



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

OPERATION AND MAINTENANCE MANUAL

PRINCETON REFUGE HABITAT REHABILITATION AND ENHANCEMENT

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

**POOL 14, MISSISSIPPI RIVER MILES 504.0 – 506.4R
SCOTT COUNTY, IOWA**

AUGUST 2005



DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT CORPS OF ENGINEERS
CLOCK TOWER BUILDING - P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

CEMVR-PM-F

**OPERATION AND MAINTENANCE MANUAL
FOR
PRINCETON REFUGE HABITAT
REHABILITATION AND ENHANCEMENT**

**UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM**

**POOL 14, MISSISSIPPI RIVER MILES 504.0-506.4R
SCOTT COUNTY, IOWA**

AUGUST 2005

ACKNOWLEDGMENT

Many individuals of the Rock Island District, U.S. Army Corps of Engineers; the U.S. Fish and Wildlife Service; and the Iowa Department of Natural Resources contributed to the development of this Operations and Maintenance Manual for the Princeton Refuge Habitat Rehabilitation and Enhancement Project. Additional information about the Princeton HREP project is available at the following web site - www.mvr.usace.army.mil. These individuals are listed below:

U.S. ARMY CORPS OF ENGINEERS ROCK ISLAND DISTRICT

PROGRAM MANAGER:	Roger Perk
TECHNICAL COORDINATOR:	Darron Niles
PROJECT ENGINEER:	Rachel Fellman
BIOLOGIST:	Charlene Carmack
FORESTER:	Gary Swenson
GEOTECHNICAL ENGINEER:	Tom Mack
HYDRAULIC ENGINEER:	Tom Kirkeeng
LEVEE INSPECTOR:	Mark Clark
MECHANICAL ENGINEER:	John Behrens
REPORT PREPARER:	Nancy Holling

U.S. FISH AND WILDLIFE SERVICE UPPER MISSISSIPPI RIVER NATIONAL WILDLIFE & FISH REFUGE

EMP COORDINATOR:	Keith Beseke
SAVANNA DISTRICT MANAGER:	Ed Britton

IOWA DEPARTMENT OF NATURAL RESOURCES MAQUOKETA WILDLIFE UNIT

AREA WILDLIFE BIOLOGIST:	Bob Sheets
WILDLIFE TECHNICIAN/SITE MANAGER:	Randy Robinson
MISSISSIPPI RIVER FISHERIES BIOLOGIST:	Tom Boland
MISSISSIPPI RIVER WILDLIFE BIOLOGIST:	Mike Griffin



**US Army Corps
of Engineers®**



**OPERATION AND MAINTENANCE MANUAL
FOR
PRINCETON REFUGE HABITAT
REHABILITATION AND ENHANCEMENT**

**UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM**

**POOL 14, MISSISSIPPI RIVER MILES 504.0–506.4R
SCOTT COUNTY, IOWA**

CONTENTS

1. INTRODUCTION.....	1
a. Background	1
b. Purpose and Scope	1
c. Use of Manual	2
2. HISTORICAL SUMMARY	3
a. Authorization and Location.....	3
b. Planning and Construction Activities	3
c. Actual Project Costs	6
d. Project References	12
3. DESCRIPTION OF PROJECT FEATURES	13
a. Project Data.....	13
b. General Description	14
c. Water Control Plan.....	15
d. Water Source.....	16
e. Levee System	17
f. Pump Station.....	17
g. Water Control Structures	18
h. Gatewell Structure	18
i. Mast Tree Plantings	18
j. Site Access.....	18
k. Borrow Areas/Potholes	19
l. Utilities.....	19
4. INSPECTIONS	20
a. Purpose.....	20
b. Project Inspections.....	20
c. Joint Inspections.....	20
5. OPERATION AND MAINTENANCE.....	21
a. General	21
b. Perimeter Levee, Overflow Roadway, and Cross Dike	22
c. Pump Station	23

d. Water Control Structures	25
e. Gatewell Structures	26
f. Mast Tree Plantings	27
g. Borrow Areas/Potholes	27
6. PERFORMANCE MONITORING AND ASSESSMENT	28
a. General	28
b. Post-Construction.....	29

Tables

2-1	Implementation Schedule.....	3
2-2	Project Goals and Objectives	5
2-3	Summary of Project Costs	6
2-4	Stage I Construction Costs.....	7
2-5	Stage II Construction Costs	8
2-6	Stage III Construction Costs	10
2-7	Stage IV Construction Costs.....	11
2-8	Project References	12
3-1	Summary of Project Data.....	13
3-2	Wetland Management Unit Water Control Plan.....	15
3-3	Elevation Frequency Relationships.....	16
5-1	Estimated Annual Operation and Maintenance Costs	21
5-2	Annual Management Plan.....	24
6-1	Estimated Annual Post-Construction Monitoring Costs.....	28
6-2	Monitoring and Performance Evaluation Matrix	30
6-3	Monitoring and Data Collection Summary	31
6-4	Transect Evaluation Summary	33
6-5	Post-Construction Evaluation Plan	34

Figures

3-1	Stage-Duration Curve	16
-----	----------------------------	----

Appendices

A	Acronyms
B	Operation, Maintenance, and Rehabilitation Agreement
C	Site Manager’s Project Inspection and Monitoring Results
D	Cooperating Agency Correspondence
E	Pump Station Inspection Report
F	Mechanical Equipment Data
G	Levee Inspection Report
H	List of Rock Island District Approved Pesticides
I	Photographs of Project Features

Appendices (Continued)

- J Project Team Members
- K Distribution List
- L Plates

Plates

Stage I

- 1 Location Plan, Vicinity Map, and General Notes
- 2 Site Plan
- 3 Boring Locations
- 4 Boring Logs I
- 5 Boring Logs II
- 6 Boring Logs III
- 7 Perimeter Levee Plan and Profile Station 0+00 to Station 45+00
- 8 Perimeter Levee Plan and Profile Station 45+00 to Station 90+00
- 9 Perimeter Levee Plan and Profile Station 90+00 to Station 135+00
- 10 Perimeter Levee Plan and Profile Station 135+00 to Station 163+73
- 11 Overflow Roadway/Spillway Plan and Profile Station 0+00B to Station 24+51B
- 12 Cross Dike Plan and Profile Station 0+00C to Station 52+68.51C
- 13 Typical Levee Sections I
- 14 Typical Levee Sections II
- 15 Offset Tables
- 16 Miscellaneous Details
- 17 Pump Station Site Plan
- 18 Pump Station and Intake Section
- 19 Gate Details
- 20 Gatewell Plan and Elevation
- 21 Gatewell Reinforcing
- 22 Gatewell Grating and Handrail Details
- 23 Stoplog Structure Plan & Section
- 24 Stoplog Structure Reinforcing
- 25 Stoplog Structure and Staff Gage Details
- 26 Stoplog Structure Guardrail Details
- 27 Stoplog Structure Miscellaneous Details
- 28 Pump Engine Building Plan, Elevations and Section
- 29 Pump Engine Building Foundation Reinforcing I
- 30 Pump Engine Building Foundation Reinforcing II
- 31 Pump Engine Building Framing Details
- 32 Pump Engine Building Door Details
- 33 Pump Engine Building Doors
- 34 Pump Engine Building Hinge and Locking Details
- 35 Pump Engine Building Walk in Door
- 36 Intake Structure Plan and Elevation
- 37 Intake Structure Foundation Plans

Plates (Continued)

	<i>Stage I (Continued)</i>
38	Intake Structure Reinforcing
39	Intake Structure Grating & Trashrack
40	Pump Station Site Plan
41	Pump Station and Pump Discharge Section
42	Stoplog Structure Plan and Section
43	Intake Structure Plan and Elevation
44	Ventilation and Exhaust Plans
45	Engine Ventilation and Exhaust Details
46	Electrical Details
	<i>Stage II</i>
47	Location Plan, Vicinity Map, and Index
48	Site Plan
49	Water Control Structure Plan and Section
50	Water Control Structure Details I
51	Water Control Structure Details II
	<i>Stage III</i>
52	Scour Repair Station 0+00 to Station 40+00
53	Breach Repair Setback Levee
54	As-Builts Station 4+00 Mainline Levee
55	As-Builts Station 13+00 Mainline Levee
56	As-Builts Station 16+00 Mainline Levee
57	As-Builts Station 1+00 Setback Levee
58	As-Builts Station 4+00 Setback Levee
59	As-Builts Station 7+50 Setback Levee
	<i>General</i>
60	Monitoring Plan
	<i>Stage IV</i>
61	Location Maps, General Index, Notes
62	Site Plan
63	Lower Overflow Roadway/ Spillway

**OPERATION AND MAINTENANCE MANUAL
FOR
PRINCETON REFUGE HABITAT
REHABILITATION AND ENHANCEMENT**

**UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM**

**POOL 14, MISSISSIPPI RIVER MILES 504.0–506.4R
SCOTT COUNTY, IOWA**

1. INTRODUCTION.

a. Background. The Princeton Refuge Habitat Rehabilitation and Enhancement Project (HREP), hereafter referred to as “the Princeton HREP project,” is a part of the Upper Mississippi River System (UMRS) Environmental Management Program (EMP). The Princeton HREP project is operated and maintained by the Iowa Department of Natural Resources (IADNR) under the terms of a Cooperative Agreement with the U.S. Fish and Wildlife Service (USFWS).

The levee surrounding Princeton was originally constructed in the late 1920’s and early 1930’s. A small capacity pump and outlet structure, installed in 1957, allowed some manipulation of water levels, but management was often compromised by limited pumping capability and levee overtopping during high water events. Levee improvements in 1982, in combination with the installation of a higher capacity pump in 1983, helped to overcome some of these difficulties. However, improved water level control was necessary to maximize and sustain wetland habitat quality and quantity for migratory birds.

As stated in the Definite Project Report (DPR), the Princeton HREP project was initiated due to the inability to maintain desirable water levels as the result of a deteriorated levee system and limited water level control. The purpose of the DPR was to evaluate alternatives for potential features and identify those that would maintain the project goals and objectives over a design life of 50 years. This report also presented a detailed proposal for the rehabilitation and enhancement of the Princeton HREP project and provided planning, engineering, and sufficient construction details of the selected plan to allow final design and construction to proceed following approval.

b. Purpose and Scope. The Operation and Maintenance (O&M) Manual serves as a guide for the management of the Princeton HREP project. O&M instructions are provided for the major project features. These instructions are consistent with the general procedures presented in the approved DPR. This document is written for management personnel who are familiar with the project and does not contain detailed information that is common knowledge to such personnel or which is presented in other regulations or references (see Table 2-7).

The intent of the operating instructions is to provide information that 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 to ensure long-term utilization of project features. A timely preventative maintenance program reduces and prevents damage to constructed features by early corrective action.

c. Use of Manual. The O&M Manual provides the general standards of operation and maintenance and establishes an initial frequency of management responsibilities to ensure satisfactory project performance. This document is divided into the following sections: Section 1 - Introduction, Section 2 - Historical Summary, Section 3 - Description of Project Features, Section 4 - Inspections, Section 5 - Operation and Maintenance, and Section 6 - Performance Monitoring and Assessment. Sections 2 and 3 present historical summaries and descriptions of the major features as constructed for this project. Sections 4 and 5 include inspection procedures and O&M instructions for the major project features. Section 6 summarizes monitoring activities conducted through construction as well as an overview of continued monitoring actions. Performance monitoring is considered necessary to properly evaluate effects of the constructed project features. The attached drawings in Appendix L have been included to provide as-built conditions and typical sections of project features.

2. HISTORICAL SUMMARY.

a. Authorization and Location. The authority for this project is provided by the Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The Princeton HREP project was funded and constructed under this authorization by the U.S. Army Corps of Engineers (USACE), Rock Island District, in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Iowa Department of Natural Resources (IADNR).

The Princeton HREP project is located in Pool 14 along the right descending bank of the Upper Mississippi River navigation channel between River Miles (RM) 504.0 and 506.4, or approximately 1 mile north of the City of Princeton, Iowa. The entire refuge encompasses approximately 1,129 acres, with 418 acres being State lands and the remaining 711 acres being Federal lands. Plate 1 in Appendix L contains the location plan, vicinity map, and general notes for the Princeton HREP project.

b. Planning and Construction Activities.

(1) Summary. Table 2-1 summarizes the planning, engineering, design, and construction activities associated with the Princeton HREP project. These activities are further discussed in the following sections.

TABLE 2-1 Implementation Schedule			
Project Phase	Purpose	Project Milestone	Date Completed
Planning	Identify and define problems and establish need of project	Submit Fact Sheet	May 1988
		Approve Fact Sheet	June 1989
		SHPO Concurrence	April 1992
		O&M Agreement	June 1992
Engineering & Design	Quantify project objectives, perform preliminary design, satisfy NEPA and permit requirements, develop performance evaluation plan, obtain project approval for construction	Draft DPR	August 1993
		DPR Public Review	October 1994
		NEPA Public Review	November 1994
		Refuge Compatibility	December 1994
		Final DPR & EA Obtain Section 401/404 Permits	February 1995

**TABLE 2-1 (Continued)
Implementation Schedule**

Project Phase	Purpose	Project Milestone	Date Completed
		Final Plans & Specifications Project Cooperative Agreement	September 1995
		Approve Plans & Specifications Memorandum of Agreement	October 1995
Construction	Finalize plans and specifications, obtain operation and maintenance agreement, advertise and award construction contracts, construct project	Request for Proposal	November 1995
		Bid Opening	December 1995
		Award Contract	September 1996
		Notice to Proceed	October 1996
		Complete Stage I Construction	October 1999
		Complete Stage II Construction	July 2000
		Complete Stage II As-Builts	November 2000
		Complete Stage I As-Builts	May 2001
		Complete Stage III Construction	December 2001
		Complete Stage III As-Builts	January 2002
	Complete Stage IV Construction	September 2002	
	Complete Stage IV As-Builts	October 2002	

(2) Goals and Objectives. Project goals and objectives, formulated and quantified during the design phase, are summarized in Table 2-2.

TABLE 2-2 Project Goals and Objectives		
Goals	Objectives	Project Features
Enhance Wetland Habitat	Provide reliable food source for migratory birds	Levee restoration
		Water control improvements
	Increase overall vegetation diversity and availability of preferred wildlife foods	Mast tree planting

(3) Project Design. The project was designed by USACE, Rock Island District, in cooperation with the USFWS and IADNR. Design considerations and investigations are presented in the DPR dated February 1995.

(4) Construction Contracts.

(a) Stage I Contract. The Stage I contract was designated as an 8a set aside. The bid opening was conducted on December 18, 1995. Due to insufficient funds, negotiations for the project were delayed until March 1996. The Stage I construction contract was awarded to Malco Steel, Incorporated of Kansas City, Missouri, on September 13, 1996, in the amount of \$2,463,900.42. This contract was negotiated, awarded, and performed through cooperation with the Small Business Administration and was supervised by USACE, Rock Island District, Construction Division, Central Area Office.

The Stage I contract (DACW25-96-C-0019) included construction of the major project features. The existing access road was modified to function as a spillway. During high river levels, the overflow roadway (spillway) provides controlled filling, minimizing damage to the perimeter levee. The perimeter levee was reinforced and raised. The pump station was moved from the lower end to the middle of the wetland management unit (WMU). This relocation, along with the cross dike, provides independent water level control to the two WMUs. A spring flood in 1997 on the Mississippi River resulted in modifications to the construction schedule. Major damage occurred inside the refuge. The high river levels were enough to overtop the perimeter levee and scour the loose embankment material. The borrow areas were completely filled with water. With no means of dewatering the entire project, construction was delayed several weeks. Construction was essentially complete in November 1998, except for the mast tree plantings, which were conducted in the spring of 1999. A dedication ceremony was held in November 1999.

(b) Stage II Contract. The Stage II contract (DACW25-00-P-0003) was awarded to Kemp & Son Incorporated of Letts, Iowa, in the amount of \$72,379.20. This contract consisted of supplying a portable pump and construction of two CMP stoplog structures. Cross dike ditch excavation was also completed to provide improved drainage. The portable pump is an 8-inch Godwin CD225M driven by a John Deere 4045T diesel engine, mounted on a GP3052 highway trailer. Construction was complete in July 2000.

(c) Stage III Contract. The Stage III contract (DACW25-02-C-0011) was awarded to Phoenix Corporation of the Quad Cities from Port Byron, Illinois, in the amount of \$60,456.00. This contract consisted of repairs to the north perimeter levee as a result of the 2001 spring flood. Construction was complete in December 2001. Stage III drawings are illustrated in Appendix L, plates 33 through 40.

(d) Stage IV Contract. The Stage IV contract (DACW25-02-M-0333) was awarded to MPS Engineers, P.C. from West Des Moines, Iowa, in the amount of \$38,126.00. This contract consisted of repairs to the overflow roadway as a result of the 2001 spring flood. Construction was complete in September 2002. Stage IV drawings are illustrated in Appendix L, plates 61 through 63.

c. Actual Project Costs. A summary of overall project costs is presented in Table 2-3, with construction costs in Tables 2-4, 2-5, and 2-6. The original bid schedule for Stage I included Items 0001 through 0016, with Items 0017 through 0033 added as a result of modifications.

TABLE 2-3 Summary of Project Costs (as of October 2002)	
Description	Amount
Real Estate	12,587.90
Definite Project Report (DPR)	474,510.29
Planning, Engineering, and Design	391,408.88
Stage I Construction Contract	2,627,062.41
Stage II Construction Contract	144,425.87
Stage III Construction Contract	55,224.50
Stage IV Construction Contract	38,105.84
Construction Management	278,200.74
TOTAL	\$4,021,526.21

**TABLE 2-4
Stage I Construction Costs**

Item	Description	Quantity	U/M	U/P	Amount
0001	Performance Bond	1	LS	30,899.12	\$30,899.12
0002	Temporary Field Office	1	LS	18,872.00	18,872.00
0003	Telephone Bills				
0003AA	First \$720	720	DL	1.43	1,029.60
0003AB	Over \$720	720	DL	1.43	129.60
0004	Mobilization & Demobilization	1	LS	63,818.00	63,818.00
0005	Clearing & Grubbing	1	LS	164,449.00	164,449.00
0006	Pump Station	1	LS	543,396.00	543,396.00
0007	Stoplog Structure	1	LS	89,806.00	89,806.00
0008	Gatewell	1	LS	89,997.00	89,997.00
0009	Perimeter Levee Embankment Station 0+75 to 37+00 & Station 10+88B to 19+55B				
0009AA	First 4,700 Cubic Yards	4,700	CY	8.94	42,018.00
0009AB	Over 4,700 Cubic Yards	9,555	CY	8.94	85,421.70
0010	Perimeter Levee Embankment Station 37+00 to 10+88B & Station 19+55B to 23+32.7B				
0010AA	First 68,250 Cubic Yards	68,250	CY	8.94	610,155.00
0010AB	Over 68,250 Cubic Yards	45,716	CY	8.94	408,701.04
0011	Cross Dike Levee Embankment Station 0+00C to 52+68.5C				
0011AA	First 13,200 Cubic Yards	13,200	CY	8.94	118,008.00
0011AB	Over 13,200 Cubic Yards	4,419	CY	8.94	39,505.86
0012	Ditch Excavation Station 0+00C to 53+41C	734	CY	8.94	6,561.96
0013	Granular Surfacing	4,835.93	TN	18.41	89,029.47
0014	Stone Protection, Riprap				
0014AA	First 2,100 Tons	288.5	TN	34.58	9,976.33
0014AB	Over 2,100 Tons	0	TN	34.58	0
0015	Seeding	33.2	AC	2,055.00	68,226.00
0016	Security Gates	2	EA	6,196.00	12,392.00
0017	Granular Surfacing	1600	TN	29.77	47,632.00
0018	Filter Fabric	4450	SY	1.77	7,876.50
0019	Cross Dike-Clear/Grub	1	LS	8,190.69	8,190.69
0020	Water Access at Cross Dike	1	LS	2,169.22	2,169.22

TABLE 2-4 (Continued). Stage I Construction Costs					
Item	Description	Quantity	U/M	U/P	Amount
0021	Regrade Borrow Areas	1	LS	3,481.55	3,481.55
0022	Access at Inlet Structure	1	LS	486.42	486.42
0023	Repair Scour Hole	1	LS	12,326.76	12,326.76
0024	Additional Survey	1	LS	1,429.71	1,429.71
0025	Pump Revisions	1	LS	7,146.51	7,146.51
0026	Remobilization	1	LS	6,773.11	6,773.11
0027	Flood Damage	1	LS	10,581.45	10,581.45
0028	Hydraulic Hose	1	LS	7,127.67	7,127.67
0029	Bedding Stone	1	LS	3,485.36	3,485.36
0030	Stripped Material	1	LS	5,002.54	5,002.54
0031	Flatten Slopes	1	LS	2,031.00	2,031.00
0032	Seed Specifications	1	LS	54.18	54.18
0033	Geotextile Fabric	1	LS	8,876.06	8,876.06
TOTAL					\$2,627,062.41

The original bid schedule for Stage II included Items 0001 through 0006, with Items 0007 through 0010 added as a result of modifications. Stage III was an equipment rental contract with Items 0002 through 0008 complete with operation personnel and supplies.

TABLE 2-5. Stage II Construction Costs					
Item	Description	Quantity	U/M	U/P	Amount
0001	New Cross Dike Excavation	1	LS	30,899.12	30,899.12
0001AA	First 3,200 Cubic Yards	3,200	CY	6.88	22,016.00
0001AB	Over 3,200 Cubic Yards	6,321.67	CY	6.88	43,493.09
0002	Existing Cross Dike Ditch Excavation				
0002AA	First 490 Cubic Yards	490	CY	6.88	3,371.20
0002AB	Over 490 Cubic Yards	957.74	CY	6.88	6,589.25
0003	Water Control Structure	2	EA	10,265.60	20,531.20
0004	Seeding, Cross Dike	1	LS	2,000.00	2,000.00

**TABLE 2-5 (Continued).
Stage II Construction Costs**

0005	Seeding, Perimeter Levee				
0005AA	First 1,600 Square Yards	1,600	SY	3.13	5,008.00
0005AB	Over 1,600 Square Yards	800	SY	3.13	2,504.00
0006	Relocation of Existing Brush Piles	1	LS	10,000.00	10,000.00
0007	Additional Survey	1	LS	3,780.00	3,780.00
0008	Additional Final Survey	1	LS	2,220.00	2,220.00
0009	Additional Seeding, Cross Dike	1	LS	6,764.10	6,764.10
0010	Additional Ditch Excavation	1	LS	16,149.03	16,149.03
TOTAL					\$144,425.87

**TABLE 2-6
Stage III Construction Costs**

Item	Description	Quantity	U/M	U/P	Amount
0001	Mobilization	1	LS	XXX	\$5,000.00
0002	Tractor; crawler type, minimum engine horsepower of 150, equipped w/hydraulically operated bulldozer blade of minimum 108 inch width, and tower tamping roller				
0002AA	First 48 Hours	48	HR	\$140.00	\$6,720.00
0002AB	Over 48 Hours	8	HR	\$140.00	\$1,120.00
0003	Tractor; crawler type, minimum engine horsepower of 150, equipped w/hydraulically operated bulldozer blade of minimum 108 inch width				
0003AA	First 24 Hours	24	HR	\$125.00	\$3,000.00
0003AB	Over 24 Hours	8	HR	\$125.00	\$1,000.00
0004	Tractor; crawler type, minimum engine horsepower of 90, maximum ground pressure of 7.0 psi, equipped w/hydraulically operated bulldozer blade of minimum 96 inch width				
0004AA	First 72 Hours	72	HR	\$96.00	\$6,912.00
0004AB	Over 72 Hours	5.75	HR	\$96.00	\$552.00
0005	Dump Truck; off-highway type, end dump, 13 to 16 cubic yard capacity				
0005AA	First 48 Hours	37.5	HR	\$118.00	\$4,425.00
0005AB	Over 48 Hours	0	HR	\$118.00	\$0.00
0006	Dump Truck; off-highway type, end dump, 13 to 16 cubic yard capacity				
0006AA	First 48 Hours	44.25	HR	\$118.00	\$5,221.50
0006AB	Over 48 Hours	0	HR	\$118.00	\$0.00
0007	Dump Truck; off-highway type, end dump, 13 to 16 cubic yard capacity				
0007AA	First 48 Hours	48	HR	\$118.00	\$5,664.00
0007AB	Over 48 Hours	0	HR	\$118.00	\$0.00
0008	Hydraulic Excavator; crawler type, minimum 3 cubic yard capacity				
0008AA	First 48 Hours	48	HR	\$162.00	\$7,776.00
0008AB	Over 48 Hours	7	HR	\$162.00	\$1,134.00
0009	Demobilization	1	LS	XXX	\$5,000.00
0010	Survey Support				
0010AA	First 3 Days	2	DY	\$680.00	\$1,360.00
0010AB	Over 2 Days	0.5	DY	\$680.00	\$340.00
TOTAL					\$55,224.50

**TABLE 2-7
Stage IV Construction Costs**

Item	Description	Quantity	U/M	U/P	Amount
0001	Roadway Excavation	1	LS	26,526.00	26,526.00
0002	Granular Surfacing (3")	800	TN	12.00	9,600.00
0003	Seeding	1	LS	2,000.00	2,000.00
0004	Variation in Quantity	1	LS	-20.16	-20.16
TOTAL					\$38,105.84

d. Project References. Several reports and documents related to this project were reviewed and incorporated into the O&M Manual. Table 2-8 below summarizes these related project references.

TABLE 2-8 Project References		
Title	Purpose	Date
<i>Definite Project Report (R-10F) with Integrated Environmental Assessment, Princeton Wildlife Management Area, Upper Mississippi River System Environmental Management Program, Pool 14, Mississippi River Miles 504.0 – 506.5, Scott County, Iowa</i>	To provide guidance on planning, designing, constructing, operating, and managing the recommended plan for project approval purposes	February 1995
<i>Shop Drawings</i>	To provide detailed operation and maintenance instructions for specific pieces of equipment as recommended by the manufacturer	October 1999
<i>As-Built Drawings, Upper Mississippi River System, Environmental Management Program, Pool 14, River Miles 504.0 thru 506.4, Princeton Wildlife Management Area, Stage II</i>	To provide sufficient detail for construction of the cross dike ditch and water control structures	November 2000
<i>Draft Operation and Maintenance Manual, Princeton Wildlife Management Area, Upper Mississippi River Environmental Management Program, Pool 14, River Miles 504.0 - 506.4, Scott County, Iowa</i>	To serve as a guide for the operation and maintenance of the Princeton HREP project and to provide operation & maintenance instructions for major features	March 2001
<i>As-Built Drawings, Upper Mississippi River System, Environmental Management Program, Pool 14, River Miles 504.0 thru 506.4, Princeton Wildlife Management Area</i>	To provide sufficient detail for construction of the wetland management unit, which consisted of levee restoration, water control improvements, mast tree plantings	May 2001
<i>Post-Construction Performance Evaluation Report – Year 3 (2001) and Flood Damage Assessment (2001), Upper Mississippi River System, Pool 14, Mississippi River Miles 504.0-506.4R, Scott County, Iowa</i>	To provide a summary of the monitoring data, field observations, and operation & maintenance, as well as an assessment of the spring 2001 flood damages	November 2001
<i>As-Built Drawings, Upper Mississippi River System, Environmental Management Program, Pool 14, River Miles 504.0 - 506.4, Scott County, Iowa, Princeton Wildlife Management Area, Stage III, Emergency Levee Repairs, Lease of Equipment</i>	To provide sufficient detail for construction of setback levee and repair of scour areas along north perimeter levee from flood of 2001	January 2002
<i>As-Built Drawings, Upper Mississippi River System, Environmental Management Program, Pool 14, River Miles 504.0 - 506.4, Scott County, Iowa, Princeton Wildlife Management Area, Stage IV, Repair Overflow Roadway</i>	To provide sufficient detail for construction of setback levee and repair of scour areas along the overflow roadway from the flood of 2001	October 2002

3. DESCRIPTION OF PROJECT FEATURES.

a. Project Data. The Princeton HREP project consists of a 2-cell wetland management unit (WMU) to enhance wetland habitat. Plate 2 in Appendix L contains the site plan for the Princeton HREP project. Project data have been collected for the perimeter levee, cross dike, overflow roadway (spillway), intake structure, pump engine building, reinforced stoplog structure, CMP stoplog structures (2), and the gateway structure. Table 3-1 presents a quantitative summary of the project data.

