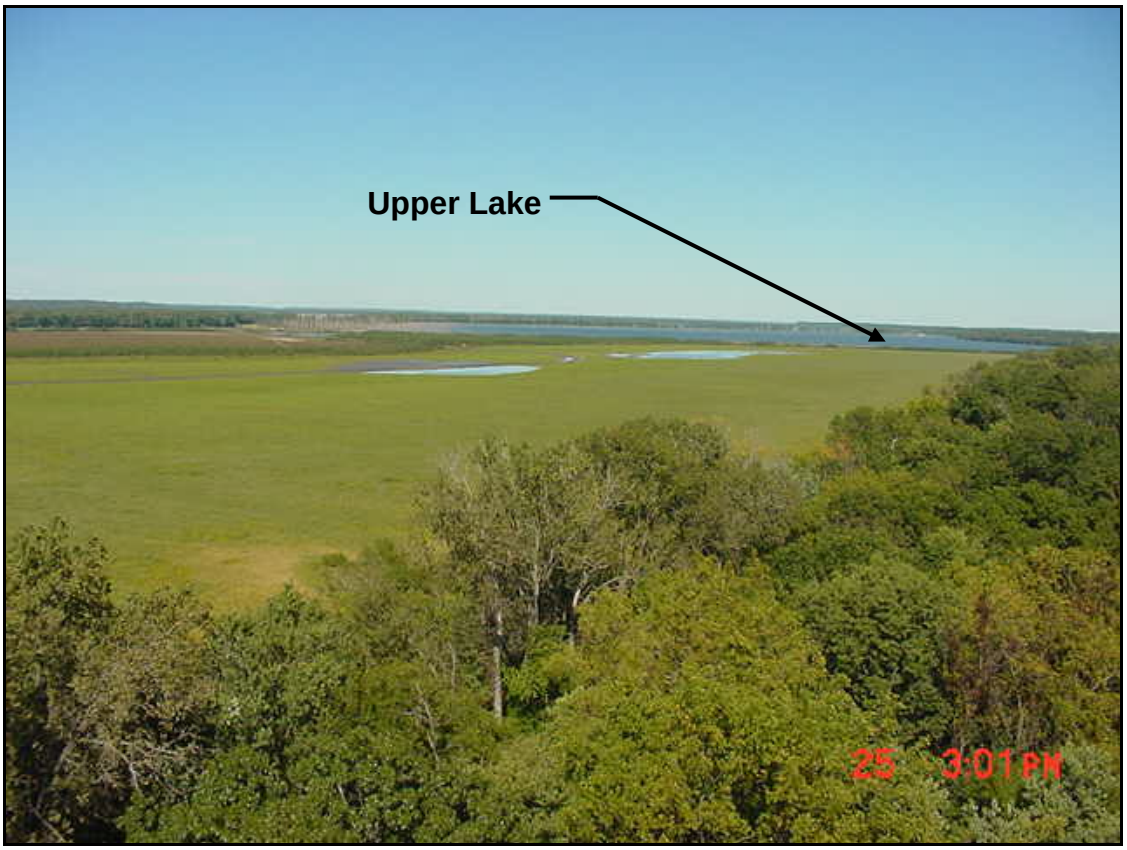
Photograph C-10. Completed Pump Station

Photograph C-11. Lower Lake Stoplog Structure

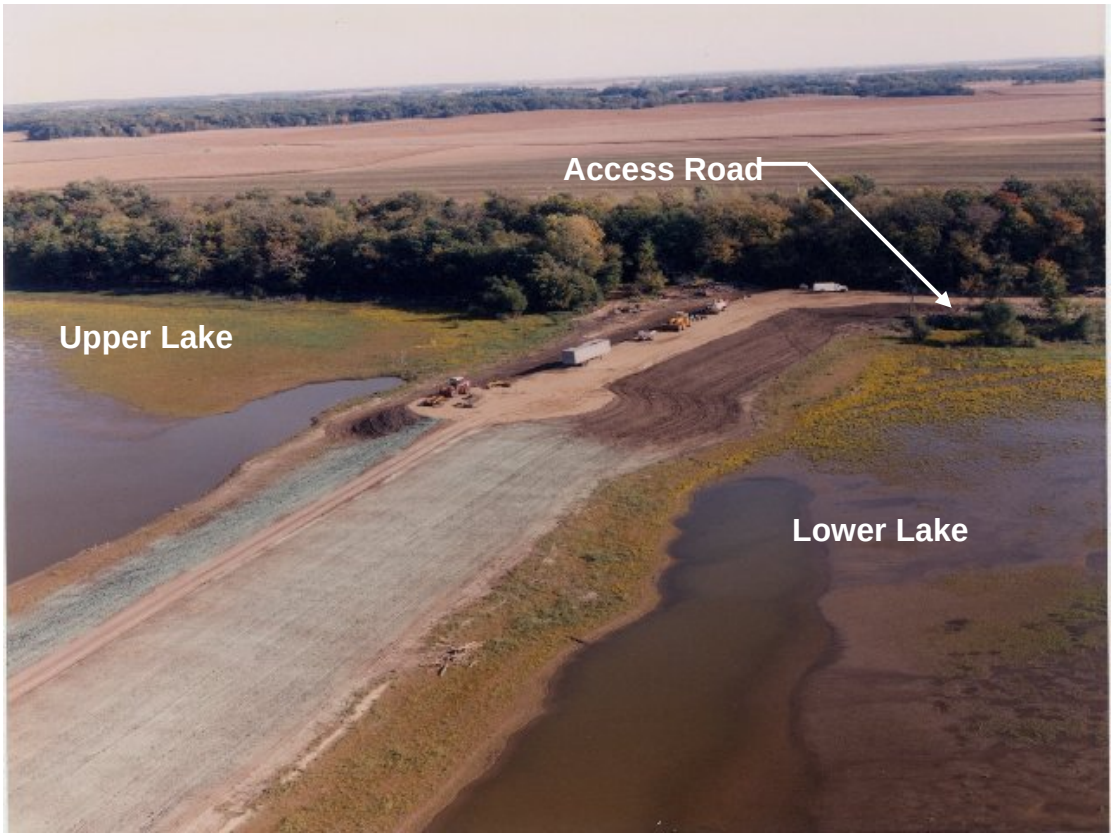
Photograph C-12. Lower Lake Levee and Stoplog Structure

Photograph C-13. Lower Lake Dewatering Channel

Photograph C-14. Floating Excavator used for Lower Lake Channel



Photograph C-15. Dewatered Lower Lake with Upper Lake to the North



Photograph C-16. Construction of Cross Dike Levee and Parking Area

Photograph C-17. Parking Area. Boat Ramp is to the left (August 2004)

Photograph C-18. Rock Closure Structure and Illinois River (August 2004)

Photograph C-19. USFWS construction of Lower Lake Levee and Overflow Structure

Photograph C-20. South end of Dewatered Lower Lake

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APPENDIX D

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