TABLE 3-1 Summary of Project Data		
Project Feature	Measurement or Quantity	Units of Measure
<i>Perimeter Levee</i>		
Length	16,400	Feet
Crown Width	10 - 12	Feet
Side Slopes	4:1	Horizontal:Vertical
Level of Protection	15	Year Event
Design Top Elevation	581.3 – 582.3	Feet NGVD 1912
Embankment Volume	100,000	Cubic Yards
<i>Overflow Roadway</i>		
Length	2,300	Feet
Crown Width	24	Feet
Side Slopes	4:1	Horizontal:Vertical
Level of Protection	10	Year Event
Design Top Elevation	580.3	Feet NGVD 1912
Embankment Volume	5,000	Cubic Yards
<i>Cross Dike</i>		
Length	5,158	Feet
Crown Width	10	Feet
Side Slopes	4:1	Horizontal:Vertical
Level of Protection	< 5	Year Event
Design Top Elevation	578	Feet NGVD 1912
Embankment Volume	18,500	Cubic Yards
<i>Pump Station Intake Structure</i>		
Concrete Top Elevation	578	Feet NGVD 1912
Concrete Sill Elevation	568	Feet NGVD 1912
<i>Intake Pipe</i>		
Diameter	24	Inches
Length (to centerline traverse)	27	Feet
Invert Elevation	570	Feet NGVD 1912
Riprap	182	Tons

**TABLE 3-1 (Continued)
Summary of Project Data**

Project Feature	Measurement or Quantity	Units of Measure
<i>Pump Station Engine Building</i>		
Length	28	Feet
Width	22	Feet
Concrete Floor Elevation	583.5 – 583.78	Feet NGVD 1912
<i>Concrete Stoplog Structure</i>		
Concrete Top Elevation	578.5	Feet NGVD 1912
Concrete Sill Elevation	574	Feet NGVD 1912
Length	16	Feet
Width	5	Feet
<i>Discharge Pipe</i>		
Diameter	24	Inches
Length (to centerline traverse)	90.5	Feet
Invert Elevation	575	Feet NGVD 1912
Riprap	20	Tons
<i>CMP Stoplog Structures (2)</i>		
Diameter	24	Inches
Invert Elevation West Structure	571.50	Feet NGVD 1912
Invert Elevation Middle Structure	572.10	Feet NGVD 1912
<i>Gateway Structure</i>		
Concrete Top Elevation	582	Feet NGVD 1912
Concrete Floor Elevation	573	Feet NGVD 1912
Slide Gate	1	Each
<i>RCP</i>		
Diameter	36	Inches
Length	64	Feet
Landside Invert Elevation	573.25	Feet NGVD 1912
Riverside Invert Elevation	572.75	Feet NGVD 1912
Riprap	22	Tons

b. General Description. The Princeton HREP project consists of wetland habitat enhancement through levee restoration, water control improvements, and mast tree plantings. Water level control is provided by construction of low levees, which are used to impound water during seasonal waterfowl migrations. River water is provided to the project through use of a portable pump or by gravity flow. The two wetland cells can be managed independently through operation of stoplog structures located along the cross dike. Mast tree plantings provide vegetation diversity and availability of preferred wildlife foods. The project features discussed in more detail below include the water control plan, water source, perimeter levee, overflow roadway (spillway), cross dike, pump station, water control structures, gateway structure, mast tree plantings, site access, and borrow

areas. These features and additional project components are shown in Appendix L. Photographs of project features can be viewed in Appendix I.

c. Water Control Plan. Over 700 acres of the Princeton HREP project area can be impounded by the constructed earthen levees and associated water control structures to create a 357-acre forested north WMU and a 344-acre non-forested south WMU as shown on plate 2 in Appendix L. The basic operating plan for the Princeton HREP project is to maintain a lower water elevation in the spring and summer and a higher water elevation in the fall and winter, as illustrated in Table 2-2. To manage for specific vegetation needs, it is best to be able to control water levels independently within two WMUs, hereafter referred to as the North Wetland Management Unit (NWMU) and South Wetland Management Unit (SWMU).

To accomplish independent filling of the WMUs, the pump station directly discharges into a reinforced concrete structure (located at the east end of the cross dike) where flow direction can then be controlled by placement or removal of stoplogs. To facilitate independent drainage of the WMUs, a new gatewell structure was constructed to gravity drain the NWMU. The existing gatewell structure at the downstream end of the project area is used to gravity drain the SWMU. Two CMP stoplog structures were added to the cross dike to increase capacity and facilitate drainage to a lower elevation. A portable pump may also be used to increase or decrease water elevations within the WMUs.

TABLE 3-2 Wetland Management Unit Water Control Plan				
Water Elevation (Feet)	Area < 1' Deep (Acres)	Acres 1'-2' Deep (Acres)	Acres > 2' Deep (Acres)	Total Area Flooded (Acres)
<i>SWMU</i>				
574	167.1	9.8	0.0	177.0
575	167.0	167.1	9.9	344.0
576	98.0	167.0	177.0	442.0
577	33.0	98.0	344.0	475.0
<i>NWMU</i>				
574	36.0	0.0	0.0	36.0
575	181.0	36.0	0.0	217.0
576	140.0	181.0	36.0	357.0
577	97.0	140.0	217.0	454.0

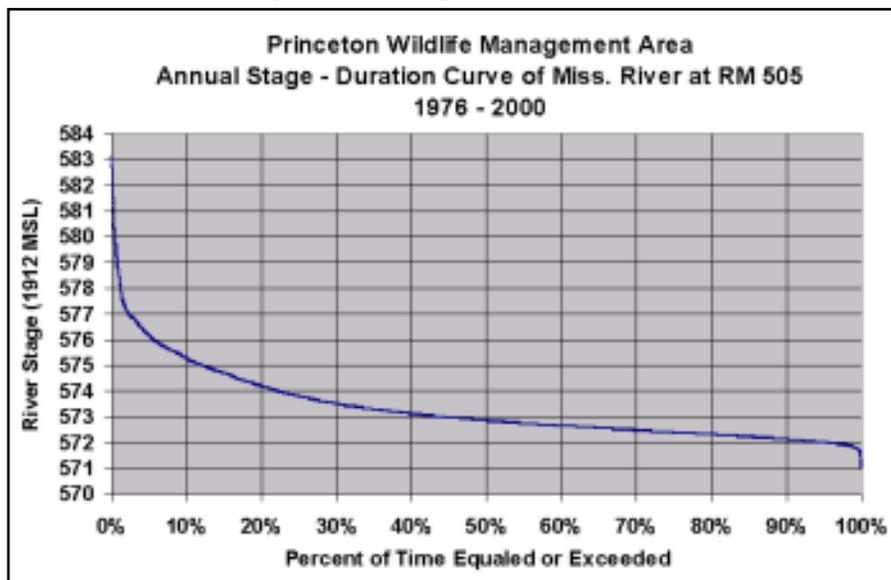
Table 3-2 shows the surface areas of incremental water depths for various flooding heights for each WMU. The optimum water surface elevations are 576 feet NGVD in the NWMU and 575 feet NGVD in the SWMU. These elevations represent those that maximize the

water surface area with water 1 to 2 feet deep. Migratory waterfowl, in particular dabbling ducks, require water depths of 12 to 18 inches for access to food plants. The optimum water surface elevations represent maximum levels for design purposes; actual operating levels may be lower if desired.

d. Water Source. The pump station intake is located in Grant Slough, which is a backwater of the Mississippi River. Water surface elevations in the slough fluctuate with those of the river, but overall a flat pool elevation of 572 feet NGVD is maintained for navigation. Therefore, the slough is considered to be a reliable water source and will accommodate the annual management plan.

TABLE 3-3 Elevation Frequency Relationships			
Storm Frequency	RM 504.0 South End	RM 505.0 Cross Dike	RM 506.5 North End
5-Year	578.7	579.1	579.7
10-Year	580.3	580.7	581.3
25-Year	582.0	582.5	583.1
50-Year	583.3	583.8	584.4
100-Year	584.4	584.8	585.5
200-Year	585.6	586.0	586.7
500-Year	587.0	587.4	588.0

Figure 3-1. Stage-Duration Curve



Mississippi River discharge frequency relationships and corresponding water surface elevations were developed by USACE, Rock Island District, in cooperation with the St. Paul and St. Louis Districts for the Upper Mississippi River Basin Commission. Table 3-3 illustrates the elevation frequency relationships, while Figure 3-1 presents the stage/duration curve for selected river miles adjacent to the Princeton HREP project.

e. Levee System.

(1) Perimeter Levee. The existing perimeter levee is approximately 3.1 miles in length. The maximum top elevation for the WMU perimeter levee is 582.3 feet NGVD (Station 0+00 to Station 56+00). To minimize damage potential, the perimeter levee profile parallel to the Mississippi River (Station 56+00 to Station 164+00) is sloped from elevation 582.3 feet NGVD at the upstream end to elevation 581.3 feet NGVD at the downstream end. This design provides for gradual overtopping during a 15-year flood event or greater. The levee top width is 12 feet in reaches having an access road and 10 feet in reaches without an access road. The levee side slopes are shaped to a minimum of 4 horizontal on 1 vertical. The plan, profile, and section drawings for the perimeter levee are located in Appendix L, plates 8 through 12.

(2) Overflow Roadway. To provide controlled overtopping of the levee system, a 2,300-foot overflow roadway (spillway) was constructed at elevation 580.3 feet NGVD or approximately 2 feet lower than the north end of the perimeter levee. This elevation provides for gradual overtopping during a 10-year flood event or greater. The top width is 24 feet with minimum side slopes of 4 horizontal on 1 vertical. The overflow roadway allows rapid filling of the WMU interior water surfaces prior to overtopping of the perimeter levee. An overtopping analysis is contained in Appendix H of the DPR. The plan, profile, and section drawings for the overflow roadway are presented on plates 13 and 15 in Appendix L.

To ensure proper function during flood events, it is critical that the overflow roadway maintain an elevation at or below the design grade of 580.3 feet NGVD. This elevation can be field verified on occasion through use of a benchmark located at the east end of the overflow roadway. The benchmark is a chiseled “X” on the northeast wingwall of the gatewell structure at elevation 577.28 feet NGVD.

(3) Cross Dike. To provide enhanced management capabilities, a 5,158-foot cross dike was constructed at elevation 578 feet NGVD. This elevation provides for gradual overtopping during a 5-year flood event or greater. The top width is 10 feet with minimum side slopes of 4 horizontal on 1 vertical. The plan, profile, and section drawings for the cross dike are presented on plates 14 and 15 in Appendix L.

f. Pump Station. A pump station was constructed at the intersection of the perimeter levee and cross dike. The pump station is designed to fill the NWMU to elevation 576 feet NGVD in 7 days and the SWMU to elevation 575 feet NGVD in 5 days. Actual fill times are longer than the design intent. The pump station consists of an intake structure and engine building. Equipment data for the pump station are contained in

Appendix F. Additional details for the pump station are presented on plates 16 through 23 in Appendix L.

(1) Intake Structure. The intake structure is located on the riverside slope of the levee and was constructed of reinforced concrete. The intake structure has a top elevation of 578 feet NGVD and a sill elevation of 568 feet NGVD. The intake pipe from this structure to the engine building is 24 inches in diameter and approximately 27 feet in length with an invert elevation of 570 feet NGVD. The base of the intake structure is protected with riprap.

(2) Engine Building. The engine building was constructed of reinforced concrete with a floor elevation of 583.5 feet NGVD. The size of the engine building is 28 feet long by 22 feet wide. This building provides weather-tight housing for the pump engine, trailer, an additional fuel tank, diesel engine generator, and miscellaneous supplies. A 16,000-gallon per minute hydraulic pump provides the necessary flow to fill the WMUs.

g. Water Control Structures.

(1) Concrete Stoplog Structure. The stoplog structure is located at the east end of the cross dike in conjunction with the pump station discharge pipe. This pipe is 24 inches in diameter and approximately 90 feet long with an invert elevation of 575 feet NGVD. The stoplog structure was constructed of reinforced concrete with a top elevation of 578.5 feet NGVD and a sill elevation of 574 feet NGVD. The base of this structure is 16 feet long by 5 feet wide. The placement of aluminum stoplogs at either end of this structure directs the pumped water into the NWMU or SWMU as needed. Heavy-duty metal grating was provided across the top for vehicular access. Additional details are provided in Appendix L, plates 24 and 25.

(2) CMP Stoplog Structures. In addition, two stoplog structures with 24-inch-diameter CMPs are located near the middle and west end of the cross dike. These structures provide water level control between the WMUs at lower elevations by gravity flow. The invert elevations for the middle and west structures are 572.1 and 571.5 feet NGVD, respectively. Further details are shown in Appendix L, plates 27 through 32.

h. Gatewell Structure. A gatewell structure with a 36-inch-diameter reinforced concrete pipe is located immediately upstream of the intake structure along the perimeter levee. Operation of this structure allows for filling or dewatering of the WMUs, whenever river levels will allow. Additional details are illustrated in Appendix L, plate 26.

i. Mast Tree Plantings. In the NWMU, approximately 21 acres of mast trees were planted. Two sites were selected for plantings, one near the mid-point of the north perimeter levee and one in the eastern half just south of the power line. The species selected consist of swamp white oak, pin oak, bur oak, pecan, hickory, and cedar.

j. Site Access. Access to the project is by county road from U.S. Highway 67. There are three access areas to the Princeton HREP project: south, middle, and north.

Each area has a parking lot and security gate to control access. The IADNR operates these gates as necessary to prevent public vehicular access and minimize consequent disturbance. A crushed stone surface road, 10 feet in width, runs along the top of the perimeter levee from the south parking lot to the pump station. This road facilitates delivery of materials for the pump station. Plate 2 in Appendix L illustrates the site access areas, parking lots, and access road to the pump station.

k. Borrow Areas/Potholes. Material for perimeter levee restoration came from the riverside slope and borrow areas located within the project boundaries. Material for cross dike construction came from the adjacent ditch excavation and was supplemented with the borrow areas. The excavated ditch along the south side of the cross dike serves as boat access from the west parking lot to the SWMU.

During construction, the contractor removed the material from the borrow areas in strips, rather than excavating one big hole. Therefore, if seepage of ground water occurred, it would be contained and not saturate the entire area. The strips are approximately 10 feet apart. Now these strips function as potholes, creating additional habitat benefits. The borrow areas and soil borings are identified on plates 2 and 4 in Appendix L. The soil boring logs are presented in Appendix L, plates 5 through 7.

l. Utilities. A transmission line running east-west crosses the north portion of the NWMU. The size of this line is approximately 345,000 Volts. The transmission line eventually crosses the Mississippi River. At all times, measures shall be taken to ensure electrical safety and to preserve the integrity of the transmission line foundations.

4. INSPECTIONS.

a. Purpose. An active preventative maintenance program reduces damage to constructed features by taking early corrective action. Additional costs, associated with repair and rehabilitation, are also avoided. An effective preventative maintenance program requires regular, thorough inspections. These inspections will aid the IADNR Site Manager in discovering deficiencies within the project. In addition, they will provide the IADNR Site Manager with baseline condition data. These data are necessary for considering repair options of major damage.

The two types of inspections for the Princeton HREP project are project inspections, conducted by the IADNR Site Manager, and joint inspections, conducted by the IADNR Site Manager together with personnel from USACE and USFWS.

b. Project Inspections. Annual project inspections shall be performed by the IADNR Site Manager or appropriate representative for the purpose of noting routine deficiencies and initiating corrective actions. This inspection shall be conducted at periods not exceeding 12 months and shall follow inspection guidance presented in subsequent sections of this manual. It is suggested that the inspection be conducted every May, which is representative of site conditions following high river levels. Additional project inspections shall occur as necessary after flood events or as scheduled by the IADNR Site Manager.

A project inspection checklist has been developed as presented in Appendix C. It is required that the IADNR Site Manager furnish a signed copy of the completed checklist to the U.S. Army Corps of Engineers; Rock Island District; ATTN: CEMVR-ED; Clock Tower Building; Post Office Box 2004; Rock Island, Illinois 61204-2004; immediately following each project inspection.

c. Joint Inspections. Joint inspections by the IADNR Site Manager, USFWS, and USACE shall be completed in accordance with ER 1110-2-100, the Project Cooperation Agreement, and the Memorandum of Agreement, as illustrated in Appendix B. These inspections shall be initiated by USACE. The purpose of joint inspections is to assure that adequate maintenance is being performed as presented in this manual. The Rock Island District Engineer or Authorized Representative shall have access to all portions of the constructed project upon coordination with the IADNR Site Manager.

Additional joint inspections shall be formally requested by the IADNR Site Manager immediately following a specific storm or flood event that causes damage in excess of the annual operation and maintenance costs specified in this manual. A comparison of project inspections before and after such events together with the joint inspections shall be the basis for determining maintenance responsibility and potential rehabilitation by USACE as stated in the Memorandum of Agreement.

5. OPERATION AND MAINTENANCE.

a. General. This section presents management instructions for the major project features that were designed and constructed to minimize O&M requirements. The estimated annual O&M costs are presented in Table 5-1.

TABLE 5-1 Estimated Annual Operation and Maintenance Costs (as of June 2002)				
Description	Quantity	Unit	Unit Price	Amount
<i>Operation</i>				
Pump Fuel	1	LS	\$11,000.00	\$11,000.00
Pump Station Operation	35	HR	\$10.00	\$350.00
Gate Operation	16	HR	\$40.00	\$640.00
Stoplog Operation	16	HR	\$40.00	\$640.00
<i>Subtotal Operation</i>				<u>\$12,630.00</u>
<i>Maintenance</i>				
Levee Inspection	40	HR	\$40.00	\$1,600.00
Levee Mowing	55	AC	\$45.00	\$2,475.00
Pump Maintenance	40	HR	\$50.00	\$2,000.00
Crushed Stone	50	TN	\$20.00	\$1,000.00
Stoplog Replacement	4	EA	\$10.00	\$40.00
Riprap	30	TN	\$30.00	\$900.00
Levee Erosion Control	20	HR	\$100.00	\$2,000.00
Planting Maintenance	15	AC	\$40.00	\$600.00
<i>Subtotal Maintenance</i>				<u>\$10,615.00</u>
<i>Rehabilitation</i>				
Pump Replacement	1	LS	\$5,000.00	\$5,000.00
<i>Subtotal O&M</i>				\$28,245.00
Contingencies				\$2,000.00
TOTAL ESTIMATED ANNUAL O&M COSTS				\$30,245.00

^{1/} Rehabilitation cannot be accurately estimated. Rehabilitation is reconstructive work that significantly exceeds the annual operation and maintenance requirements identified above and which is needed as a result of major storms or flood events.

The IADNR Site Manager shall take the appropriate steps to correct conditions disclosed by project inspections or joint inspections. Regular maintenance repair measures shall be

accomplished during the appropriate season as scheduled by the IADNR Site Manager to ensure feature serviceability. Appropriate advance measures shall be taken to ensure the availability of adequate labor and materials to meet contingencies.

Project features shall be continuously maintained and operated to obtain maximum benefits. No encroachment or trespass that will adversely affect the efficient operation or maintenance of the project shall be permitted upon the constructed features. No improvement shall be passed over, under, or through the constructed features, nor shall any excavation or construction be permitted within these features without prior approval by the USACE, Rock Island District. Such improvements or alterations, which are desirable and permissible, shall 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 shall be obtained from the Rock Island District Engineer or, if otherwise obtained, shall be submitted for approval. As-built drawings or prints showing improvements or alterations as finally constructed shall be furnished to the Rock Island District Engineer or Authorized Representative after completion of such work.

b. Perimeter Levee, Overflow Roadway, and Cross Dike.

(1) Operation. Specific operation requirements will be performed as determined by the IADNR Site Manager. During operational inundation periods, the levee system shall be inspected to verify the following:

- No indications of slides or sloughs are developing;
- No wave wash or scouring action is occurring;
- No high reaches of overflow roadway above design grade exist to delay filling of the WMU interior;
- No low reaches of perimeter levee below design grade exist that may be overtopped prematurely; and
- No other conditions exist which might endanger the levee system.

Steps shall be taken to control any condition that endangers the levee system and to repair the damaged section.

(2) Maintenance. The IADNR Site Manager shall provide at all times such maintenance as may be necessary to ensure the serviceability of the levee system in time of inundation. Measures shall be taken such as mowing, burning, and herbicide application to promote the growth of sod, control burrowing animals, provide routine mowing to extend 10 feet horizontally from the toe of the levee where applicable, remove wild growth and drift deposits, and repair damage caused by erosion or other forces. Any major repairs shall be coordinated with USACE, Rock Island District.

Project inspections shall be made by the IADNR Site Manager to ensure that the above maintenance measures are being effectively carried out and to verify the following:

- No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;
- No caving has occurred on either the landside or the riverside of the levee that may affect the stability of the levee section;
- No seepage, saturated areas, or sand boils are occurring;
- No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sods;
- The crown of the levee is shaped to drain readily;
- No unauthorized grazing or vehicular traffic on the levee; and
- No encroachments are occurring that may endanger the levee system or hinder its proper and efficient functioning during times of inundation.

Such inspections shall be made prior to the beginning of an inundation period, immediately following major high water periods, and otherwise at intervals necessary to insure the best care of the levee system or once per year. Steps shall be taken to correct conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the IADNR Site Manager. All routine maintenance and corrective actions completed shall be documented in the levee inspection report provided in Appendix G.

c. Pump Station.

(1) Operation. Specific operation requirements will be performed as determined by the IADNR Site Manager. To inundate the WMUs, the pump must be activated manually. The pump also must be deactivated manually once the desired interior water elevations are achieved. Pumping to maintain interior elevations during WMU operation also will be by manual activation/deactivation. To recover a 6-inch drop in the interior water level, approximately 4 days of pumping will be required. Once initial flooding is completed, the overall decrease in water elevation during the impoundment period (November through February) due to seepage, infiltration, and evaporation is not expected to exceed 6 inches. The pump station and reinforced concrete stoplog structure are equipped with staff gages to easily determine water levels in the WMUs.

As with more recently developed EMP projects, a formal Annual Management Plan has been developed for the Princeton HREP project. This plan was developed by the USACE, in coordination with the IADNR, as shown in Table 5-2.

TABLE 5-2 Annual Management Plan		
Month	Action	Purpose
April to July	Dewater area by gravity flow or portable pump	Expose and maintain mudflats to allow revegetation
August to November	Gradually increase water levels to correspond with growth of marsh plant community	Provide access to food plants for migratory waterfowl
December to April	Maintain water levels to maximum extent possible and then release water late during early spring	Maintain winter furbearer habitat and then prepare for aquatic plant germination through gradual water release

(2) Maintenance. The Rock Island District shall monitor the management of the pump station through annual inspections. In addition, the IADNR Site Manager shall perform inspections of the pump station as necessary, but as a minimum, no less than once per year. Steps shall be taken to correct conditions disclosed by such inspections. A pump station inspection guide is provided in Appendix E to assist the IADNR Site Manager in performing the necessary maintenance.

Project inspections shall be made by the IADNR Site Manager to ensure that the above maintenance measures are being effectively carried out and to check the following:

(a) Structure. Visually inspect all structural surfaces to discover any adverse conditions such as cracks or excessive corrosion. Conditions that may affect the integrity of the structure shall be corrected as soon as practicable.

(b) Lighting/Generator. All electrical lighting and associated wiring shall be examined closely and their overall condition assessed. The standby generator shall be periodically operated to ensure reliability in accordance with the manufacturer's operation and maintenance manual. Any corroded, loose, or broken contacts shall be cleaned, tightened, and repaired as needed.

(c) Pump. The pump shall be observed for indications of improper operation or damage. Avoid operation of pump during sump cavitation or ice conditions. 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 will require periodic

cleaning. Inspect the hydraulic piping and hoses for evidence of leaking or deterioration. During operation, the engine gauges shall be monitored for proper engine oil pressure and temperature, revolutions per minute and hydraulic oil pressure, and temperature. Perform pump, engine, and hydraulic maintenance as required by the pump manufacturer's operation and maintenance manual.

Stoplogs shall be installed in the slots, prior to major seasonal flooding, to avoid sediment inflow into the project. Flow tests have shown that larger pumping capacities are achieved with a 3-inch siphon break gate valve open. Pump operation shall occur with this valve in the open position.

(d) Trash Racks. The IADNR Site Manager shall check for trash accumulation at racks and clear as necessary. If operating conditions or observations indicate trouble is developing and as operating conditions will permit, inspections shall be performed to investigate general condition.

(e) Sump. The IADNR Site Manager shall check for sedimentation in the sump. Accumulated sediments in the sump may interfere with the proper operation of the pump and shall be cleaned out prior to use of the pump.

d. Water Control Structures.

(1) Operation. Specific operation requirements will be performed as determined by the IADNR Site Manager. When the WMUs are in use, the stoplogs shall be in place. Stoplogs can be placed at either end of the reinforced concrete structure to direct the flow of water to the desired cell during pumping. To prevent overtopping damage to the cross dike, all stoplogs shall be removed and stored when the water levels of the Mississippi River rise, and overtopping of the perimeter levee is predicted. Overtopping occurs at the overflow roadway at an elevation of 580.3 feet NGVD at RM 504. This elevation correlates to a river stage of 7.5 feet at the Princeton Gage, located at RM 502.1R on the concrete retaining wall. The stoplogs shall remain out until the water levels recede and the unit goes back into operation. The stoplogs can also be removed to direct the flow of water from one cell to the other to facilitate drainage.

(2) Maintenance. The water control structures shall be inspected immediately following a high water event to determine whether seepage is taking place along the lines of its contact with the embankment. Corrective action shall be taken upon discovery of any adverse conditions at the structures.

Project inspections of the water control structures shall be made by the IADNR Site Manager to verify the following:

- Stoplog channels are clear of debris and the stoplogs are present;
- Inlet and outlet channels are open;

- Care is being exercised to prevent the accumulation of trash and debris; and
- Erosion is not occurring adjacent to the structure that may endanger its function.

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

e. Gatewell Structures.

(1) Operation. Specific operation requirements will be performed as determined by the IADNR Site Manager. When the WMUs are in use, or water levels of the Mississippi River rise with heavy sediment loads, the gatewell structures in the perimeter levee and overflow roadway shall be closed to prevent sediment from entering the project. The gatewell structures shall remain closed until the following occurs:

- Heavy sediment floodwaters recede;
- The WMUs are not in use; or
- Overtopping of the perimeter levee is predicted.

Overtopping occurs at the overflow roadway at an elevation of 580.3 feet NGVD at RM 504. This elevation correlates to a river stage of 7.5 feet at the Princeton Gage, located at RM 502.1R on concrete retaining wall.

(2) Maintenance. The gatewell structures shall be inspected immediately following a high water event to determine whether seepage is taking place along the lines of its contact with the embankment. Corrective action shall be taken upon discovery of any adverse conditions at the structures.

Project inspections of the gatewell structures shall be made by the IADNR Site Manager to verify the following:

- Slide gate is in good operating condition;
- Inlet and outlet channels are open;
- Care is being exercised to prevent the accumulation of trash and debris; and
- Erosion is not occurring adjacent to the structure that may endanger its function.

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

f. Mast Tree Plantings.

(1) Operation. Specific operational requirements shall be performed as determined by the IADNR Site Manager. The Rock Island District shall monitor the survival and growth of mast trees through annual inspections of the planting sites. The IADNR Site Manager shall perform remedial action as necessary to ensure survival and growth. In addition, the IADNR Site Manager shall keep records of any herbicide applications and inspections, as well as any corrective actions taken to ensure survival.

(2) Maintenance. The mast tree plantings shall be inspected immediately following a high water event to determine any negative impacts. Corrective action shall be taken upon discovery of any adverse conditions at the planting sites.

Project inspections of the mast trees shall be made by the IADNR Site Manager to verify the following:

- Survival and growth of the seedlings; and
- Unwanted vegetation is kept to a minimum.

Steps shall be taken to repair damage or remedy adverse conditions disclosed by such inspections.

g. Borrow Areas/Potholes.

(1) Operation. Specific operational requirements shall be performed as determined by the IADNR Site Manager.

(2) Maintenance. The borrow areas/potholes shall be inspected immediately following a high water event to determine any negative impacts. Corrective action shall be taken upon discovery of any adverse conditions at the potholes.

Project inspections of the mast trees shall be made by the IADNR Site Manager to verify the following:

- Presence or absence of debris, sedimentation, or vegetation; and
- Wildlife use, vegetation types and density, presence or absence of invertebrates.

Steps shall be taken to repair damage or remedy adverse conditions disclosed by such inspections.

6. PERFORMANCE MONITORING AND ASSESSMENT.

a. General. The purpose of this section is to summarize monitoring and data collection aspects of the project. Table 6-1 outlines the estimated annual post-construction monitoring costs. Engineering data are the levee system transects to be conducted by the USACE every 5 years. Natural resources data are the vegetation transects and aerial photography to be completed by the IADNR Site Manager every 5 years. The estimated cost for collecting these data every 5 years was interpolated into an annual cost as shown below in Table 6-1.

TABLE 6-1 Estimated Annual Post-Construction Monitoring Costs (June 1993 Price Level)	
Description	Amount
Engineering Data	\$3,000.00
Natural Resources Data	\$2,000.00
<i>Subtotal Monitoring Data</i>	<i>\$5,000.00</i>
Contingencies	\$1,000.00
<i>Total Monitoring Data</i>	<i>\$6,000.00</i>
Planning, Engineering, and Design	\$1,500.00
TOTAL MONITORING COSTS	\$7,500.00

Table 6-2 presents the Monitoring and Performance Evaluation Matrix, which highlights the main project phases, the types of activities involved for each phase, and their purposes. For each activity, it is defined who is the responsible agency, who is the implementing agency, what is the funding source, and any implementation instructions, if applicable.

Table 6-3 illustrates the Monitoring and Data Collection Summary, which outlines what is monitored, how it will be accomplished, who will collect the data, and at what intervals. For purposes of this manual, USACE and the IADNR Site Manager are responsible for the engineering and natural resources data in the post-construction phase column.

Table 6-4 contains the Transect Evaluation Summary, which defines the locations for vegetation and levee system transects and the objectives associated with these transects. These locations can be seen on the monitoring plan in Appendix L, plate 60. Changes to the monitoring plan shall be coordinated with the IADNR, USFWS, and USACE.

b. Post-Construction. Table 6-5 presents the Post-Construction Evaluation Plan. The seventh column in this table shall be completed for the year the enhancement features are monitored, while the last column outlines the annual field observations to be performed by the IADNR Site Manager. These observations shall be completed in conjunction and documented on the checklist form provided in Appendix C.

The monitoring parameters were developed to measure the effectiveness of the stated goals. The feature measurements, together with the annual field observations, as illustrated in Table 6-5, will form the basis for project evaluation. The proposed feature measurements focus primarily on the physical response to the project, while the annual field observations deal more with the biological response. The physical and biological response shall be monitored as follows:

(1) General. The Princeton HREP project shall be monitored through aerial photography performed every 5 years by the IADNR Site Manager. With this mapping, an overall evaluation as to the performance of the enhancement features will be possible. In addition, the borrow areas/potholes shall be monitored every year by the IADNR Site Manager. Annual field observations shall describe the presence or absence of debris, sedimentation, or vegetation and evaluate wildlife use and vegetation types and density.

(2) Provide Reliable Food Source for Migratory Birds through Levee Restoration. This objective shall be monitored through levee system transects and profiles performed every 5 years by USACE. The goal is to maintain zero lineal feet of eroded levee at Year 50 (2048). The total length of the levee system is 16,400 feet. Annual field observations by the IADNR Site Manager shall describe any erosion and/or seepage.

(3) Provide Reliable Food Source for Migratory Birds through Water Control Improvements. This objective shall be monitored through vegetation transects performed every 5 years by the IADNR Site Manager. The goal is to attain 300 acres of aquatic vegetation at Year 50 (2048). This acreage includes areas of cropland or non-forested wetland conversion. The area of aquatic vegetation prior to construction was 213 acres. Annual field observations by the IADNR Site Manager shall estimate the effective acreage of aquatic vegetation and wildlife use. These field observations of wildlife use shall include annual waterfowl census data.

(4) Increase Overall Vegetation Diversity and Availability of Preferred Wildlife Foods through Mast Tree Planting. This objective shall be monitored through vegetation transects performed every 5 years by the IADNR Site Manager. The goal is to attain 40 acres of mast trees at Year 50 (2048). The area of mast trees prior to construction was approximate 7 to 10 acres. Annual field observations by the IADNR shall estimate the effective acreage of established and/or regenerated mast trees.

TABLE 6-2 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	USGS	USGS (UMESC)	LTRMP	--
	Pre-Project Monitoring	Identify and define problems at HREP site; Establish need of proposed project features	Sponsor	Sponsor	Sponsor	--
	Baseline Monitoring	Establish baselines for performance evaluation	USACE	USACE/ Sponsor	HREP	See Table 6-3
Design	Data Collection for Design	Include quantification of project objectives; Design of project; and Development of performance evaluation plan	USACE	USACE	HREP	See Table 6-3
Construction	Construction Monitoring	Assess construction impacts; Assure permit conditions are met	USACE	USACE	HREP	See State Section 401 Stipulations
Post-Construction	Performance Evaluation Monitoring	Determine success of project, as related to objectives	USACE/ Sponsor	USACE/ Sponsor	HREP	See Table 6-3

TABLE 6-3
Monitoring and Data Collection Summary ^{1/}

Type Measurement	Engineering Data			Natural Resource Data			Sampling Agency	Remarks
	Pre-Project Phase	Design Phase	Post-Const Phase	Pre-Project Phase	Design Phase	Post-Const Phase		
POINT MEASUREMENTS								
<i>Select Point Locations</i>							USACE	
Soil Borings ^{2/}	1	1						
TRANSECT MEASUREMENTS								
<i>Transects</i>								
Vegetation ^{3/}						5Y	Sponsor	
Levee System ^{4/}		1	5Y				USACE	
AREA MEASUREMENTS								
<i>Mapping</i>								
Vegetation Monitoring ^{5/}					1		USACE	
Aerial Photography ^{6/}				1		5Y	Sponsor	
Land Topographic ^{7/}		1					USACE	

LEGEND

Y = Yearly

nY = n-Yearly interval

1,2,3, --- = number of times data are collected within designated project phase

**TABLE 6-3 (Continued)
Monitoring and Data Collection Summary ^{1/}**

^{1/} Monitoring and Data Collection Summary (See plate 60 in Appendix L for Monitoring Plan) – First monitoring activity to occur the first year following project completion

^{2/} Soil Borings (Pre-Project Phase)

<u>Boring Number</u>	<u>Date</u>
PWA-90-1 to PWA-90-2	05-22-90
PWA-90-3 to PWA-90-6	05-23-90
PWA-90-7 to PWA-90-8	05-24-90
PWA-90-9 to PWA-90-11	05-15-90
PWA-90-12	05-24-90
PWA-90-13 to PWA-90-17	05-29-90
PWA-90-18 to PWA-90-19	05-30-90
PWA-90-20	05-31-90
PWA-90-21	05-05-90
PWA-90-21A	05-31-90
PWA-90-22 to PWA-90-24	06-01-90

Soil Borings (Design Phase)

<u>Boring Number</u>	<u>Date</u>
PWA-92-1 to PWA-92-4	01-29-92
PWA-92-5	02-10-92

^{3/} Vegetation Transects (Post-Construction Phase) – See plate 3 in Appendix L for locations

V-M503.1B to V-M503.4J
V-M504.6A to V-M504.7K
V-M506.0A to V-M505.9J
V-M506.2A to V-M506.1J

^{4/} Levee System Transects (Design Phase) – Cross sections at even 200-foot intervals, profile cross dike and perimeter levee

Levee System Transects (Post-Construction Phase) – Cross sections at even 500-foot intervals, profile cross dike and perimeter levee

^{5/} Vegetation Monitoring (Design Phase) – September 1990 aerial photography

^{6/} Aerial Photography (Pre-Project and Post-Construction Phases) – Scale at 1:1250

^{7/} Land Topographic (Design Phase) – Contours at 1-foot intervals

**TABLE 6-4
Transect Evaluation Summary**

Transect	Project Objectives to Be Evaluated	
	Provide Reliable Food Source for Migratory Birds	Increase Overall Vegetation Diversity and Availability of Preferred Wildlife Foods
Vegetation		
<i>SWMU</i>		
V-M503.1B to V-M503.4J	X	X
V-M504.6A to V-M504.7K	X	X
<i>NWMU</i>		
V-M506.0A to V-M505.9J	X	X
V-M506.2A to V-M506.1J	X	X
Levee System		
<i>Perimeter Levee</i>		
Sta. 0+00 to Sta. 164+00	X	
<i>Overflow Roadway</i>		
Sta. 0+00B to Sta. 23+50B	X	
<i>Cross Dike</i>		
Sta. 0+00C to Sta. 53+53C	X	

TABLE 6-5 Post-Construction Evaluation Plan									
Goal	Objective	Enhancement Feature	Unit	Year 0 (1998) Without Project	Year 0 (1998) With Project	^{1/}Year X (XXXX) With Project	Target Year 50 (2048) With Project	Feature Measurement	Annual Field Observations by IADNR Site Manager ^{3/}
Enhance Wetland Habitat	Provide reliable food source for migratory birds	Levee Restoration	Lineal feet of eroded levee	16,400	0	--	0	Levee system transects and profiles	Describe any erosion and/or seepage effects
		Water Control Improvements	Acres of aquatic vegetation	213	213	--	300 ^{2/}	Vegetation transects	Estimate effective acreage and wildlife use ^{4/}
	Increase overall vegetation diversity & availability of preferred wildlife foods	Mast Tree Planting	Acres of mast trees	7-10	28-31	--	40	Vegetation transects	Estimate area of established and/or regenerated vegetation

^{1/} Completed for the year the enhancement features are monitored

^{2/} Includes areas of cropland or non-forested wetland conversion

^{3/} To be submitted with annual Site Manager's Project Inspection and Monitoring Results (refer to Appendix C)

^{4/} Includes annual waterfowl census data

APPENDIX A

ACRONYMS

ACRONYMS

CEMVR	Corps of Engineers, Mississippi Valley Division, Rock Island District
CMP	corrugated metal pipe
DPR	Definite Project Report
EMP	Environmental Management Program
ER	Engineer Regulation
HREP	Habitat Rehabilitation and Enhancement Project
LTRMP	Long-Term Resource Monitoring Program
IADNR	Iowa Department of Natural Resources
NGVD	National Geodetic Vertical Datum
NWMU	North Wetland Management Unit
O&M	Operation and Maintenance
PM-M	Planning, Programs, and Project Management Division – Project Management Branch
R	Right Descending Bank
RM	River Mile
SWMU	South Wetland Management Unit
UMESC	Upper Midwest Environmental Sciences Center
UMRS	Upper Mississippi River System
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMU	Wetland Management Unit

APPENDIX B

OPERATION, MAINTENANCE, AND REHABILITATION AGREEMENT

**PROJECT COOPERATION AGREEMENT
BETWEEN
THE DEPARTMENT OF THE ARMY
AND
THE STATE OF IOWA
FOR CONSTRUCTION OF THE
PRINCETON WILDLIFE MANAGEMENT AREA
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
IN SCOTT COUNTY, IOWA**

THIS AGREEMENT is entered into this 29 day of September, 1995, by and between THE DEPARTMENT OF THE ARMY (hereinafter the "Government"), represented by the U.S. Army Engineer for the Rock Island District (hereinafter the "District Engineer"), and THE STATE OF IOWA (hereinafter the "State"), represented by the Director, Iowa Department of Natural Resources.

WITNESSETH, THAT:

WHEREAS, construction of the Habitat Rehabilitation and Enhancement Project, at Princeton Wildlife Management Area, in Scott County, Iowa (hereinafter the "Authorized Project" as defined in Article I.A. of this Agreement), was approved under the terms of the Upper Mississippi River System Environmental Management Program, as authorized by Section 1103(e) of the Water Resources Development Act of 1986, Public Law 99-662, as amended;

WHEREAS, a portion of the Authorized Project is located on lands owned by the State of Iowa (hereinafter the "Project", as defined in Article I.B. of this Agreement);

WHEREAS, the Government and the U.S. Fish and Wildlife Service shall enter into an agreement regarding the construction, operation, and maintenance of that portion of the Authorized Project located solely on Federal lands;

WHEREAS, the Government and the State desire to enter into a Project Cooperation Agreement for construction of the Project.

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

WHEREAS, Section 906(e) provides that the first costs for enhancement of fish and wildlife resources shall be a Federal cost when certain specified circumstances are present;

WHEREAS, Section 906(e) further provides that when such specified circumstances are not present, 25 percent of the first cost of enhancement of fish and wildlife resources shall be provided by the Non-Federal Interest;

APPENDIX C

SITE MANAGER'S PROJECT INSPECTION AND MONITORING RESULTS

**PRINCETON REFUGE HABITAT
REHABILITATION AND ENHANCEMENT**

**UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 14, MISSISSIPPI RIVER MILES 504.0 – 506.4R
SCOTT COUNTY, IOWA**

SITE MANAGER'S PROJECT INSPECTION AND MONITORING RESULTS

Inspected By _____ Date _____

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

River EL: _____ Forebay EL: _____

RATING SCALE: A-ACCEPTABLE M-MINIMULY ACCEPTABLE U-UNACCEPTABLE

1. PROJECT INSPECTION

<u>Item</u>	<u>Condition</u>	<u>Rating</u>
a. <u>Perimeter Levee and Overflow Spillway</u>		
() Settlement, slough or loss of section	_____	_____
() Wavewash, scouring	_____	_____
() Overtopping erosion	_____	_____
() Vegetative cover (mowing)	_____	_____
() Unauthorized grazing or traffic	_____	_____
() Encroachments	_____	_____
() Unfavorable tree/shrub growth	_____	_____
() Seepage distress	_____	_____
b. <u>Cross-Dike</u>		
() Settlement, slough or loss of section	_____	_____
() Wavewash, scouring	_____	_____
() Overtopping erosion	_____	_____
() Vegetative cover (mowing)	_____	_____
() Unauthorized grazing or traffic	_____	_____
() Encroachments	_____	_____
() Unfavorable tree/shrub growth	_____	_____
() Seepage distress	_____	_____

<u>Item</u>	<u>Condition</u>	<u>Rating</u>
c. <u>Gatewell Structure-North Perimeter Levee</u>		
<input type="checkbox"/> Gate operation	_____	_____
<input type="checkbox"/> Concrete	_____	_____
<input type="checkbox"/> Inlet and outlet channels	_____	_____
<input type="checkbox"/> Displaced/missing riprap	_____	_____
<input type="checkbox"/> Erosion adjacent to structure	_____	_____
<input type="checkbox"/> Sedimentation (culverts/approaches)	_____	_____
<input type="checkbox"/> Seepage distress	_____	_____
d. <u>Gatewell Structure-South Perimeter Levee</u>		
<input type="checkbox"/> Gate operation	_____	_____
<input type="checkbox"/> Concrete	_____	_____
<input type="checkbox"/> Steel rail/posts, grating, fasteners	_____	_____
<input type="checkbox"/> Inlet and outlet channels	_____	_____
<input type="checkbox"/> Displaced/missing riprap	_____	_____
<input type="checkbox"/> Erosion adjacent to structure	_____	_____
<input type="checkbox"/> Sedimentation (culverts/approaches)	_____	_____
<input type="checkbox"/> Seepage distress	_____	_____
e. <u>Concrete Water Control Structure-Cross-Dike</u>		
<input type="checkbox"/> Stoplogs, stoplog keepers/slots	_____	_____
<input type="checkbox"/> Concrete	_____	_____
<input type="checkbox"/> Steel rail/posts, grating, fasteners	_____	_____
<input type="checkbox"/> Inlet and outlet channels	_____	_____
<input type="checkbox"/> Displaced/missing riprap	_____	_____
<input type="checkbox"/> Erosion adjacent to structure	_____	_____
<input type="checkbox"/> Sedimentation (culverts/approaches)	_____	_____
<input type="checkbox"/> Seepage distress	_____	_____
f. <u>East CMP Water Control Structure-Cross-Dike</u>		
<input type="checkbox"/> Stoplogs, stoplog keepers/slots	_____	_____
<input type="checkbox"/> Inlet and outlet channels	_____	_____
<input type="checkbox"/> Erosion adjacent to structure	_____	_____
<input type="checkbox"/> Sedimentation (culverts/approaches)	_____	_____
<input type="checkbox"/> Seepage distress	_____	_____

<u>Item</u>	<u>Condition</u>	<u>Rating</u>
g. <u>West CMP Water Control Structure-Cross-dike</u>		
() Stoplogs, stoplog keepers/slots	_____	_____
() Inlet and outlet channels	_____	_____
() Erosion adjacent to structure	_____	_____
() Sedimentation (culverts/approaches)	_____	_____
() Seepage distress	_____	_____
h. <u>Flood/Drainage Ditches</u>		
() Debris	_____	_____
() Unauthorized structures	_____	_____
() Bank erosion	_____	_____
() Seepage distress	_____	_____
i. <u>Pump Station</u>		
() Structure-steel	_____	_____
() Structure-concrete	_____	_____
() Displaced/missing riprap	_____	_____
() Electrical lighting/standby generator	_____	_____
() Steel discharge pipe/flapgate	_____	_____
() Forebay/sump (sedimentation)	_____	_____
() Diesel engine/hydraulic pump	_____	_____
() Hydraulic reservoir/piping/hoses	_____	_____
() Hydraulic pump	_____	_____
() Fuel supply/piping/bulk tank	_____	_____
() Stoplogs/inlet/outlet-aluminum	_____	_____
() Gravity outlet sluice gate/operator	_____	_____
() Air release/siphon break	_____	_____
j. <u>Portable Pump Station</u>		
() Diesel engine	_____	_____
() Trailer	_____	_____
() pump	_____	_____
k. <u>Vegetation</u>		
() Mast trees	_____	_____
() Seeding	_____	_____

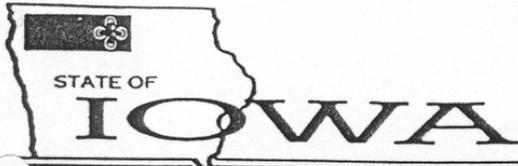
<u>Item</u>	<u>Condition</u>	<u>Rating</u>
1. <u>Access</u>		
() Road-granular surfacing, etc.	_____	_____
() Riprap	_____	_____
m. <u>Borrow Areas/Potholes</u>		
() Debris, sedimentation, or vegetation	_____	_____
() Wildlife use	_____	_____
() Vegetation types and density	_____	_____

2. COMMENTS

Site Manager

APPENDIX D

COOPERATING AGENCY CORRESPONDENCE



LARRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

June 1, 1992

Colonel John R. Brown
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, IL 61204-2004

Dear Colonel Brown:

The Iowa Department of Natural Resources hereby agrees to the following cost-share conditions for the Princeton Refuge Habitat Rehabilitation and Enhancement Project under the Environmental Management Program (EMP):

1. Construction:

a. The State of Iowa is responsible for 25 percent of all construction costs assigned to project features located on non-Federal lands within the project area. In this case, the non-Federal lands are owned by the State of Iowa.

b. The Federal Government, through the U.S. Army Corps of Engineers, is responsible for the remaining 75 percent of construction costs assigned to project features located on non-Federal lands within the project area.

c. The Federal Government, through the U.S. Army Corps of Engineers, is responsible for 100 percent of all construction costs assigned to project features located on Federal lands within the project area that are "managed as a national wildlife refuge" in the context of Section 906(e) of the Water Resources Development Act of 1986. In this case, Federal lands are General Plan lands managed by the Iowa Department of Natural Resources through a cooperative agreement with the U.S. Fish and Wildlife Service.

2. Operation, Maintenance, and Repair:

a. The State of Iowa is responsible for 100 percent of operations, maintenance, and repair of project features located on non-Federal lands.

b. The State of Iowa will cooperate with the U.S. Fish and Wildlife Service to assure that non-Federal operation, maintenance, and repair responsibilities associated with the project features on Federal land are in conformance with Section 906(e) of the Water Resources Development Act of 1986 and existing agreements between the Service and the Director, Iowa Department of Natural Resources.

Sincerely,


LARRY J. WILSON
DIRECTOR

IOWA DEPARTMENT OF NATURAL RESOURCES

APPENDIX E

PUMP STATION INSPECTION REPORT

PUMP STATION INSPECTION REPORT

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

Princeton Wildlife Management Area, EMP
Pool 14, River Miles 504.0-506.5, Scott County, Iowa

Date/Hour Inspection Began/Ended:

Date: _____ Time: _____

Inspectors:

Corps Representatives:
Local Sponsor Officials:

River/Forebay Elevations:

Mississippi River El.: _____ Stage El.: _____ Zero Gage El.: _____
North Management Unit El.: _____ Stage El.: _____ Zero Gage El.: _____
South Management Unit El.: _____ Stage El.: _____ Zero Gage El.: _____

Note:

Project Data:

Pumping Arrangement and Configuration: One (1) hydraulic submersible M&W pump set up for one-way pumping with diversion to either management unit.

Size of Moist Cell Unit(s) (Acres): North Management Unit = 357 Acres at water surface elevation 576.0
South Management Unit = 344 Acres at water surface elevation 575.0

Fill Time (Days):

Actual: North Management Unit = 45 days fill time to elevation 577.0. (1' above Corps design)

It takes an additional 15 days of pumping to achieve the 1' increase.

South Management Unit = Approximately 30 days simultaneous with the filling of the North Management Unit.

Design: The design was to take 7 days for the North Unit and 5 days for the South Unit.

Empty Time (Days):

Actual: Depends on the fluctuating river. IADNR tries to lower the management units as low as possible.

Design: Approximately elevation 574.0

General Comments:

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	REMARKS
SECTION I				<i>FOR INTERNAL USE AND EVALUATION</i>	
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				<i>FOR LOCAL SPONSOR USE</i>	
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.)	

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	REMARKS
4. Annual Inspection				Annual inspection is being performed by the local sponsor. (A or U.)	
5. Plant Building				<p>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.</p> <p>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.</p> <p>U Any condition that does not meet at least Minimum Acceptable standard.</p>	
6. Pumps				<p>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.</p> <p>M All pumps are operational and deficiencies/minor discrepancies are such that pumps could be expected to perform through the next period of usage.</p> <p>U One or more primary pumps are not operational, or noted discrepancies have not been corrected.</p>	

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	REMARKS
7. Motors, Engines and Gear Reducers				<p>A All items are operational. Preventive maintenance and lubrication being performed. Systems are periodically subjected to performance testing. Instrumentation, alarms, and auto shutdowns operational.</p> <p>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.</p> <p>U One or more primary motors are not operational, or noted discrepancies have period of usage.</p>	
8. Sumps/Trash Racks				<p>SPECIAL INSTRUCTIONS: <i>Measure silt accumulation in sumps and trash racks. Measure water depth at inlet and outlet.</i></p> <p>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.</p> <p>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.</p> <p>U Proper operation can not be ensured through the next period of usage. Possible damage could result to the pumping equipment with continued operation.</p>	

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	
9. Other Metallic Items				<p>A All metal parts in plant/building are protected from permanent damage by corrosion. Equipment anchors and grout pads show no rust or deterioration.</p> <p>M Corrosion on metallic parts (except equipment anchors) and deterioration period of usage.</p> <p>U Any condition that does not meet at least Minimum Acceptable standards.</p>	
10. Ancillary Equipment i.e. Compressed Air Siphon Breakers Fuel Supply Vacuum Priming Pump Lubrication Heating/Ventilation Engine Cooling Engine Oil Filtering				<p>A All equipment operational. Preventive and annual maintenance being performed. Equipment operation understood and followed by pump station operators.</p> <p>M Ancillary equipment is operational and deficiencies/minor discrepancies are such that equipment could be expected to perform through the next period of usage.</p> <p>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.</p>	
11. Backup Ancillary Equipment				<p>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.</p> <p>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.</p> <p>U Backup ancillary equipment not considered reliable to sustain operations during flooding conditions.</p>	
12. Pump Control System				<p>A Operational and maintained free of damage, corrosion, or other debris.</p> <p>M Operational with minor discrepancies.</p> <p>U Not operational, or uncorrected discrepancies noted from previous inspections.</p>	

PUMP STATION MAINTENANCE INSPECTION GUIDE

RATED ITEM	A	M	U	EVALUATION	REMARKS
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)				<p>A Megger test has been performed within the last 36 months. Results of megger test show that insulation of primary conductors and electric motor meets manufacturer's or industry standard.</p> <p>M Results of megger test show that insulation resistance is lower than manufacturer's or industry's standard, but can be expected to perform satisfactorily until next testing or can be corrected.</p> <p>U Insulation resistance is low enough to cause the equipment to not be able to meet its design standard of operation.</p>	
15. Final Remarks					
<p>GENERAL INSTRUCTIONS</p> <ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> A - Acceptable M - Minimally Acceptable U - Unacceptable 					

APPENDIX F

MECHANICAL EQUIPMENT DATA

APPENDIX G

LEVEE INSPECTION REPORT

LEVEE INSPECTION REPORT

1. Name of Flood Control Works:
Princeton Refuge Habitat Rehabilitation and Enhancement Project (HREP)

2. Date/Hour Inspection Began/Ended:

3. Inspectors (Including Sponsor Representatives):
Corps Representative(s) –
Sponsor Representative(s) –

4. Inspection Procedures Followed:

5. Evaluation of Flood Control Works:

6. General Comments:

Inspector's observations and comments as follows:

RATING	ITEM	LOCATION Sta. to Sta.	REMARKS Note: R/S - Riverside L/S - Landside
--------	------	--------------------------	--

LEVEE SLOPES

Depressions

Erosion

Slope Stability

Cracking

Seepage Areas
*(Do not rate. Note areas that are
of concern during high water.)*

Animal Burrows

Unwanted Growth

Grazing

Sod

Encroachments

RATING	ITEM	LOCATION Sta. to Sta.	REMARKS Note: R/S - Riverside L/S - Landside
--------	------	--------------------------	--

LEVEE CROWN

Authorized Access Gates
(Do not rate. List gate locations.)

Three security gates located at the north, west, and south access areas

Depressions

Erosion

Cracking

Animal Burrows

Unwanted Growth

Grazing

Sod

Road Crossings
(other than those with closure structures)

Encroachments

RATING	ITEM	LOCATION Sta. to Sta.	REMARKS Note: R/S - Riverside L/S - Landside
--------	------	--------------------------	--

REVETTED AREAS

Riprap/Revetment

Unwanted Growth

Encroachments

DRAINAGE STRUCTURE(S)

Toe Drains
*(Do not rate. List stationing
and locations of drains.)*

Relief Wells

Culverts

Riprap/Revetment

Stability of Concrete Structures

Concrete Surfaces

Structural Foundations

Gates

RATING	ITEM	LOCATION Sta. to Sta.	REMARKS Note: R/S - Riverside L/S - Landside
--------	------	--------------------------	--

CHANNELS

Unwanted Growth

Stability of Concrete Structures

Concrete Surfaces

Structural Foundations

CLOSURE STRUCTURE(S)

PUMP STATION(S)
*(See "Pump Station Inspection
 Report" in Appendix E.)*

APPENDIX H

LIST OF ROCK ISLAND DISTRICT APPROVED PESTICIDES

List of Rock Island District Approved Pesticides

The below list of chemicals, by trade name, have been approved in accordance with product label restrictions on Corps properties at Coralville Lake, Lake Red Rock, Saylorville Lake, and the Mississippi River Recreation and Natural Resource Lands. It is the responsibility of each project to ensure that each pesticide is applied according to label directions and properly documented.

2,4-D 40A	Frontier	Rodeo
2,4-D LV4	Furidan 4F	Rotenone
2,4-D Amine	Fusilade	Roundup
Accent	Fusilade 4E	Roundup Pro
Accord	Fusion	Roundup Ultra
Arsenal	Garlon 3A	Saharha
Asana	Garlon 4	Salsbury Ropax Bars
Avitrol	Glyphosate	See 2,4-D
Banvel	Goal 1.6E	Select
Basagran	Harness	Sencor
Beacon	Hawk	Sevin Dust
Blazer	Hornet	Short-Stop
Boundry	Hyvar	Solicam
Broadstrike	Karmex DF	Sonar
Buctril	Kerb 50W	Spike 20P
Casaron 4G	Krenite S	Sprout-Gard-AR
ChemSurf	Lasso	Stalker
Clarity	Liberty	Stomp
Class 40A	Lorox	Sultan
Class LV4	Malathion	Surflan AS
Command	MCCP	Surpass
Counter 20CR	Millenium Ultra	Team
Crossbow	Orthene	Tempo
Cygon 400	Oust	Tree Guard
Dacthal W-75	Pathfinder	Tordon RTU
Demand CS	Pathfinder II	Touchdown
Diazanone	Pathway	Transline
Dicamba	Penduum	Treflan MTF
Diuron	Penncap M	Trimec
Dowpon	Permit	Triplet
Dual	Plateau	Tripower
Dual 25G	Poast	Trix
Dual II	Preference	Turbo
Dylox	Princep 4G	Turflon-d
Embark	Princep 80W	Vantage
Endurance	Princep Caliber 90	Vernam
Eradicane	Princep DF	Weed B-Gon
Escort	Prowl	Weedone 170
Evik	Pursuit	Weedone LV-4
Flexstar	Pyrid	Wilbur Ellis LV-4
Force	Quest	
Formula 40 2,4-D	Resource	
Fortress	Reward	

APPENDIX I

PHOTOGRAPHS OF PROJECT FEATURES

Photos 1, 2, & 3



Photos 4, 5, & 6



- Photo 1 – Southeast corner of refuge looking north at gatewell structure
- Photo 2 – Southeast corner of refuge looking north at security gate
- Photo 3 – West parking lot looking east at cross dike
- Photo 4 – South perimeter levee looking north at pump station
- Photo 5 – North perimeter levee
- Photo 6 – North perimeter levee

Photos 7, 8, & 9



Photos 10 & 11



Photo 7 – Perimeter levee looking south from pump station

Photo 8 – Cross dike looking west from pump station at concrete stoplog structure

Photo 9 – Southeast corner of refuge looking west at access road (overflow spillway)

Photo 10 – Southeast corner of refuge looking north at perimeter levee

Photo 11 – Cross dike looking west from pump station at concrete stoplog structure

Photos 12 & 13



Photos 14 & 15



Photo 16



Photo 12 – East end of cross dike looking north at gatewell structure

Photo 13 – Northwest corner of refuge looking north along railroad levee

Photo 14 – Northwest corner of refuge looking south from railroad levee

Photo 15 – East end of cross dike looking north at brush pile

Photo 16 – Southeast corner of refuge looking west from gatewell structure

Photos 17 & 18



Photos 19 & 20



Photo 20



Photos 16 to 20 – Mast tree plantings

APPENDIX J

PROJECT TEAM MEMBERS

PRINCETON HREP PROJECT TEAM MEMBERS									
POC	Position	Agency	Address	City	State	Zip Code	Telephone Number	FAX Number	Email Address
Roger Perk	Program Manager	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5475	309-794-5710	Roger.A.Perk@usace.army.mil
Darron Niles	Technical Coordinator	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5400	309-794-5710	Darron.L.Niles@usace.army.mil
Rachel Fellman	Project Engineer	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5788	309-794-5698	Rachel.C.Fellman@usace.army.mil
John Behrens	Mechanical Engineer	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5620	309-794-5698	John.T.Behrens@usace.army.mil
Charlene Carmack	Biologist	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5570	309-794-5157	Charlene.Carmack@usace.army.mil
Ron Cover	Engineering Technician	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5481	309-794-5698	Ronald.L.Cover@usace.army.mil
Tom Kirkeeng	Hydraulic Engineer	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-4348	309-794-5584	Thomas.A.Kirkeeng@usace.army.mil
Randy Kinney	Geotechnical Engineer	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5483	309-794-5207	Randall.S.Kinney@usace.army.mil
Gary Swenson	Forester	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-4489	309-794-4347	Gary.V.Swenson@usace.army.mil
Nancy Holling	Report Preparer	USACE	Clock Tower Building P.O. Box 2004	Rock Island	IL	61204	309-794-5491	309-794-5710	Nancy.L.Holling@usace.army.mil
Keith Beseke	EMP Coordinator	USFWS	51 East Fourth Street Room 101	Winona	MN	55987	507-452-4232	507-452-0851	Keith_Beseke@fws.gov
Ed Britton	District Manager	USFWS	7071 Riverview Road	Thomson	IL	61285	815-273-2732	815-273-2960	Ed_Britton@fws.gov
Bob Sheets	Area Wildlife Biologist	IADNR	County Court House 201 West Platt	Maquoketa	IA	52060	563-652-3132	563-652-3909	Robert.Sheets@dnr.state.ia.us
Randy Robinson	Site Manager	IADNR	51576 Green Island Road	Miles	IA	52064	563-682-7392		Randy.Robinson@dnr.state.ia.us
Mike Griffin	Wildlife Biologist	IADNR	206 Rose Street	Bellevue	IA	52031	563-872-5700	563-872-5456	Michael.Griffin@dnr.state.ia.us
Tom Boland	Fisheries Biologist	IADNR	24143 Highway 52 R.R. 3 Box 160	Bellevue	IA	52031	563-872-4976	563-872-4945	Tom.Boland@dnr.state.ia.us

APPENDIX K

DISTRIBUTION LIST

DISTRIBUTION LIST

Mr. Robert Sheets
Maquoketa Wildlife Unit
18670 63rd St
Maquoketa, IA 52060

Mr. Randy Robinson
Site Manager
Iowa Department of Natural Resources
51576 Green Island Road
Miles, IA 52064

Mr. Mike Steuck
Natural Resources Biologist
Iowa Department of Natural Resources
24143 Highway 52
Rural Route 3 Box 160
Bellevue, IA 52031

Mr. Ed Britton
Savanna District Manager
U.S. Fish and Wildlife Service
UMR National Fish and Wildlife Refuge
7071 Riverview Road
Thomson, IL 61285

Ms. Sharonne Baylor
EMP Coordinator
U.S. Fish and Wildlife Service
UMR National Fish and Wildlife Refuge
51 East Fourth Street #101
Winona, MN 55987

Ms. Doris Bautch
Great Lakes Region Director
U.S. Department of Transportation
Maritime Administration
2860 South River Road, Suite 185
Des Plaines, IL 60018-2413

Ms. Janet Sternburg
Missouri Department of Conservation
2401 West Truman Boulevard
P.O. Box 180
Jefferson City, MO 65102-0180

Mr. Al Fenedick
U.S. Environmental Protection Agency
Environmental Analysis Section, ME-19J
77 West Jackson Boulevard
Chicago, IL 60604

Mr. George Garklavs
District Chief
U.S. Geological Survey
Water Resources Division
2280 Wooddale Drive
Mounds View, MN 55112

Ms. Linda Leake
Center Director
U.S. Geological Survey
Upper Midwest Environmental Sciences
Center
2630 Fanta Reed Road
La Crosse, WI 54601

Mr. Tim Schlagenhaft
Minnesota Department of Natural Resources
2300 Silver Creek Road NE
Rochester, MN 55906

Ms. Gretchen Benjamin
Wisconsin Department of Natural Resources
3550 Mormon Coulee Road
La Crosse, WI 54601

Ms. Holly Stoerker
Executive Director
Upper Mississippi River Basin Association
415 Hamm Building
408 Saint Peter Street
St. Paul, MN 55102

Mr. Rick Mollahan
Office of Resource Conservation
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702-1271

Mr. Mike McGhee
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319

Mr. Charles Wooley
Assistant Regional Director
Ecological Services
U.S. Fish and Wildlife Service
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111

Mr. Charles Barton
U.S. Army Corps of Engineers
Mississippi Valley Division
ATTN: CEMVD-PD-SP
1400 Walnut P.O. Box 80
Vicksburg, MI 39181-0080

Mr. Owen Dutt
U.S. Army Corps of Engineers
Saint Louis District
ATTN: CEMVS-PM-N
1222 Spruce Street
St. Louis, MO 63103-2833

Mr. Donald Powell
U.S. Army Corps of Engineers
Saint Paul District
ATTN: CEMVP-PM-A
190 Fifth Street East
St. Paul, MN 55101-1638

Mr. Mike Griffin
Iowa Department of Natural Resources
206 Rose St.
Bellevue, IA 52031

Ms. Susan Smith
U.S. Army Corps of Engineers
Mississippi Valley Division
ATTN: CEMVD-PM-E
1400 Walnut P.O. Box 80
Vicksburg, MS 39181-0080

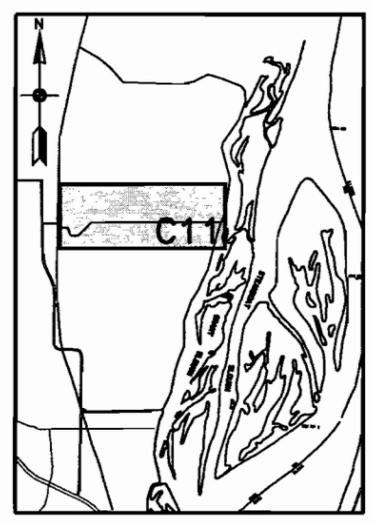
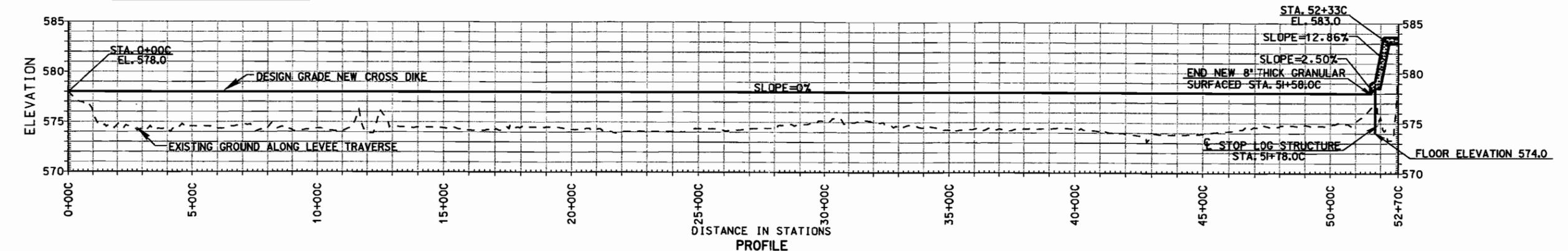
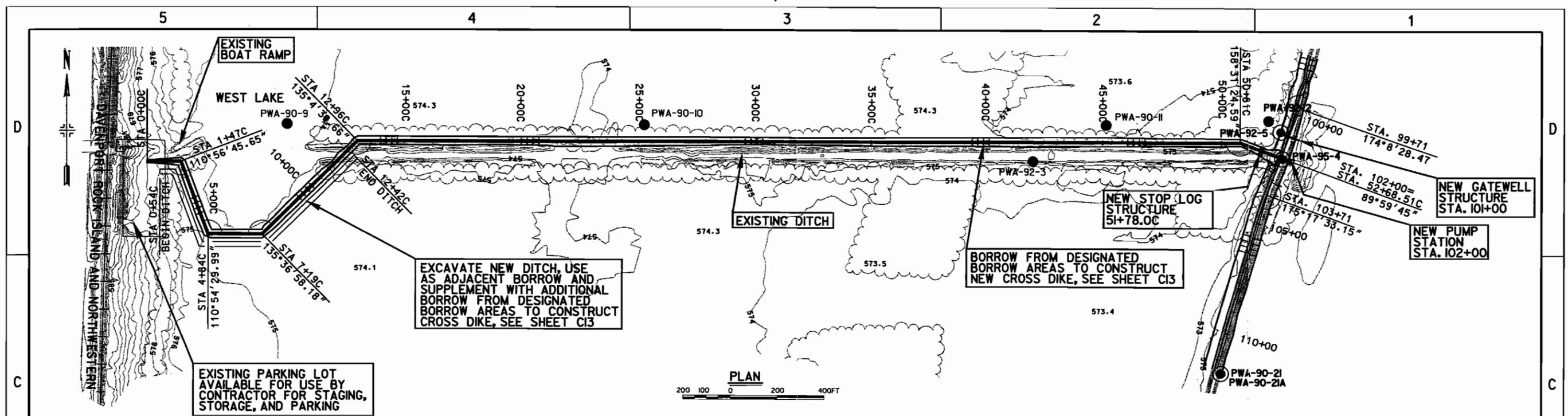
Mr. Mike Thompson
U.S. Army Corps of Engineers
Saint Louis District
ATTN: CEMVS-PM-N
1222 Spruce Street
St. Louis, MO 63103-2833

INTERNAL DISTRIBUTION:

CEMVR-PM-M (2)
CEMVR-PM-F (Niles)
CEMVR-PM-M (Perk)
CEMVR-PM-A
CEMVR-PM-A (Carmack)
CEMVR-CD
CEMVR-CD-C
CEMVR-ED
CEMVR-ED-D
CEMVR-ED-DN (2)
CEMVR-ED-DG (Fellman)
CEMVR-ED-H
CEMVR-ED-HQ
CEMVR-ED-HQ (Bierl)
CEMVR-ED-G
CEMVR-OD-M
CEMVR-OD-MN
CEMVR-OD-MN (Swenson)
CEMVR-IM-CL (2)

APPENDIX L

PLATES



LEGEND:

- BORING LOCATION
PWA-90-20
- ~ TREE LINE

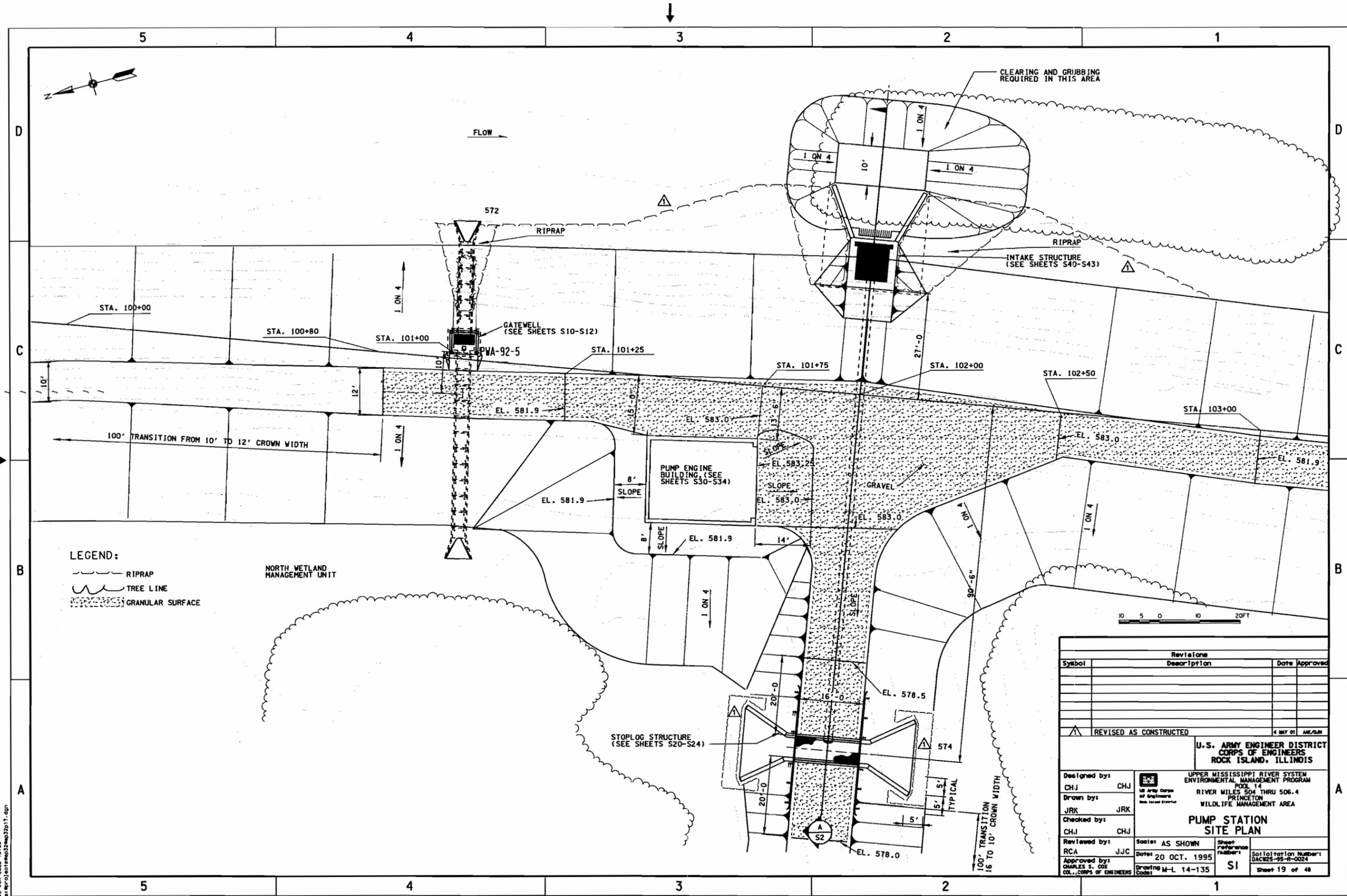
NOTE:

1. FOR NOTES SEE SHEET C6.

Revisions		
Symbol	Description	Date Approved
▲	AS CONSTRUCTED	4 MAY 01 ABE/DM

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS		
Designed by: AWG	UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM POOL 14 RIVER MILES 504 THRU 506.4 PRINCETON WILDLIFE MANAGEMENT AREA	
Drawn by: TPD	CROSS DIKE PLAN AND PROFILE STA. 0+00C TO STA. 52+68.51C	
Checked by: AWG		
Reviewed by: BLK	Scale: AS SHOWN	Sheet reference number: C11
Approved by: CHARLES S. COX COL., CORPS OF ENGINEERS	Date: 20 OCT. 1995	Solicitation Number: DACW25-95-R-0024
	Drawing M-L 14-135	Sheet 14 of 48

21-JUN-2002 10:21
e:\proj\ent\map32\map32p12.dgn



LEGEND:
 --- RIPRAP
 ~~~~~ TREE LINE  
 [Stippled] GRANULAR SURFACE

NORTH WETLAND  
 MANAGEMENT UNIT

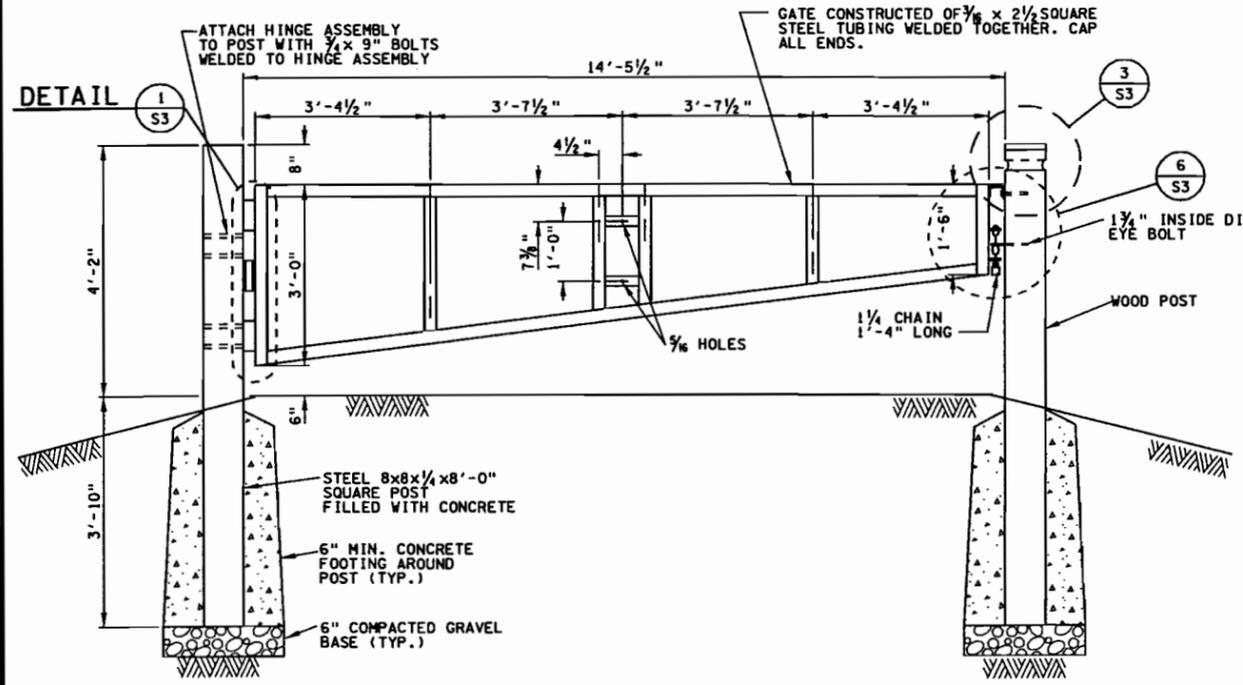
| Revisions |                        |                  |
|-----------|------------------------|------------------|
| Symbol    | Description            | Date Approved    |
| ▲         | REVISED AS CONSTRUCTED | 4 MAY 01 ABE/DAI |

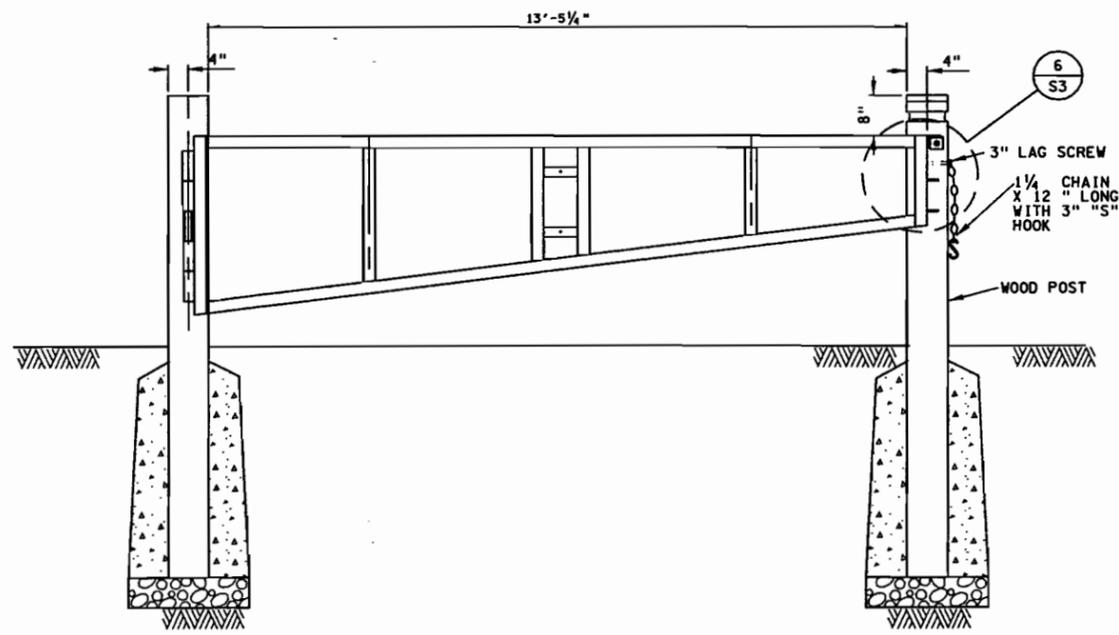
|                                                                            |                                                                                                                                                      |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| U.S. ARMY ENGINEER DISTRICT<br>CORPS OF ENGINEERS<br>ROCK ISLAND, ILLINOIS |                                                                                                                                                      |
| Designed by:<br>CHJ CHJ                                                    | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |
| Drawn by:<br>JRK JRK                                                       | <b>PUMP STATION<br/>         SITE PLAN</b>                                                                                                           |
| Checked by:<br>CHJ CHJ                                                     |                                                                                                                                                      |
| Reviewed by:<br>RCA JJC                                                    | Scale: AS SHOWN<br>Date: 20 OCT. 1995<br>Drawing M-L 14-135                                                                                          |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS                 | Sheet reference number:<br><b>SI</b><br>Solicitation Number:<br>DACW25-95-R-0024<br>Sheet 19 of 48                                                   |

25-JUN-2002 10:20  
 a:\p\01\14\135\25p32b11.dgn

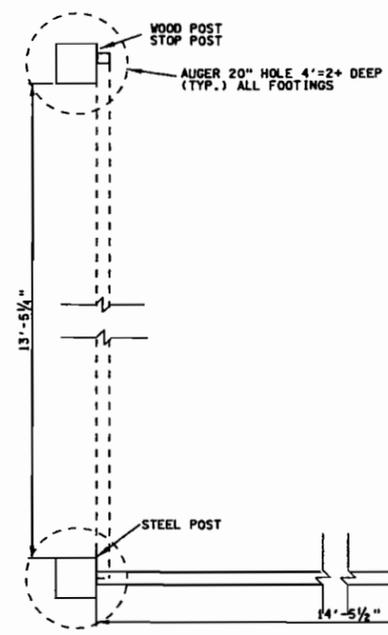




**GATE POST/LOCK POST/GATE ELEVATION** (1) S3  
NO SCALE



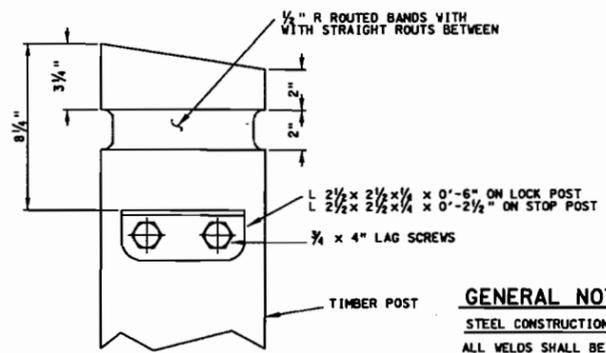
**GATE POST/STOP POST/GATE ELEVATION** (4) S3  
NO SCALE



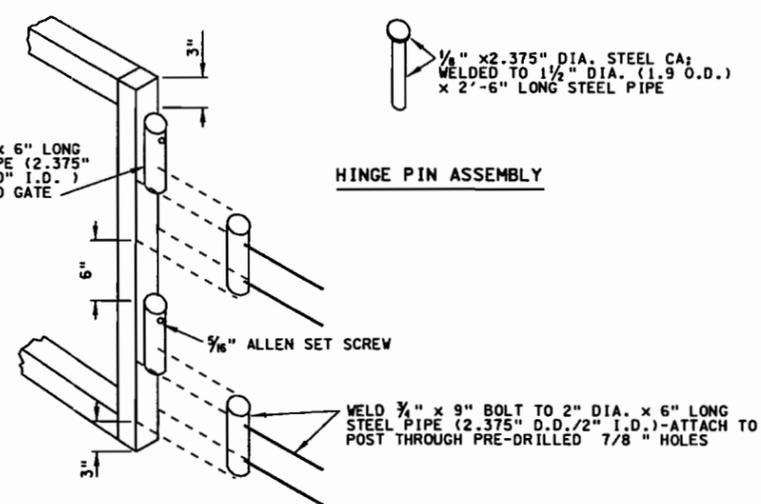
**WOOD POST DETAIL** (3) S3  
SCALE: 3"=1'-0"



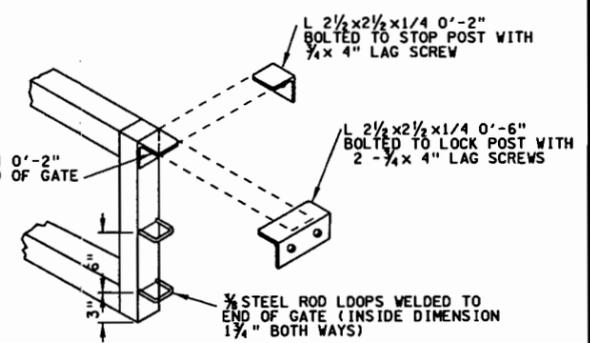
**GATE LAYOUT** (2) S3  
SCALE IN FEET



**LOCK ASSEMBLY** (6) S3  
SCALE IN FEET



**HINGE PIN ASSEMBLY** (1) S3  
SCALE IN FEET



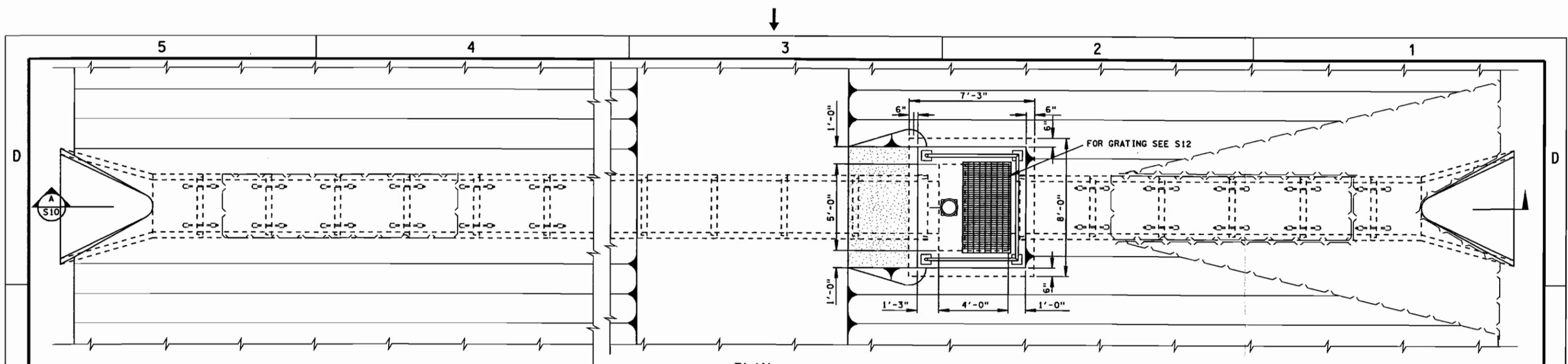
**LOCK ASSEMBLY** (6) S3  
SCALE IN FEET

**GENERAL NOTES**

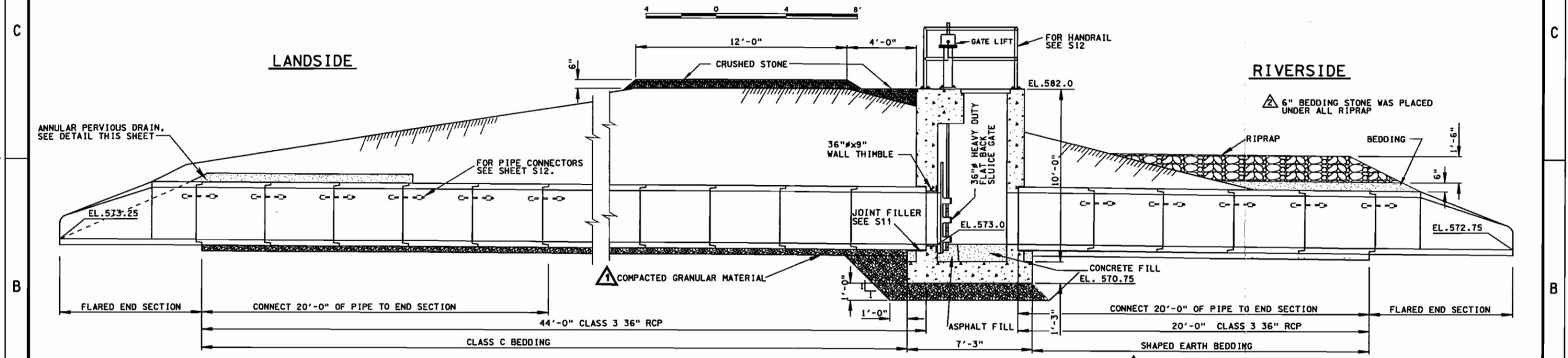
**STEEL CONSTRUCTION**  
ALL WELDS SHALL BE BROWNED AND EVEN  
PRIME STEEL WITH ZINC CHROMATE PRIMER/PAINT STEEL WITH PRATT & LAMBERT BLACK COFFEE R-146A EFFECTO ENAMAL

**TIMBER POSTS**  
POSTS SHALL BE STAINED WITH PRATT & LAMBERT BLACK COFFEE R-146A SOLID HIDE RUSTIC STAIN  
POSTS SHALL BE 8" x 8" x 8'-0" ROUGH SAWN C.C.A. TREATED TIMBER

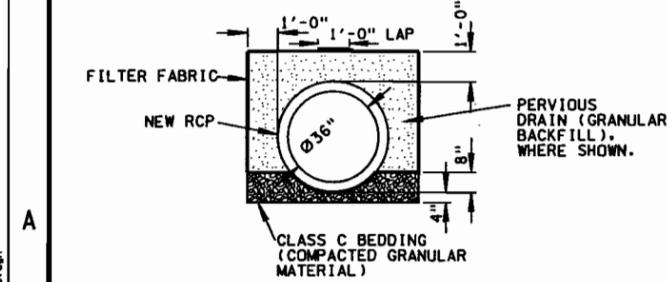
| Revisions                                                               |                                                                                                                                                   |                               |                                         |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------|
| Symbol                                                                  | Description                                                                                                                                       | Date                          | Approved                                |
|                                                                         |                                                                                                                                                   |                               |                                         |
|                                                                         |                                                                                                                                                   |                               |                                         |
|                                                                         |                                                                                                                                                   |                               |                                         |
|                                                                         |                                                                                                                                                   |                               |                                         |
| AS CONSTRUCTED                                                          |                                                                                                                                                   |                               |                                         |
| U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS<br>ROCK ISLAND, ILLINOIS |                                                                                                                                                   |                               |                                         |
| Designed by:<br>TJW                                                     | UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                               |                                         |
| Drawn by:<br>JRK                                                        |                                                                                                                                                   |                               |                                         |
| Checked by:<br>CHJ                                                      |                                                                                                                                                   |                               |                                         |
| Reviewed by:<br>RCA                                                     | Scale: AS SHOWN                                                                                                                                   | Sheet reference number:<br>S3 | Calculation Number:<br>DACW25-55-R-0024 |
| Approved by:<br>CHARLES S. COE<br>COL., CORPS OF ENGINEERS              | Date: 20 OCT. 1995                                                                                                                                | Drawing M-L 14-135            | Sheet 21 of 48                          |



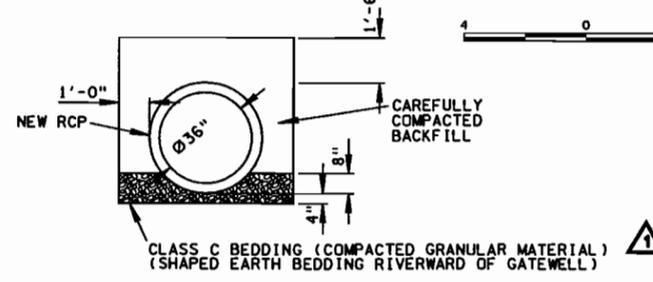
PLAN



SECTION A S10



BEDDING AND DRAIN DETAIL



BEDDING DETAIL

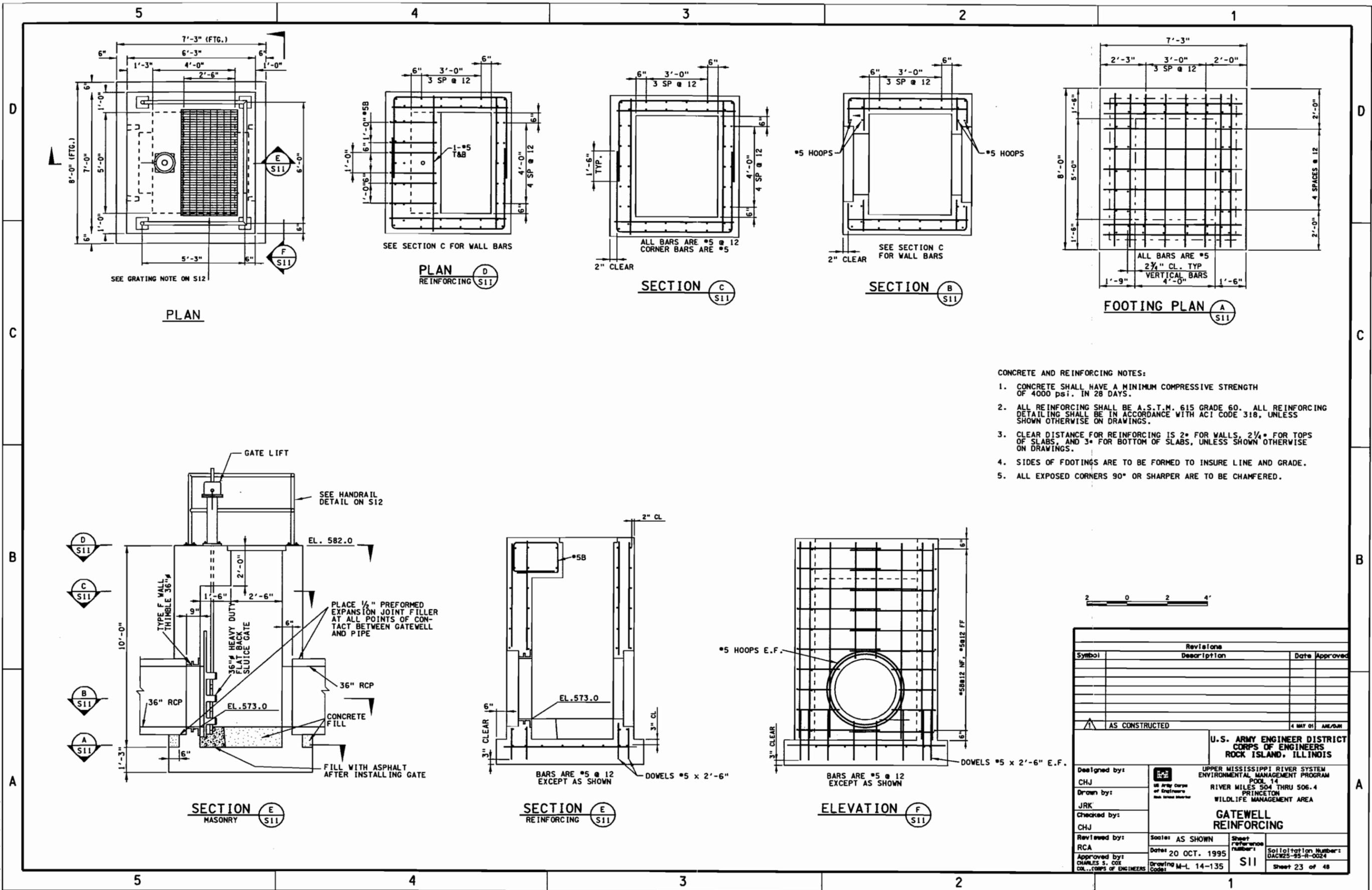
GATE OPERATOR NOTES:  
 SEATING HEAD = 8.5'  
 UNSEATING HEAD = 8.5'  
 OPERATING HEAD = 8.5'

- REFERENCES:
- FOR LOCATION OF GATEWELL SEE SHEET S1.
  - FOR EXISTING GRADE SEE SHEET S1.

| Revisions |                                                                 |          |          |
|-----------|-----------------------------------------------------------------|----------|----------|
| Symbol    | Description                                                     | Date     | Approved |
| △         | REVISED AS CONSTRUCTED                                          | 4 MAY 01 | AME/DM   |
| △         | AMD. #1 REMOVED COMPACTED GRAVEL BEDDING RIVERWARD OF GATEWELL. | 8DEC95   |          |

|                                                                            |                                                                                                                                                      |                                        |                                          |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------|
| U.S. ARMY ENGINEER DISTRICT<br>CORPS OF ENGINEERS<br>ROCK ISLAND, ILLINOIS |                                                                                                                                                      |                                        |                                          |
| Designed by:<br>CHJ                                                        | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA | <b>GATEWELL<br/>PLAN AND ELEVATION</b> |                                          |
| Drawn by:<br>JRK                                                           |                                                                                                                                                      |                                        |                                          |
| Checked by:<br>CHJ                                                         | Scale: AS SHOWN                                                                                                                                      | Sheet reference number:<br>S10         | Solicitation Number:<br>DACW25-95-R-0024 |
| Reviewed by:<br>RCA                                                        | Date: 20 OCT. 1995                                                                                                                                   | Drawing M-L 14-135                     | Sheet 22 of 48                           |
| Approved by:<br>CHARLES S. COE<br>COL., CORPS OF ENGINEERS                 |                                                                                                                                                      |                                        |                                          |

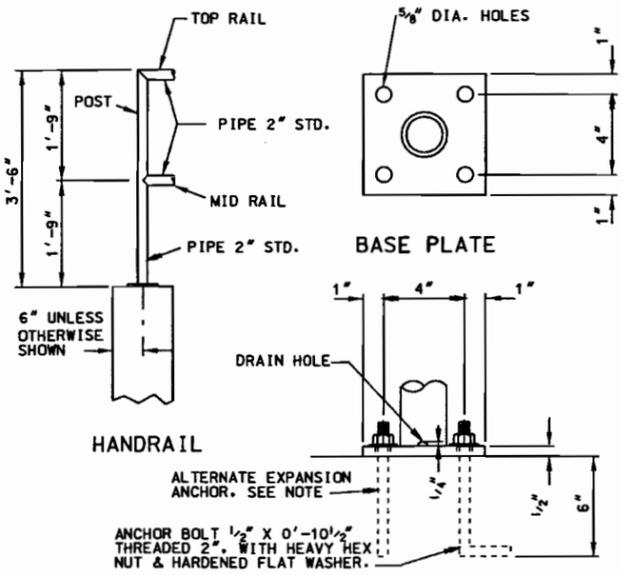


- CONCRETE AND REINFORCING NOTES:**
1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 psi. IN 28 DAYS.
  2. ALL REINFORCING SHALL BE A.S.T.M. 615 GRADE 60. ALL REINFORCING DETAILING SHALL BE IN ACCORDANCE WITH ACI CODE 318, UNLESS SHOWN OTHERWISE ON DRAWINGS.
  3. CLEAR DISTANCE FOR REINFORCING IS 2" FOR WALLS, 2 1/4" FOR TOPS OF SLABS, AND 3" FOR BOTTOM OF SLABS, UNLESS SHOWN OTHERWISE ON DRAWINGS.
  4. SIDES OF FOOTINGS ARE TO BE FORMED TO INSURE LINE AND GRADE.
  5. ALL EXPOSED CORNERS 90° OR SHARPER ARE TO BE CHAMFERED.



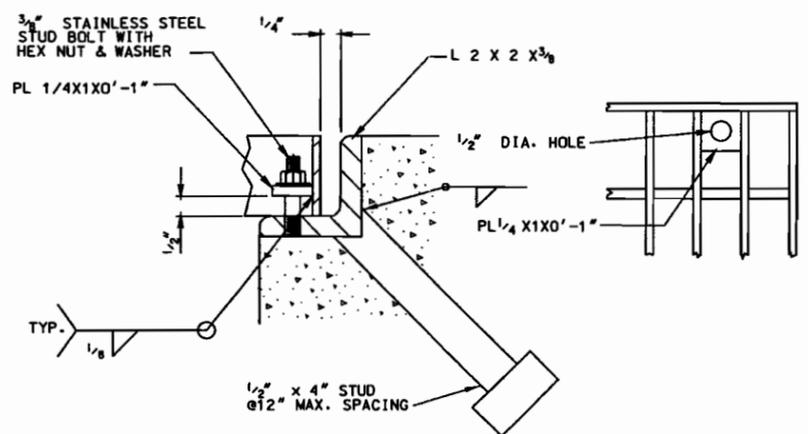
| Revisions                                                                                                                                            |                    |                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------|
| Symbol                                                                                                                                               | Description        | Date Approved                           |
|                                                                                                                                                      |                    |                                         |
|                                                                                                                                                      |                    |                                         |
|                                                                                                                                                      |                    |                                         |
|                                                                                                                                                      |                    |                                         |
| AS CONSTRUCTED                                                                                                                                       |                    |                                         |
| 4 MAY 01 ABE/DH                                                                                                                                      |                    |                                         |
| <b>U.S. ARMY ENGINEER DISTRICT<br/>CORPS OF ENGINEERS<br/>ROCK ISLAND, ILLINOIS</b>                                                                  |                    |                                         |
| UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                    |                                         |
| <b>GATEWELL<br/>REINFORCING</b>                                                                                                                      |                    |                                         |
| Designed by:<br>CHJ                                                                                                                                  | Scale: AS SHOWN    | Sheet reference number:<br>S11          |
| Drawn by:<br>JRK                                                                                                                                     | Date: 20 OCT. 1995 | Solicitation Number:<br>DACW5-95-R-0024 |
| Checked by:<br>CHJ                                                                                                                                   | Drawing M-L 14-135 | Code:                                   |
| Reviewed by:<br>RCA                                                                                                                                  |                    |                                         |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS                                                                                           |                    | Sheet 23 of 48                          |

21-JUN-2002 10:37  
s:\proj\fort\map32\map32p21.dgn



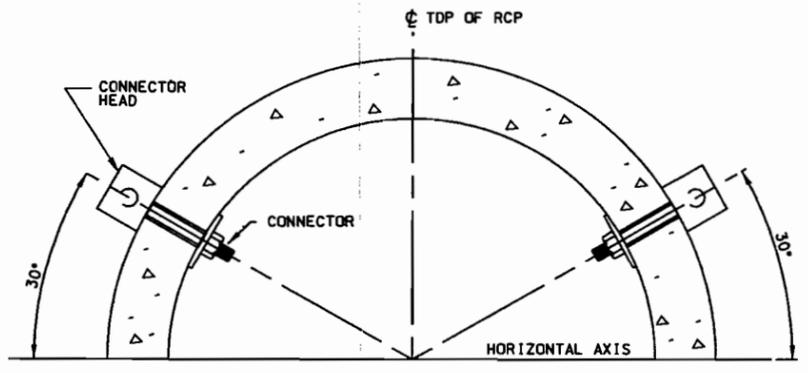
**HANDRAIL DETAILS**  
NO SCALE

- NOTES:
- ANCHOR BOLTS MAY BE EITHER EMBEDDED BOLTS OR EXPANSION BOLTS. EXPANSION BOLTS SHALL BE 1/2" DIA., HAVING AT LEAST 5 INCH EMBEDMENT, 4000 LB. ULTIMATE PULLOUT AND 6000 LB. ULTIMATE SHEAR. ALL ANCHOR BOLTS AND FASTENERS TO BE GALVANIZED OR OF CORROSION RESISTANT MATERIAL.
  - WELD ALL PIPE JOINTS WITH CONTINUOUS BEAD, SIZE EQUAL TO PIPE WALL THICKNESS, AND DRESS SMOOTH.
  - HANDRAIL TO BE GALVANIZED AFTER FABRICATION.
  - USE AWS D1.1-94 STRUCTURAL WELDING CODE - STEEL FOR ALL WELDING.
  - USE ASTM E70XX LOW HYDROGEN ELECTRODES.
  - USE ASTM A36 STEEL FOR BASE PLATE.
  - USE ASTM A53 GRADE B OR A501 FOR PIPE.



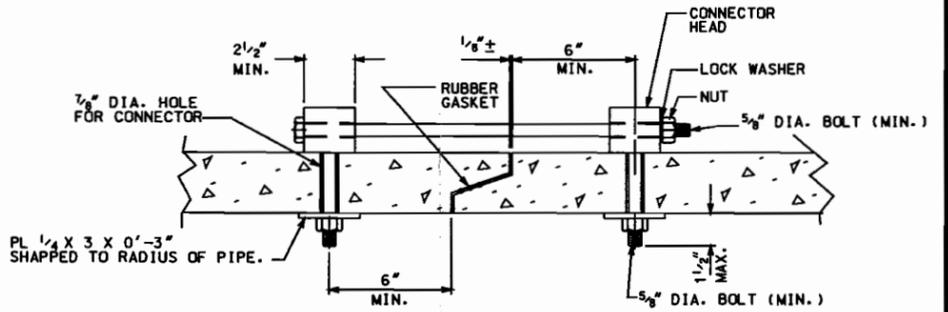
**GRATING FASTENER DETAILS**  
NO SCALE

- NOTES:
- BAND ENDS OF BEARING BARS WITH BAR 1 1/2 X 3/16.
  - BEARING BARS ARE 1 1/2 X 3/16 ON 1 3/16 CENTERS. CROSS BARS ARE AT 4" CENTERS.
  - PROVIDE GRATING IN TWO EQUAL SECTIONS.
  - PROVIDE FASTENER AT EACH CORNER AS SHOWN.
  - THE FRAME AND GRATING ARE TO BE STEEL HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM-123, AFTER FABRICATION.
  - OUTSIDE OF FRAME IS 2'-10" X 5'-4".



- NOTES:
- GALVANIZE AFTER FABRICATION.
  - ALTERNATE PIPE CONNECTIONS MAY BE SUBMITTED FOR APPROVAL.

**SECTION**



**SECTION**  
**PIPE CONNECTOR**  
NO SCALE

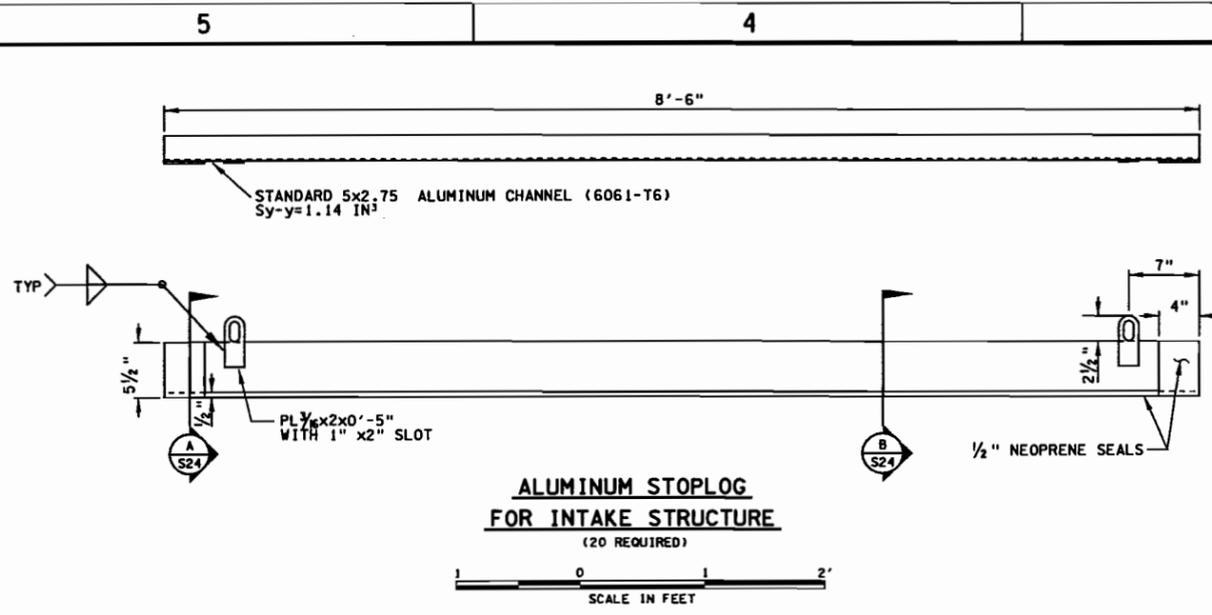
| Revisions                                                                  |                                                                                                                                                      |                                      |                                          |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------|
| Symbol                                                                     | Description                                                                                                                                          | Date                                 | Approved                                 |
|                                                                            |                                                                                                                                                      |                                      |                                          |
|                                                                            |                                                                                                                                                      |                                      |                                          |
|                                                                            |                                                                                                                                                      |                                      |                                          |
|                                                                            |                                                                                                                                                      |                                      |                                          |
| AS CONSTRUCTED                                                             |                                                                                                                                                      |                                      | 4 MAY 01 ABE/DAH                         |
| U.S. ARMY ENGINEER DISTRICT<br>CORPS OF ENGINEERS<br>ROCK ISLAND, ILLINOIS |                                                                                                                                                      |                                      |                                          |
| Designed by:<br>CHJ                                                        | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                                      |                                          |
| Drawn by:<br>JRK                                                           | <b>GATEWELL<br/>GRATING AND HANDRAIL DETAILS</b>                                                                                                     |                                      |                                          |
| Checked by:<br>CHJ                                                         | Scale: AS SHOWN                                                                                                                                      | Sheet<br>reference<br>number:<br>S12 | Solicitation Number:<br>DACW25-95-R-0024 |
| Reviewed by:<br>RCA                                                        | Date: 20 OCT. 1995                                                                                                                                   | Drawing M-L 14-135                   | Sheet 24 of 48                           |
| Approved by:<br>CHARLES S. COE<br>COL., CORPS OF ENGINEERS                 |                                                                                                                                                      |                                      |                                          |





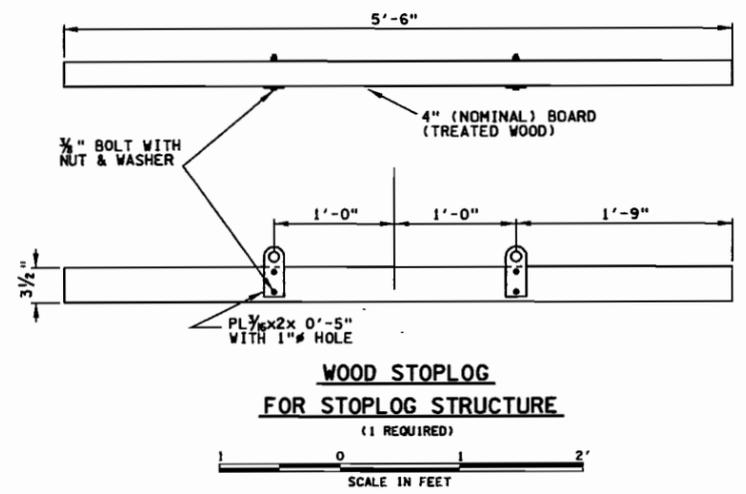






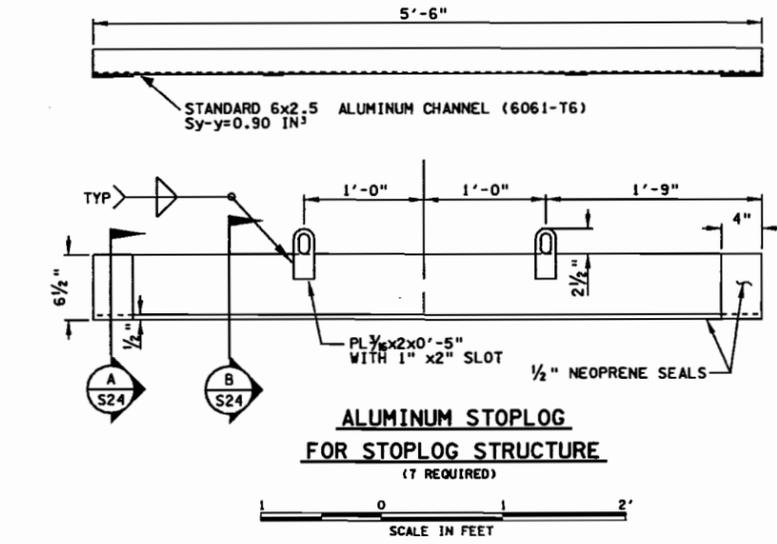
**ALUMINUM STOPLOG  
FOR INTAKE STRUCTURE**  
(20 REQUIRED)

SCALE IN FEET



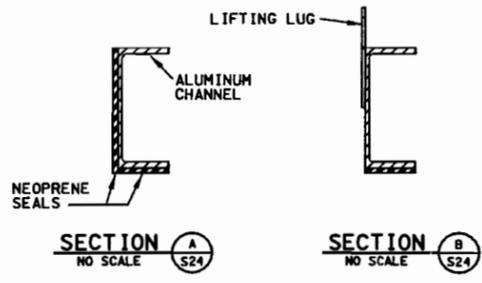
**WOOD STOPLOG  
FOR STOPLOG STRUCTURE**  
(1 REQUIRED)

SCALE IN FEET



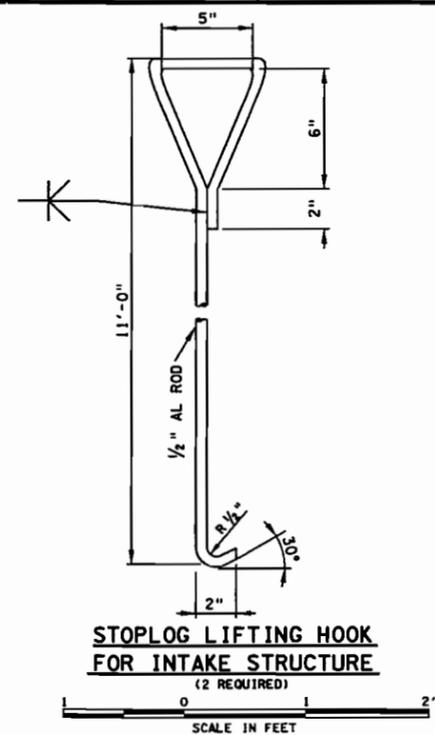
**ALUMINUM STOPLOG  
FOR STOPLOG STRUCTURE**  
(7 REQUIRED)

SCALE IN FEET



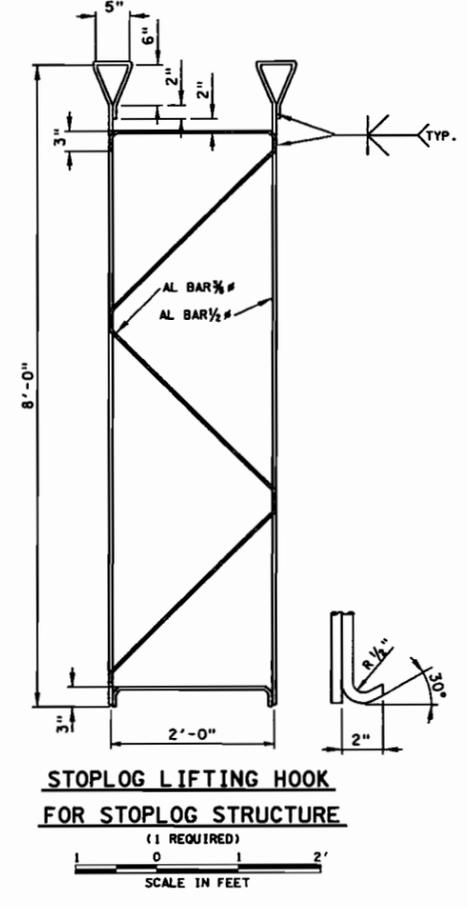
**SECTION A**  
NO SCALE

**SECTION B**  
NO SCALE



**STOPLOG LIFTING HOOK  
FOR INTAKE STRUCTURE**  
(2 REQUIRED)

SCALE IN FEET



**STOPLOG LIFTING HOOK  
FOR STOPLOG STRUCTURE**  
(1 REQUIRED)

SCALE IN FEET

| Revisions                                                                           |                                                                                                                                                      |                                |                                         |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------|
| Symbol                                                                              | Description                                                                                                                                          | Date                           | Approved                                |
|                                                                                     |                                                                                                                                                      |                                |                                         |
|                                                                                     |                                                                                                                                                      |                                |                                         |
|                                                                                     |                                                                                                                                                      |                                |                                         |
|                                                                                     |                                                                                                                                                      |                                |                                         |
| AS CONSTRUCTED                                                                      |                                                                                                                                                      | DATE OF MEASUREMENT            |                                         |
| <b>U.S. ARMY ENGINEER DISTRICT<br/>CORPS OF ENGINEERS<br/>ROCK ISLAND, ILLINOIS</b> |                                                                                                                                                      |                                |                                         |
| Designed by:<br>CHJ                                                                 | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                                |                                         |
| Drawn by:<br>JRK                                                                    | <b>STOPLOG STRUCTURE<br/>MISCELLANEOUS DETAILS</b>                                                                                                   |                                |                                         |
| Checked by:<br>CHJ                                                                  | Scale: AS SHOWN                                                                                                                                      | Sheet reference number:<br>S24 | Calculation Number:<br>DACW25-95-R-0024 |
| Reviewed by:<br>RCA                                                                 | Date: 20 OCT. 1995                                                                                                                                   | Drawing Code:<br>M-L 14-135    | Sheet 29 of 48                          |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS                          |                                                                                                                                                      |                                |                                         |

21-JUN-2002 10:46  
a:\p\j\enr\emp32\emp32p27.dgn

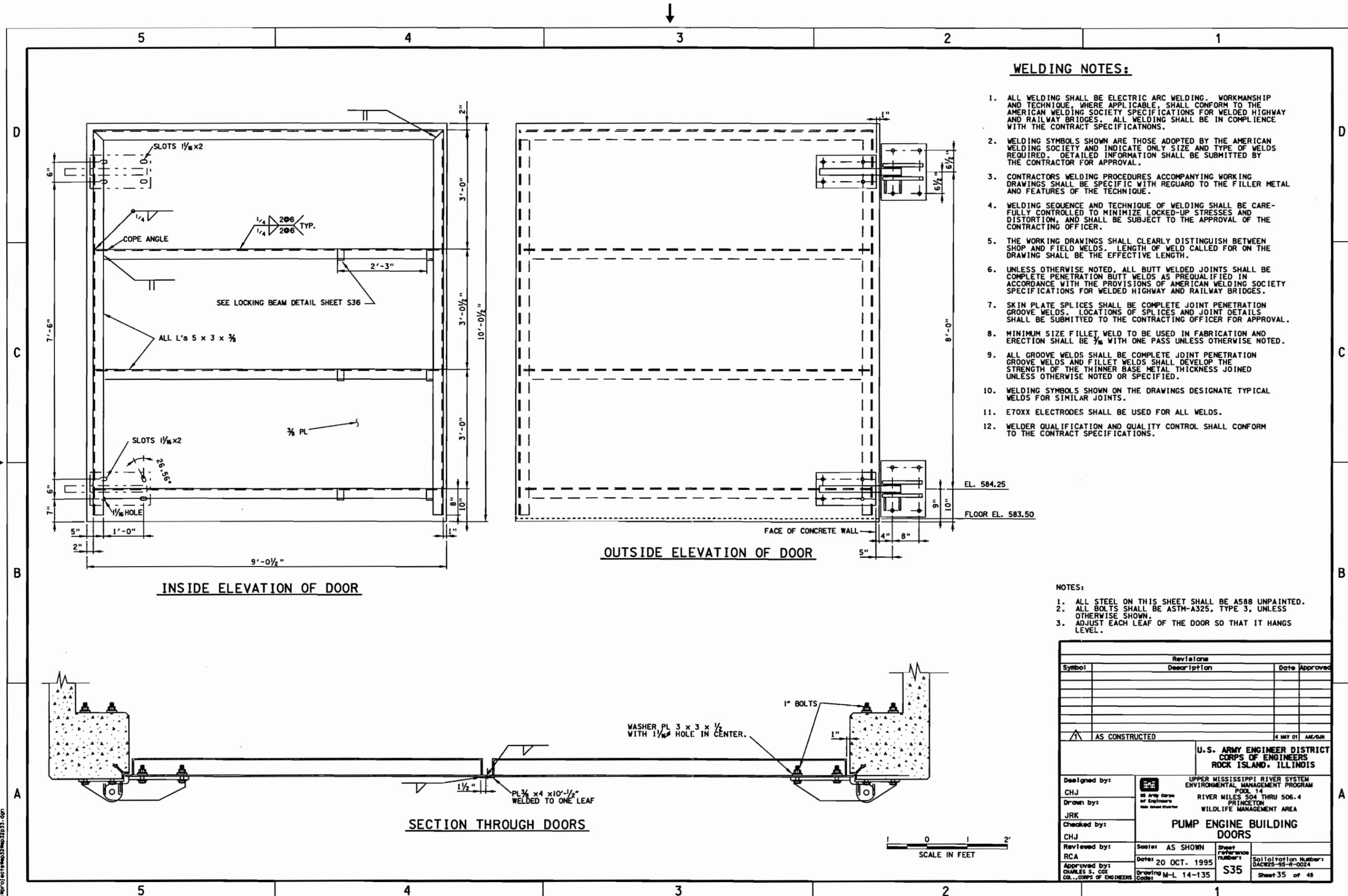












**WELDING NOTES:**

1. ALL WELDING SHALL BE ELECTRIC ARC WELDING. WORKMANSHIP AND TECHNIQUE, WHERE APPLICABLE, SHALL CONFORM TO THE AMERICAN WELDING SOCIETY SPECIFICATIONS FOR WELDED HIGHWAY AND RAILWAY BRIDGES. ALL WELDING SHALL BE IN COMPLIANCE WITH THE CONTRACT SPECIFICATIONS.
2. WELDING SYMBOLS SHOWN ARE THOSE ADOPTED BY THE AMERICAN WELDING SOCIETY AND INDICATE ONLY SIZE AND TYPE OF WELDS REQUIRED. DETAILED INFORMATION SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL.
3. CONTRACTOR'S WELDING PROCEDURES ACCOMPANYING WORKING DRAWINGS SHALL BE SPECIFIC WITH REGARD TO THE FILLER METAL AND FEATURES OF THE TECHNIQUE.
4. WELDING SEQUENCE AND TECHNIQUE OF WELDING SHALL BE CAREFULLY CONTROLLED TO MINIMIZE LOCKED-UP STRESSES AND DISTORTION, AND SHALL BE SUBJECT TO THE APPROVAL OF THE CONTRACTING OFFICER.
5. THE WORKING DRAWINGS SHALL CLEARLY DISTINGUISH BETWEEN SHOP AND FIELD WELDS. LENGTH OF WELD CALLED FOR ON THE DRAWING SHALL BE THE EFFECTIVE LENGTH.
6. UNLESS OTHERWISE NOTED, ALL BUTT WELDED JOINTS SHALL BE COMPLETE PENETRATION BUTT WELDS AS PREQUALIFIED IN ACCORDANCE WITH THE PROVISIONS OF AMERICAN WELDING SOCIETY SPECIFICATIONS FOR WELDED HIGHWAY AND RAILWAY BRIDGES.
7. SKIN PLATE SPLICES SHALL BE COMPLETE JOINT PENETRATION GROOVE WELDS. LOCATIONS OF SPLICES AND JOINT DETAILS SHALL BE SUBMITTED TO THE CONTRACTING OFFICER FOR APPROVAL.
8. MINIMUM SIZE FILLET WELD TO BE USED IN FABRICATION AND ERECTION SHALL BE 3/16" WITH ONE PASS UNLESS OTHERWISE NOTED.
9. ALL GROOVE WELDS SHALL BE COMPLETE JOINT PENETRATION GROOVE WELDS AND FILLET WELDS SHALL DEVELOP THE STRENGTH OF THE THINNER BASE METAL THICKNESS JOINED UNLESS OTHERWISE NOTED OR SPECIFIED.
10. WELDING SYMBOLS SHOWN ON THE DRAWINGS DESIGNATE TYPICAL WELDS FOR SIMILAR JOINTS.
11. E70XX ELECTRODES SHALL BE USED FOR ALL WELDS.
12. WELDER QUALIFICATION AND QUALITY CONTROL SHALL CONFORM TO THE CONTRACT SPECIFICATIONS.

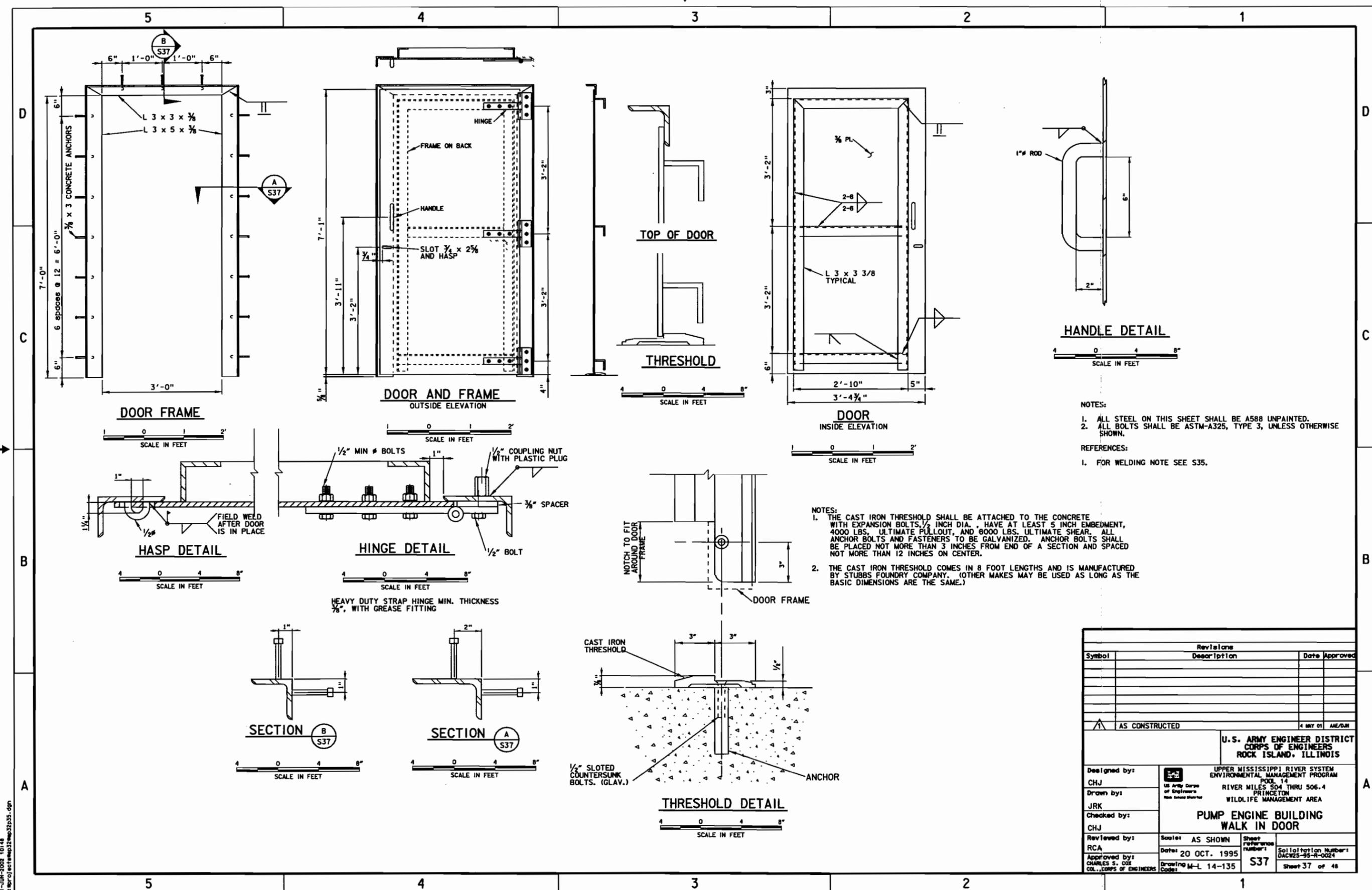
**NOTES:**

1. ALL STEEL ON THIS SHEET SHALL BE A588 UNPAINTED.
2. ALL BOLTS SHALL BE ASTM-A325, TYPE 3, UNLESS OTHERWISE SHOWN.
3. ADJUST EACH LEAF OF THE DOOR SO THAT IT HANGS LEVEL.

| Revisions                                                                           |                                                                                                                                                      |                                       |                                          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------|
| Symbol                                                                              | Description                                                                                                                                          | Date                                  | Approved                                 |
|                                                                                     |                                                                                                                                                      |                                       |                                          |
|                                                                                     |                                                                                                                                                      |                                       |                                          |
|                                                                                     |                                                                                                                                                      |                                       |                                          |
|                                                                                     |                                                                                                                                                      |                                       |                                          |
| AS CONSTRUCTED                                                                      |                                                                                                                                                      | 4 MAY 01                              | AME/DJH                                  |
| <b>U.S. ARMY ENGINEER DISTRICT<br/>CORPS OF ENGINEERS<br/>ROCK ISLAND, ILLINOIS</b> |                                                                                                                                                      |                                       |                                          |
| Designed by:<br>CHJ                                                                 | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                                       |                                          |
| Drawn by:<br>JRK                                                                    | <b>PUMP ENGINE BUILDING<br/>DOORS</b>                                                                                                                |                                       |                                          |
| Checked by:<br>CHJ                                                                  | Scale: AS SHOWN                                                                                                                                      | Sheet Reference Number:<br><b>S35</b> | Solicitation Number:<br>DACW25-95-R-0024 |
| Reviewed by:<br>RCA                                                                 | Date: 20 OCT. 1995                                                                                                                                   | Drawing M-L 14-135                    | Sheet 35 of 48                           |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS                          |                                                                                                                                                      |                                       |                                          |

21-JUL-2002 10:47  
s:\proj\act\emp\3p33.dgn





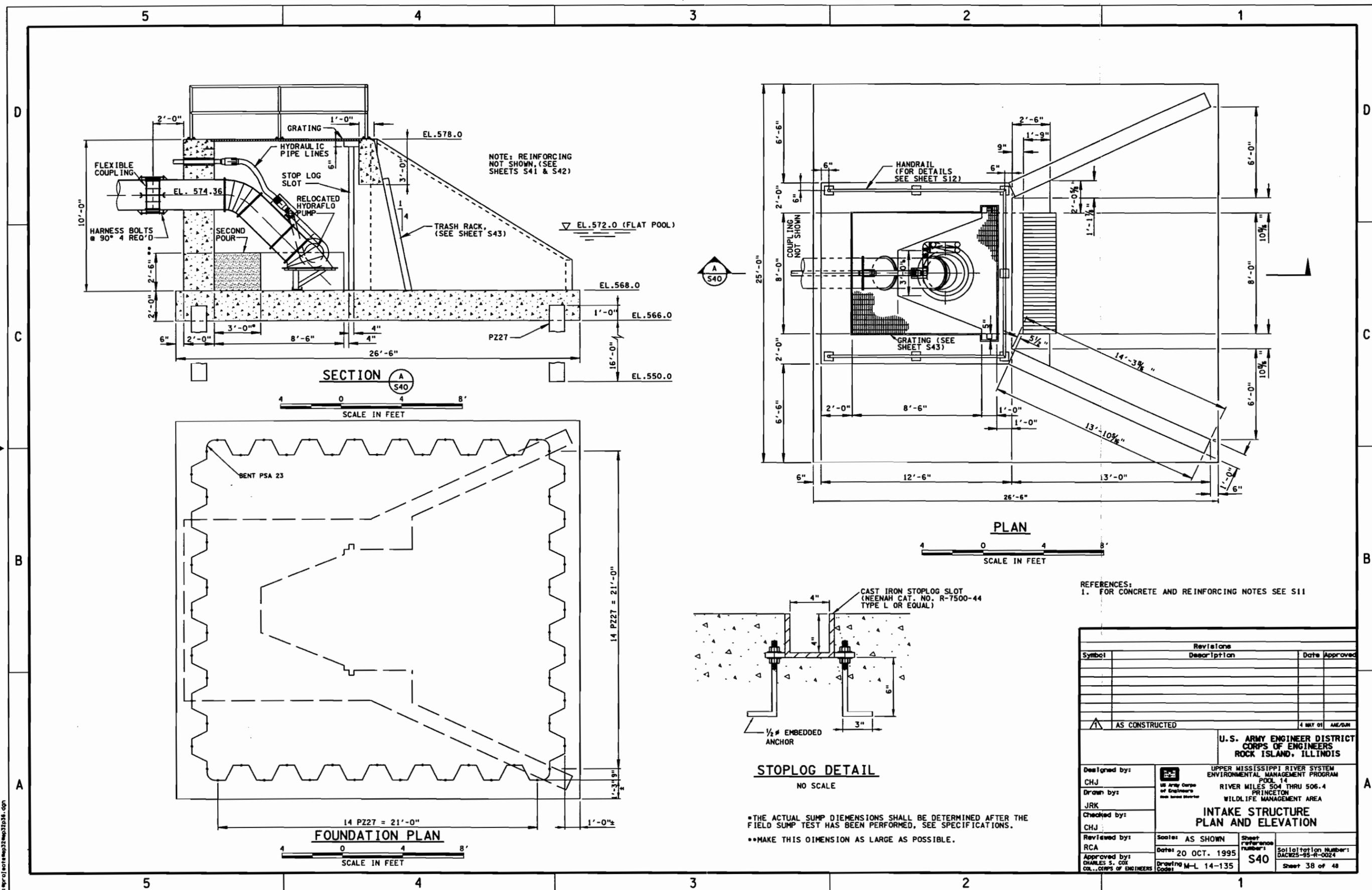
NOTES:  
 1. ALL STEEL ON THIS SHEET SHALL BE A588 UNPAINTED.  
 2. ALL BOLTS SHALL BE ASTM-A325, TYPE 3, UNLESS OTHERWISE SHOWN.

REFERENCES:  
 1. FOR WELDING NOTE SEE S35.

NOTES:  
 1. THE CAST IRON THRESHOLD SHALL BE ATTACHED TO THE CONCRETE WITH EXPANSION BOLTS 1/2 INCH DIA. HAVE AT LEAST 5 INCH EMBEDMENT, 4000 LBS. ULTIMATE PULLOUT, AND 6000 LBS. ULTIMATE SHEAR. ALL ANCHOR BOLTS AND FASTENERS TO BE GALVANIZED. ANCHOR BOLTS SHALL BE PLACED NOT MORE THAN 3 INCHES FROM END OF A SECTION AND SPACED NOT MORE THAN 12 INCHES ON CENTER.  
 2. THE CAST IRON THRESHOLD COMES IN 8 FOOT LENGTHS AND IS MANUFACTURED BY STUBBS FOUNDRY COMPANY. (OTHER MAKES MAY BE USED AS LONG AS THE BASIC DIMENSIONS ARE THE SAME.)

| Revisions                                                                  |                                                                                                                                                      |                             |                                          |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------|
| Symbol                                                                     | Description                                                                                                                                          | Date                        | Approved                                 |
|                                                                            |                                                                                                                                                      |                             |                                          |
|                                                                            |                                                                                                                                                      |                             |                                          |
|                                                                            |                                                                                                                                                      |                             |                                          |
|                                                                            |                                                                                                                                                      |                             |                                          |
| AS CONSTRUCTED                                                             |                                                                                                                                                      | 4 MAY 01                    | AME/DJM                                  |
| U.S. ARMY ENGINEER DISTRICT<br>CORPS OF ENGINEERS<br>ROCK ISLAND, ILLINOIS |                                                                                                                                                      |                             |                                          |
| Designed by:<br>CHJ                                                        | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                             |                                          |
| Drawn by:<br>JRK                                                           | <b>PUMP ENGINE BUILDING<br/>WALK IN DOOR</b>                                                                                                         |                             |                                          |
| Checked by:<br>CHJ                                                         | Scale: AS SHOWN                                                                                                                                      | Sheet number:<br>S37        | Solicitation Number:<br>DACW25-95-R-0024 |
| Reviewed by:<br>RCA                                                        | Date: 20 OCT. 1995                                                                                                                                   | Drawing Code:<br>M-L 14-135 | Sheet 37 of 48                           |
| Approved by:<br>CHARLES S. COE<br>COL., CORPS OF ENGINEERS                 |                                                                                                                                                      |                             |                                          |

21-JUN-2002 10:48  
 6168021011000320032035-000



NOTE: REINFORCING NOT SHOWN, (SEE SHEETS S41 & S42)

SECTION A-A  
S40

SCALE IN FEET

PLAN

SCALE IN FEET

STOPLOG DETAIL

NO SCALE

•THE ACTUAL SUMP DIEMENSIONS SHALL BE DETERMINED AFTER THE FIELD SUMP TEST HAS BEEN PERFORMED, SEE SPECIFICATIONS.  
 ••MAKE THIS DIMENSION AS LARGE AS POSSIBLE.

REFERENCES:  
 1. FOR CONCRETE AND REINFORCING NOTES SEE S11

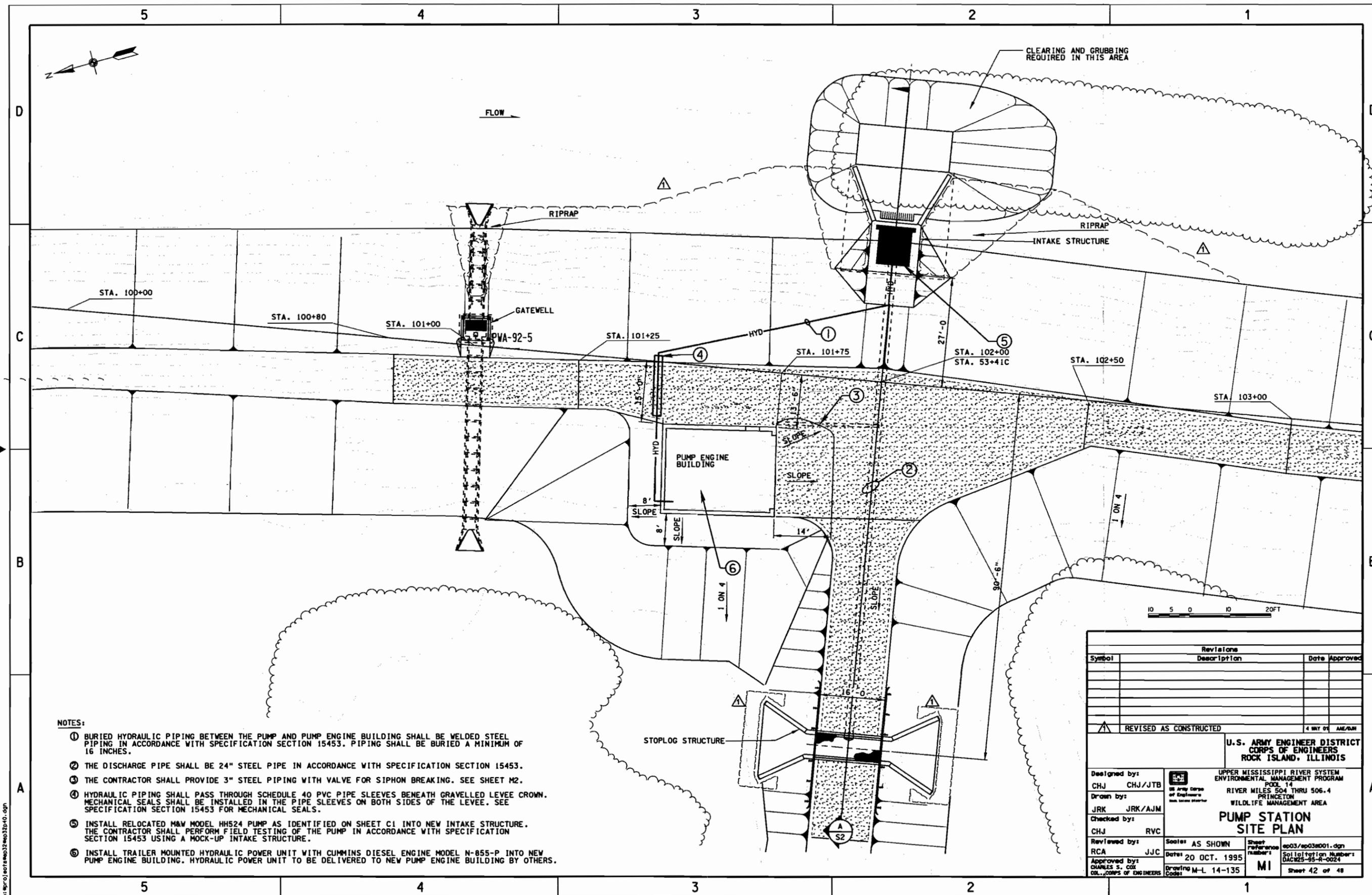
| Revisions                                                                                             |                                                                                                                                                      |                      |                                          |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------|
| Symbol                                                                                                | Description                                                                                                                                          | Date                 | Approved                                 |
|                                                                                                       |                                                                                                                                                      |                      |                                          |
|                                                                                                       |                                                                                                                                                      |                      |                                          |
|                                                                                                       |                                                                                                                                                      |                      |                                          |
|                                                                                                       |                                                                                                                                                      |                      |                                          |
| AS CONSTRUCTED                                                                                        |                                                                                                                                                      | 4 MAY 01             | AHE/DH                                   |
| <b>U.S. ARMY ENGINEER DISTRICT<br/>         CORPS OF ENGINEERS<br/>         ROCK ISLAND, ILLINOIS</b> |                                                                                                                                                      |                      |                                          |
| Designed by:<br>CHJ                                                                                   | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POND 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                      |                                          |
| Drawn by:<br>JRK                                                                                      | <b>INTAKE STRUCTURE<br/>         PLAN AND ELEVATION</b>                                                                                              |                      |                                          |
| Checked by:<br>CHJ                                                                                    | Scale: AS SHOWN                                                                                                                                      | Sheet number:<br>S40 | Solicitation Number:<br>DACW25-95-R-0024 |
| Revised by:<br>RCA                                                                                    | Date: 20 OCT. 1995                                                                                                                                   | Drawing M-L 14-135   | Sheet 38 of 48                           |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS                                            |                                                                                                                                                      |                      |                                          |

21-JUN-2002 10:44  
 s:\proj\intake\mp2\mp2p36.dgn









**NOTES:**

- ① BURIED HYDRAULIC PIPING BETWEEN THE PUMP AND PUMP ENGINE BUILDING SHALL BE WELDED STEEL PIPING IN ACCORDANCE WITH SPECIFICATION SECTION 15453. PIPING SHALL BE BURIED A MINIMUM OF 16 INCHES.
- ② THE DISCHARGE PIPE SHALL BE 24" STEEL PIPE IN ACCORDANCE WITH SPECIFICATION SECTION 15453.
- ③ THE CONTRACTOR SHALL PROVIDE 3" STEEL PIPING WITH VALVE FOR SIPHON BREAKING. SEE SHEET M2.
- ④ HYDRAULIC PIPING SHALL PASS THROUGH SCHEDULE 40 PVC PIPE SLEEVES BENEATH GRAVELLED LEVEE CROWN. MECHANICAL SEALS SHALL BE INSTALLED IN THE PIPE SLEEVES ON BOTH SIDES OF THE LEVEE. SEE SPECIFICATION SECTION 15453 FOR MECHANICAL SEALS.
- ⑤ INSTALL RELOCATED M&W MODEL HH524 PUMP AS IDENTIFIED ON SHEET C1 INTO NEW INTAKE STRUCTURE. THE CONTRACTOR SHALL PERFORM FIELD TESTING OF THE PUMP IN ACCORDANCE WITH SPECIFICATION SECTION 15453 USING A MOCK-UP INTAKE STRUCTURE.
- ⑥ INSTALL TRAILER MOUNTED HYDRAULIC POWER UNIT WITH CUMMINS DIESEL ENGINE MODEL N-855-P INTO NEW PUMP ENGINE BUILDING. HYDRAULIC POWER UNIT TO BE DELIVERED TO NEW PUMP ENGINE BUILDING BY OTHERS.

| Revisions |                        | Date Approved |        |
|-----------|------------------------|---------------|--------|
| Symbol    | Description            |               |        |
| ▲         | REVISED AS CONSTRUCTED | 4 MAY 01      | AME/BN |

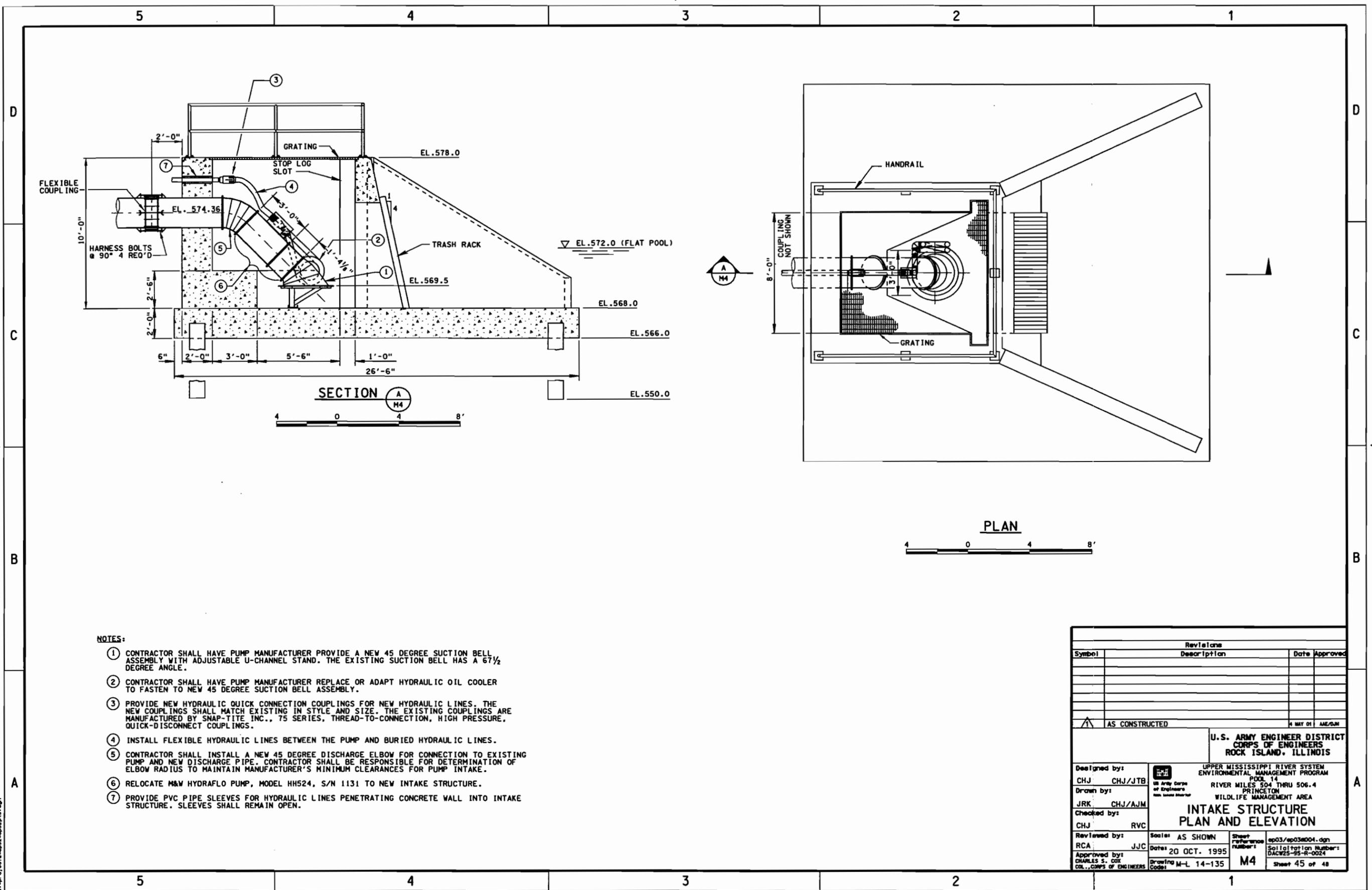
  

|                                                            |  |                                                                                                                                                      |                                              |
|------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Designed by:<br>CHJ CHJ/JTB                                |  | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                                              |
| Drawn by:<br>JRK JRK/AJM                                   |  | <b>PUMP STATION<br/>SITE PLAN</b>                                                                                                                    |                                              |
| Checked by:<br>CHJ RVC                                     |  |                                                                                                                                                      |                                              |
| Reviewed by:<br>RCA JJC                                    |  | Scale: AS SHOWN                                                                                                                                      | Sheet Reference Number:<br>ep03/ep03m001.dgn |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS |  | Date:<br>20 OCT. 1995                                                                                                                                | Solicitation Number:<br>DACW25-95-R-0024     |
|                                                            |  | Drawing M-L 14-135                                                                                                                                   | MI<br>Sheet 42 of 48                         |

25-JUN-2002 10:20  
e:\ep03\m001\ep03m001.dgn







SECTION A-A

PLAN

NOTES:

- ① CONTRACTOR SHALL HAVE PUMP MANUFACTURER PROVIDE A NEW 45 DEGREE SUCTION BELL ASSEMBLY WITH ADJUSTABLE U-CHANNEL STAND. THE EXISTING SUCTION BELL HAS A 67½ DEGREE ANGLE.
- ② CONTRACTOR SHALL HAVE PUMP MANUFACTURER REPLACE OR ADAPT HYDRAULIC OIL COOLER TO FASTEN TO NEW 45 DEGREE SUCTION BELL ASSEMBLY.
- ③ PROVIDE NEW HYDRAULIC QUICK CONNECTION COUPLINGS FOR NEW HYDRAULIC LINES. THE NEW COUPLINGS SHALL MATCH EXISTING IN STYLE AND SIZE. THE EXISTING COUPLINGS ARE MANUFACTURED BY SNAP-TITE INC., 75 SERIES, THREAD-TO-CONNECTION, HIGH PRESSURE, QUICK-DISCONNECT COUPLINGS.
- ④ INSTALL FLEXIBLE HYDRAULIC LINES BETWEEN THE PUMP AND BURIED HYDRAULIC LINES.
- ⑤ CONTRACTOR SHALL INSTALL A NEW 45 DEGREE DISCHARGE ELBOW FOR CONNECTION TO EXISTING PUMP AND NEW DISCHARGE PIPE. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINATION OF ELBOW RADIUS TO MAINTAIN MANUFACTURER'S MINIMUM CLEARANCES FOR PUMP INTAKE.
- ⑥ RELOCATE M&W HYDRAFLOW PUMP, MODEL HHS24, S/N 1131 TO NEW INTAKE STRUCTURE.
- ⑦ PROVIDE PVC PIPE SLEEVES FOR HYDRAULIC LINES PENETRATING CONCRETE WALL INTO INTAKE STRUCTURE. SLEEVES SHALL REMAIN OPEN.

| Revisions      |             |          |          |
|----------------|-------------|----------|----------|
| Symbol         | Description | Date     | Approved |
|                |             |          |          |
|                |             |          |          |
|                |             |          |          |
|                |             |          |          |
| AS CONSTRUCTED |             | 4 MAY 01 | AJE/DJM  |

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

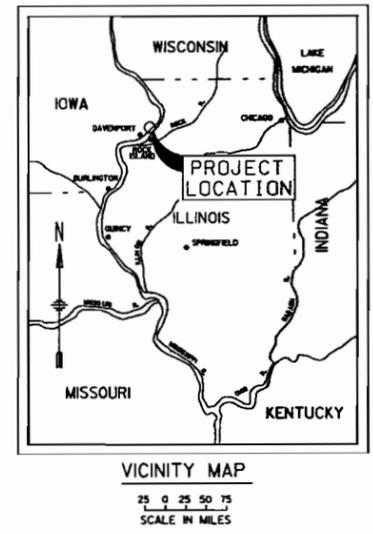
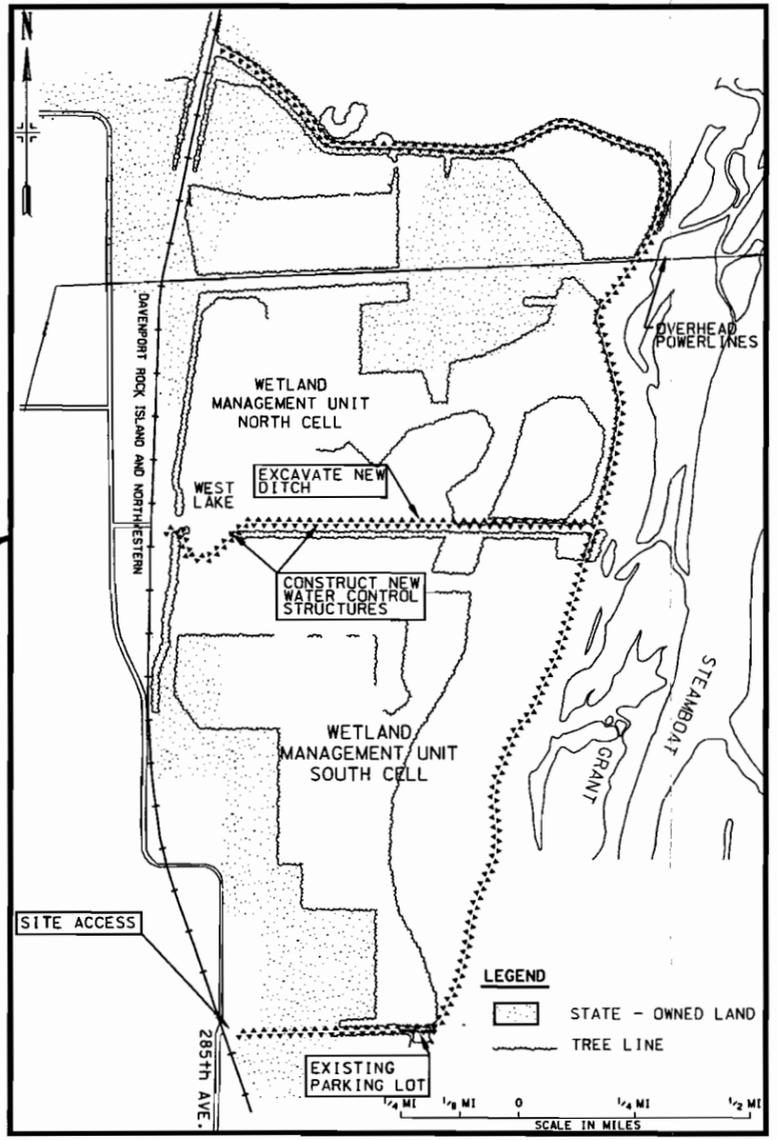
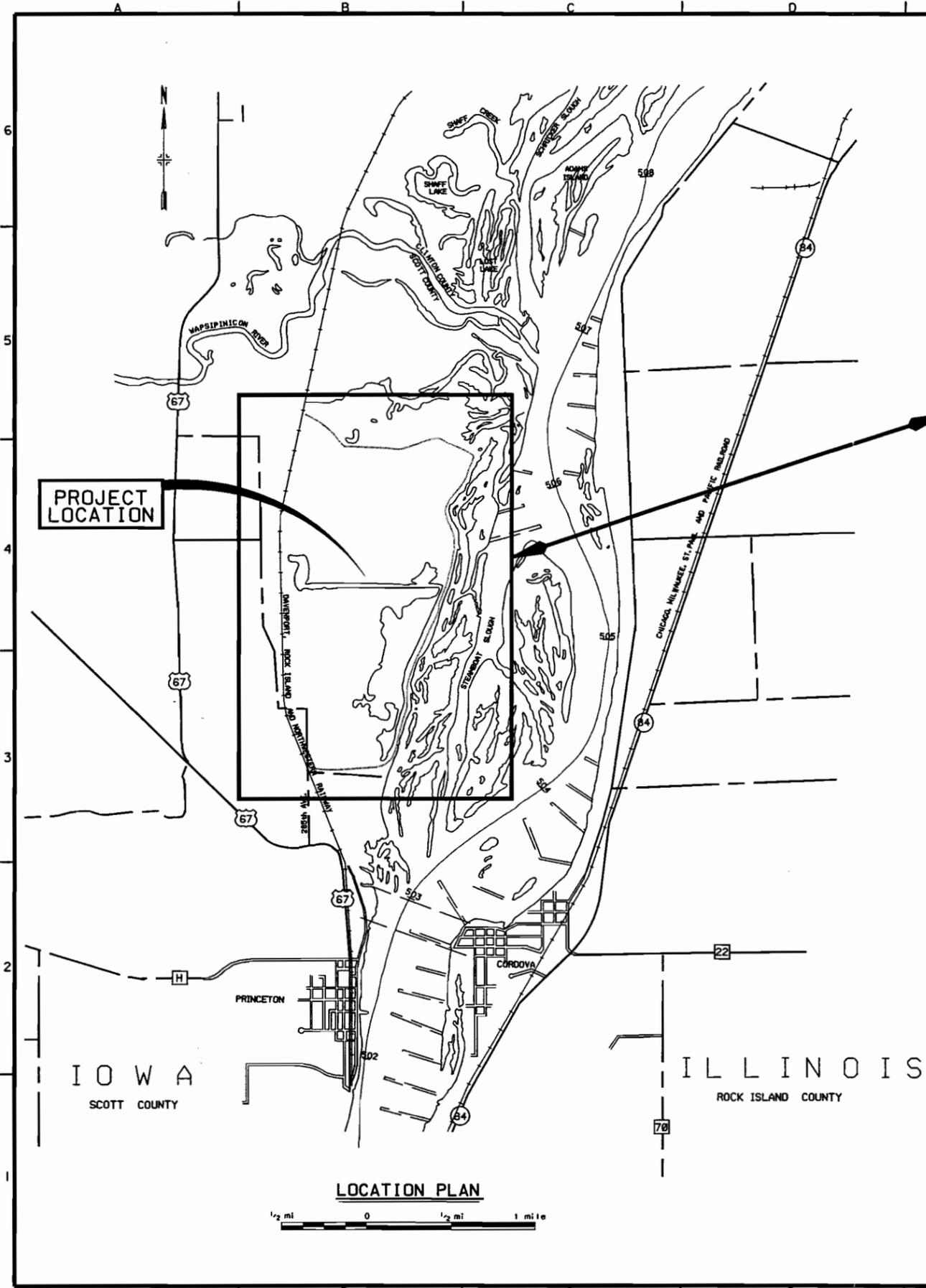
|                                                            |                                                                                                                                                      |                                                 |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Designed by:<br>CHJ CHJ/JTB                                | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                                                 |
| Drawn by:<br>JRK CHJ/AJM                                   |                                                                                                                                                      |                                                 |
| Checked by:<br>CHJ RVC                                     |                                                                                                                                                      |                                                 |
| Reviewed by:<br>RCA JJC                                    |                                                                                                                                                      |                                                 |
| Approved by:<br>CHARLES S. COX<br>COL., CORPS OF ENGINEERS | Date: 20 OCT. 1995<br>Drawing M-L 14-135<br>Code:                                                                                                    | Sheet reference number:<br>M4<br>Sheet 45 of 48 |

21-JUN-2002 10:53  
ep03/ep03m004.dgn









**LEGEND:**

SECTION 0/107 SECTION DESIGNATION  
 LOOK ON THIS SHEET FOR SECTION CUT LOCATION

SECTION 1/107 SECTION DESIGNATION  
 LOOK ON THIS SHEET FOR SECTION

STATE - OWNED LAND  
 TREE LINE

| INDEX     |                |                                          |
|-----------|----------------|------------------------------------------|
| SHEET NO. | SHEET REF. NO. | TITLE OF DRAWING                         |
| 1         | X1             | COVER SHEET                              |
| 2         | X2             | LOCATION PLAN, VICINITY MAP, AND INDEX   |
| 3         | C1             | SITE PLAN                                |
| 4         | C2             | BORING LOGS                              |
| 5         | C3             | WATER CONTROL STRUCTURE PLAN AND SECTION |
| 6         | S1             | WATER CONTROL STRUCTURE DETAILS I        |
| 7         | S2             | WATER CONTROL STRUCTURE DETAILS II       |

- GENERAL NOTES:**
- THE SCOPE OF WORK GENERALLY CONSISTS OF, BUT IS NOT LIMITED TO:
    - CONSTRUCT APPROXIMATELY 3900 FEET OF DITCH.
    - CONSTRUCT TWO WATER CONTROL STRUCTURES.
    - SEED DISTURBED AREAS ON CROSS DIKE.
    - SEED PERIMETER LEVEE. TOTAL AREA APPROXIMATELY 1/2 ACRE.
  - THE ENTIRE INTERIOR OF THE CONSTRUCTION SITE IS PROTECTED BY LEVEES, AND THE GROUNDWATER LEVELS ARE HIGHLY INFLUENCED BY VARYING RIVER STAGES. SEE SPECIFICATIONS FOR HYDRAULIC DATA.
  - THE LAYOUT OF THE PROJECT FEATURES AND CONSTRUCTION WORK LIMITS AS SHOWN SHALL BE FIELD STAKED AND APPROVED BY THE CONTRACTING OFFICER PRIOR TO CONSTRUCTION.
  - THE MAJORITY OF THE TOPOGRAPHICAL CONTOURS SHOWN WERE DEVELOPED FROM FIELD AND AERIAL SURVEYS TAKEN PRIOR TO THE FLOOD OF 1993. ACTUAL CONTOURS MAY VARY.
  - HORIZONTAL AND VERTICAL DATA AVAILABLE UPON REQUEST.

US Army Corps of Engineers  
 Rock Island District

| Symbol                  | Description | Revisions |
|-------------------------|-------------|-----------|
| AS CONSTRUCTED          |             |           |
| AND 25 - REVISED NOTE 1 |             |           |
| 3 MAY 93                | DATE        | APPROVED  |
| 3 MAY 93                | DATE        | APPROVED  |

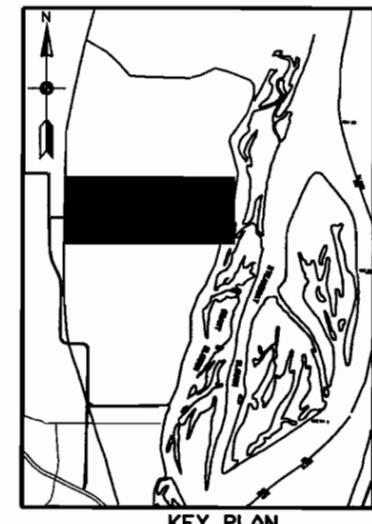
|                  |                                       |
|------------------|---------------------------------------|
| Designed By: KJD | Date: 25 OCT. 1999                    |
| Drawn By: TPD    | Scale: AS SHOWN                       |
| Checked By: EGR  | Drawing Code: M-L 14-141              |
| Reviewed By: BLK | Soil Citation Number: DUCR5-00-1-0003 |

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

US ARMY DISTRICT ENGINEER SYSTEM  
 ENVIRONMENTAL MANAGEMENT PROGRAM  
 PRINCETON VILLAGE WETLAND MANAGEMENT AREA

**LOCATION PLAN,  
 VICINITY MAP,  
 AND INDEX**

Sheet Reference Number:  
**X2**  
 Sheet 2 of 7



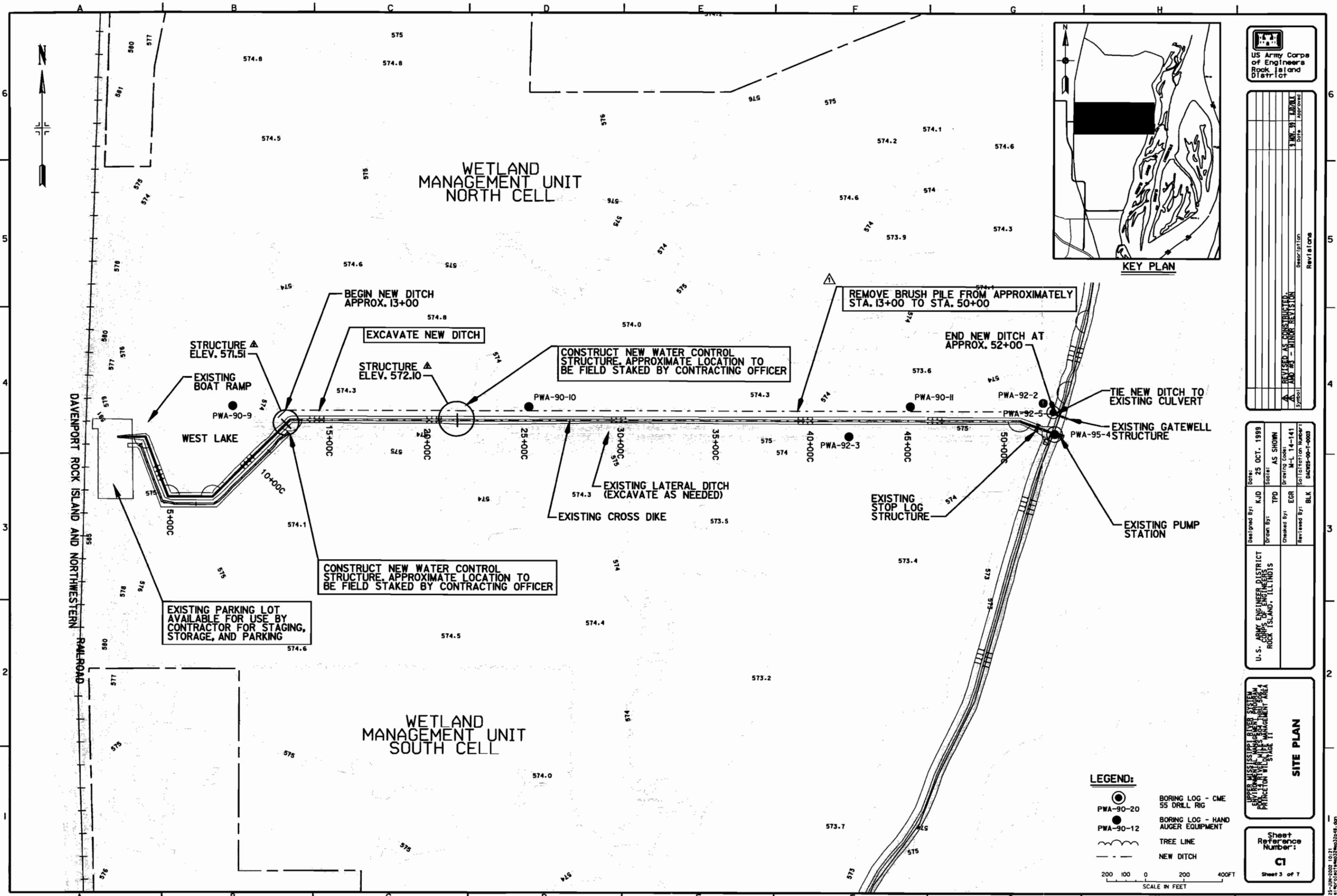
| Symbol | Description             | Date     | Revised By | Revisions |
|--------|-------------------------|----------|------------|-----------|
| ▲      | REVISED AS CONSTRUCTED  | 9 MAY 99 | MAZAL      | Approved  |
| ▲      | AND 95 - MINOR REVISION |          |            |           |

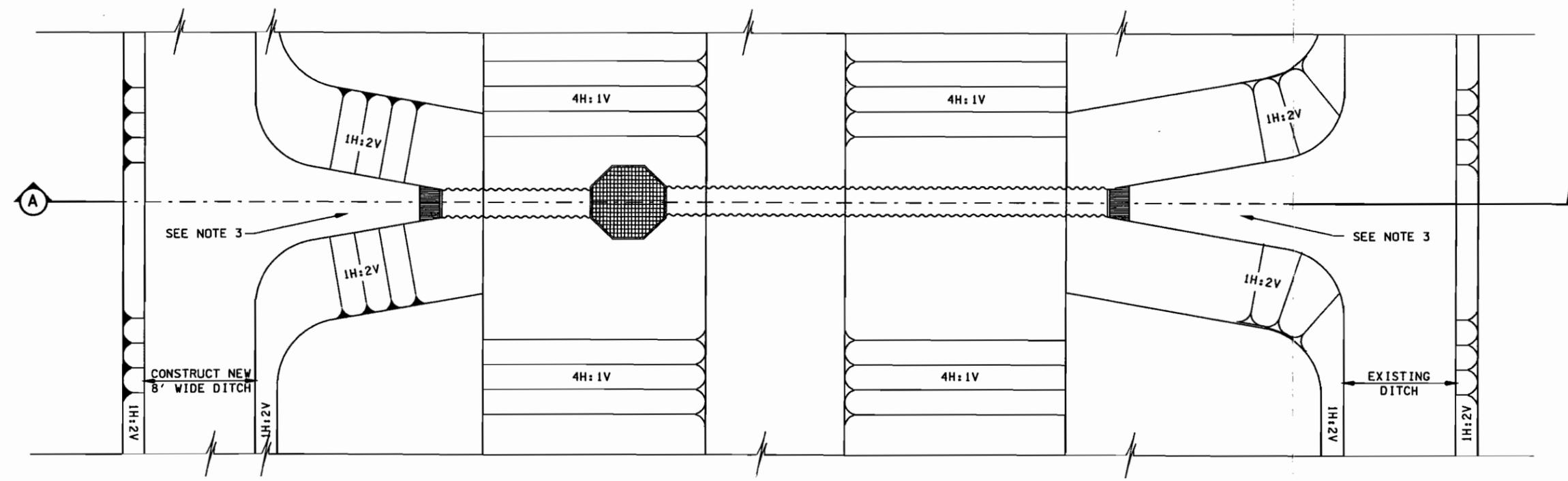
|              |     |                      |                  |
|--------------|-----|----------------------|------------------|
| Designed By: | KJD | Date:                | 25 OCT. 1999     |
| Drawn By:    | TPD | Scale:               | AS SHOWN         |
| Checked By:  | EGR | Drawing Code:        | M-L 14-141       |
| Reviewed By: | BLK | Solicitation Number: | DACW55-99-T-0003 |

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
ROCK ISLAND DISTRICT  
PRINCETON WILDLIFE MANAGEMENT AREA 4  
STAGE II MANAGEMENT AREA 4

**SITE PLAN**

Sheet Reference Number:  
**C1**  
Sheet 3 of 7





**TYPICAL WATER CONTROL STRUCTURE DITCH PLAN**  
NO SCALE

| Symbol         | Description     | Date | Approved |
|----------------|-----------------|------|----------|
| AS CONSTRUCTED | AS SHOWN        |      |          |
| JAM. #3        | MINOR REVISIONS |      |          |

| Designated By: | Drawn By: | Checked By: | Reviewed By: |
|----------------|-----------|-------------|--------------|
| KJD            | TPD       | EGR         | BLK          |

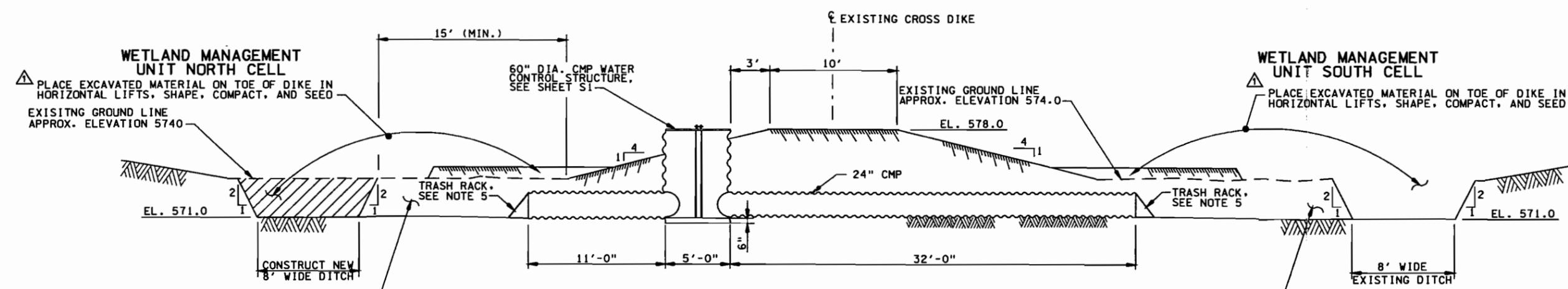
Date: 25 OCT. 1999  
Scale: AS SHOWN  
Drawing Code: M-L 14-141  
Specification Number: DACES-00-T-000

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

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
PRINCETON WETLAND MANAGEMENT AREA

**WATER CONTROL  
STRUCTURE PLAN  
AND SECTION**

Sheet Reference Number:  
**63**  
Sheet 5 of 7



**TYPICAL WATER CONTROL STRUCTURE DITCH SECTION**  
NO SCALE

- NOTES:**
- FOR DETAILS OF WATER CONTROL STRUCTURE, SEE SHEET S1.
  - 24" CMP'S SHALL BE UNDERCUT BY HALF THEIR DIAMETER WHEN PLACED.
  - DITCHES SHALL BE CUT BACK INTO CMP'S TO OBTAIN DRAINAGE.
  - EXISTING DITCH ON SOUTH SIDE OF DIKE SHALL BE EXCAVATED AS NEEDED TO OBTAIN BOTTOM ELEVATION OF 571.0'.
  - FOR TRASH RACK, PLACE 1/2" SOLID BAR VERTICALLY AND WELD IN PLACE.
  - EXISTING BRUSH PILE FROM APPROXIMATELY STA. 13+00 TO STA. 50+00 SHALL BE REMOVED.

|             |                 |
|-------------|-----------------|
| Symbol      | AS CONSTRUCTED. |
| Date        | 11-15-00        |
| Drawn By    | MM              |
| Checked By  | MM              |
| Reviewed By | MM              |
| Revision    |                 |

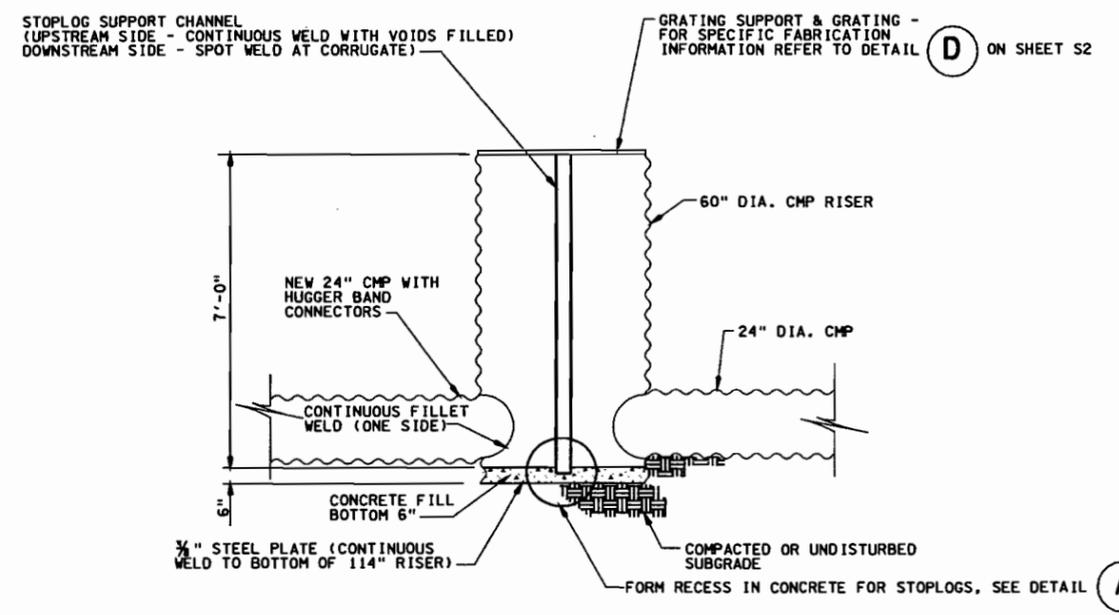
|              |     |                       |                    |
|--------------|-----|-----------------------|--------------------|
| Designed By: | BMA | Date:                 | 25 OCT. 1999       |
| Drawn By:    | TPD | Scale:                | AS SHOWN           |
| Checked By:  | CHU | Project Code:         | M-L 14-141         |
| Reviewed By: | MM  | Specification Number: | District-00-1-0003 |

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

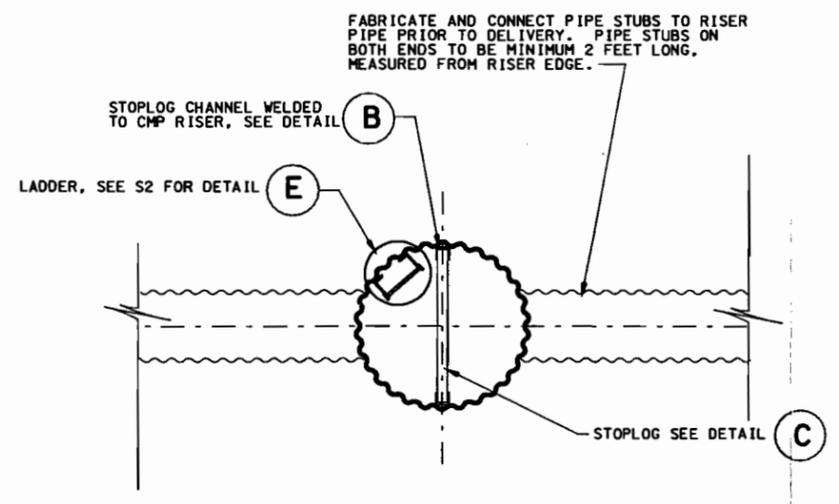
UPPER MISSISSIPPI RIVER SYSTEM  
DOWNSTREAM WATERSHED TRIBUTARY AREA  
PARTICULAR WATERSHED MANAGEMENT  
STAGE II

**WATER CONTROL  
STRUCTURE DETAILS I**

Sheet Reference Number:  
**S1**  
Sheet 6 of 7

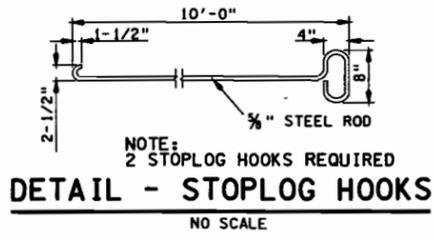


**ELEVATION**

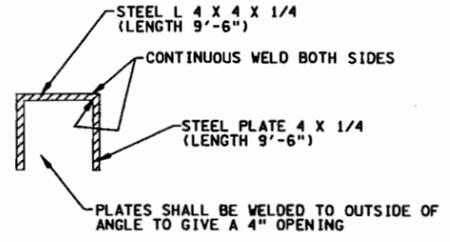


**TOP VIEW**

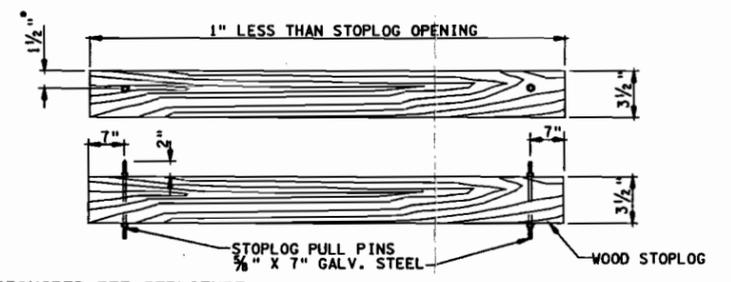
**DETAIL - CMP RISER WATER CONTROL STRUCTURE**  
NO SCALE



**DETAIL - STOPLOG HOOKS**  
NO SCALE

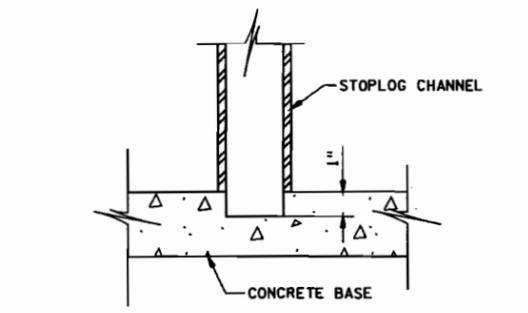


**DETAIL - STOPLOG CHANNEL** (B)  
NO SCALE



NOTE: 21 STOPLOGS REQUIRED PER STRUCTURE  
**DETAIL - STOPLOG** (C)  
NO SCALE

\*ADJUST PIN ELEVATION ON BOTTOM STOPLOG TO ALLOW STOPLOG HOOKS TO ENGAGE WHEN STOPLOG IS IN RECESS



**DETAIL - STOPLOG RECESS** (A)  
NO SCALE

| Symbol | Description    | Date | Approved |
|--------|----------------|------|----------|
| AS     | AS CONSTRUCTED |      |          |

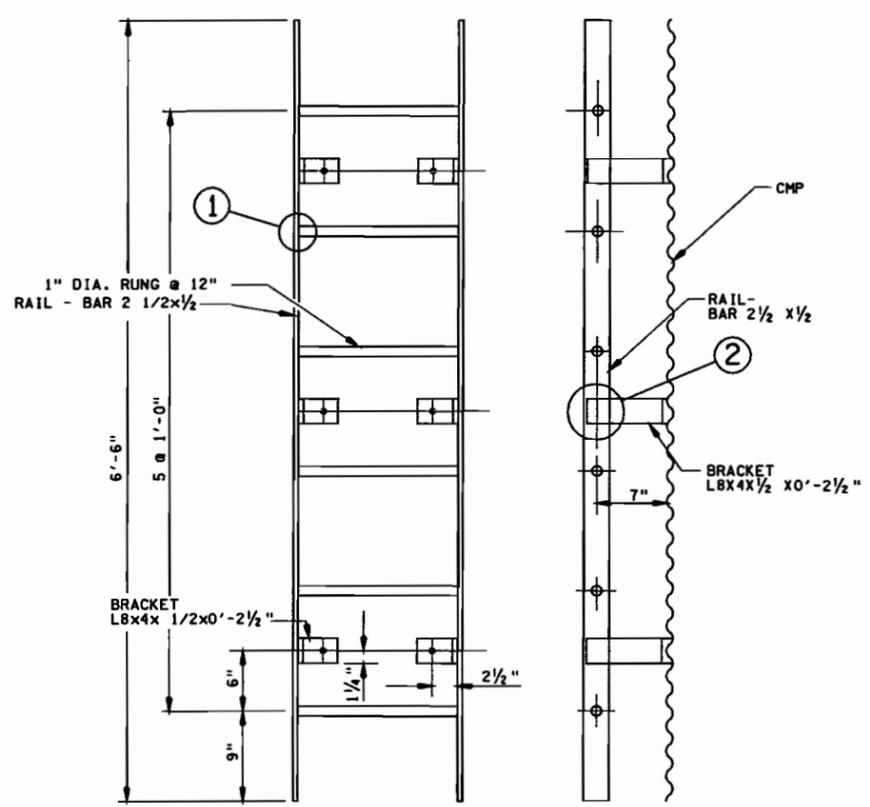
|              |     |                       |                  |
|--------------|-----|-----------------------|------------------|
| Designed By: | KJD | Date:                 | 25 OCT. 1999     |
| Drawn By:    | TPD | Scale:                | AS SHOWN         |
| Checked By:  | EGR | Drawing Code:         | M-L 14-141       |
| Reviewed By: | BLK | Specification Number: | DACR23-00-1-0003 |

U.S. ARMY ENGINEER DISTRICT  
ROCK ISLAND, ILLINOIS

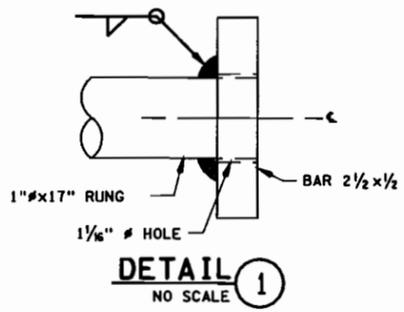
ENVIRONMENTAL MANAGEMENT SYSTEM  
PROGRAM  
POLYMER WASTE MANAGEMENT AREA  
PRINCETON WASTE MANAGEMENT AREA

**WATER CONTROL  
STRUCTURE DETAILS II**

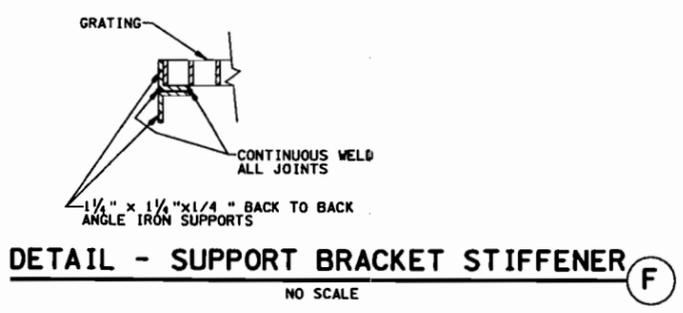
Sheet Reference Number:  
**S2**  
Sheet 7 of 7



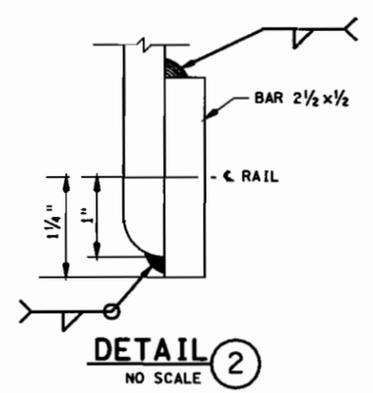
**ELEVATION SIDE VIEW**  
**LADDER DETAILS** (E)  
1 0 1 2'



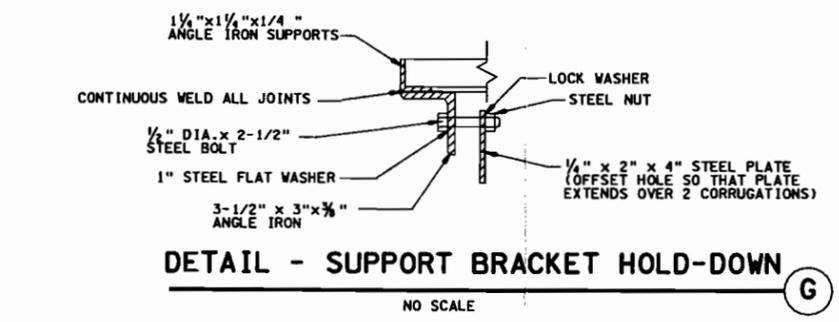
**DETAIL 1**  
NO SCALE



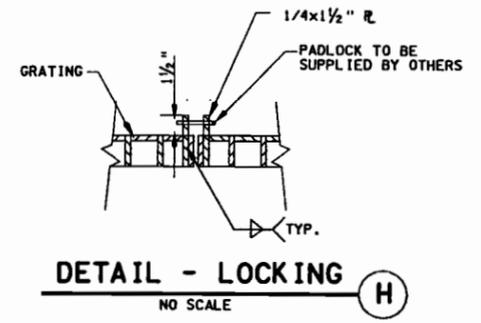
**DETAIL - SUPPORT BRACKET STIFFENER** (F)  
NO SCALE



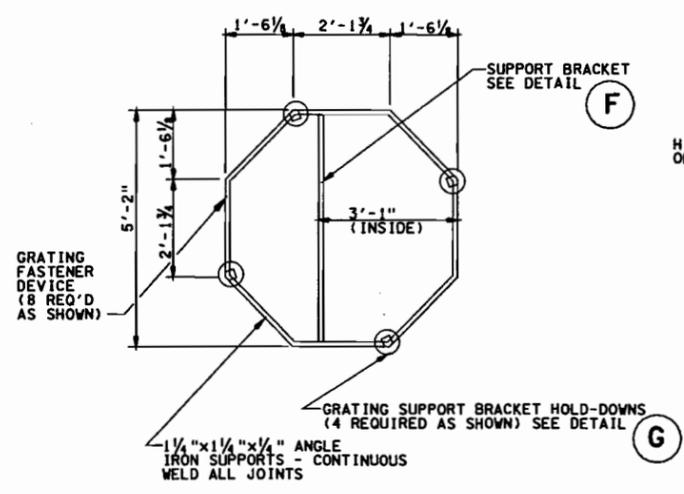
**DETAIL 2**  
NO SCALE



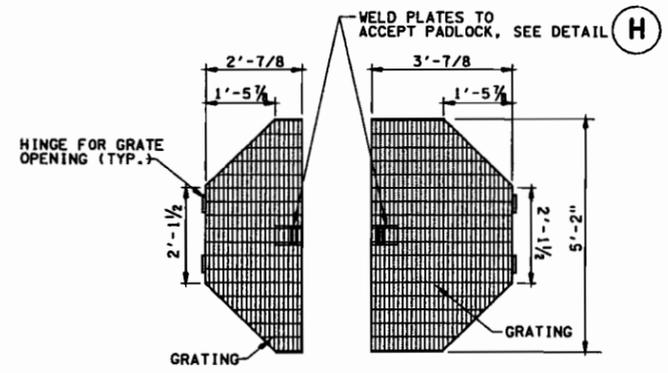
**DETAIL - SUPPORT BRACKET HOLD-DOWN** (G)  
NO SCALE



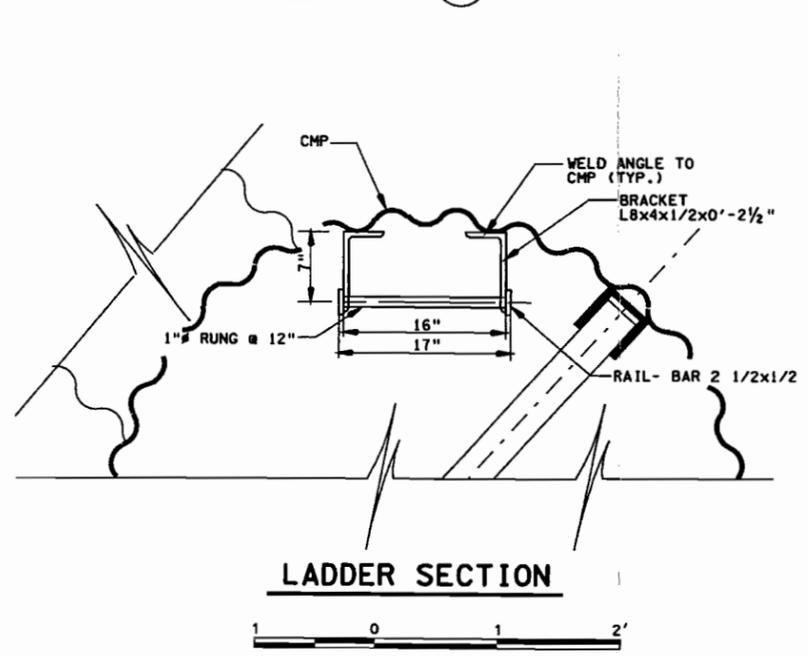
**DETAIL - LOCKING** (H)  
NO SCALE



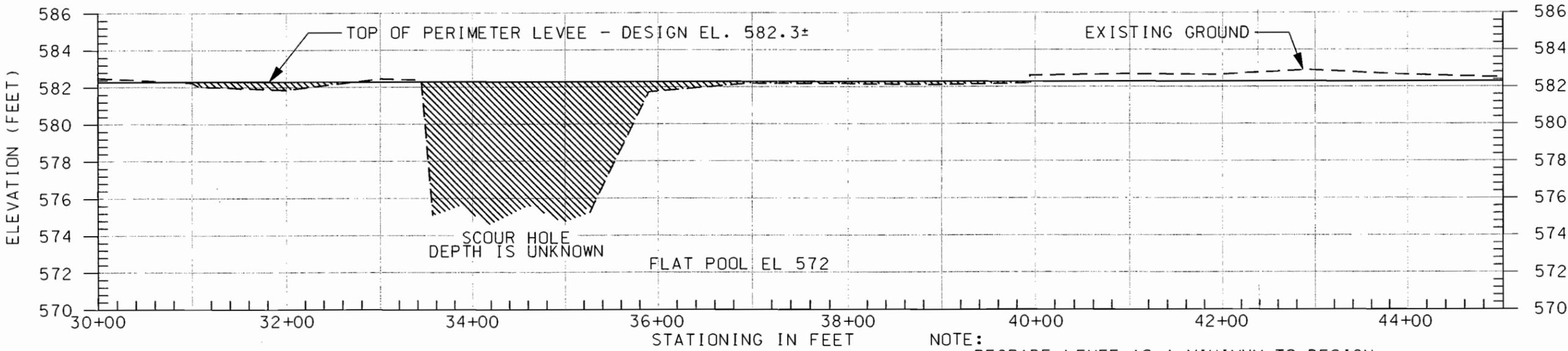
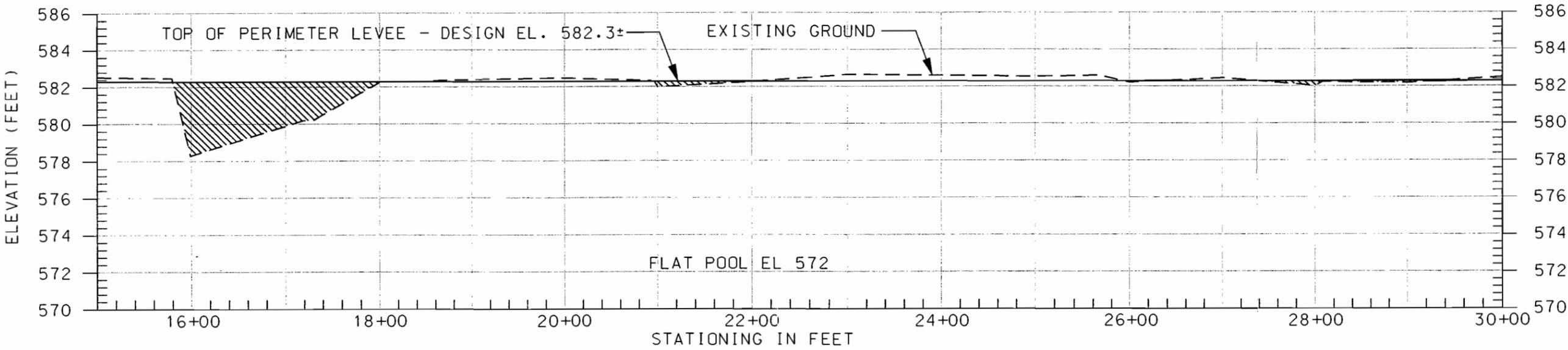
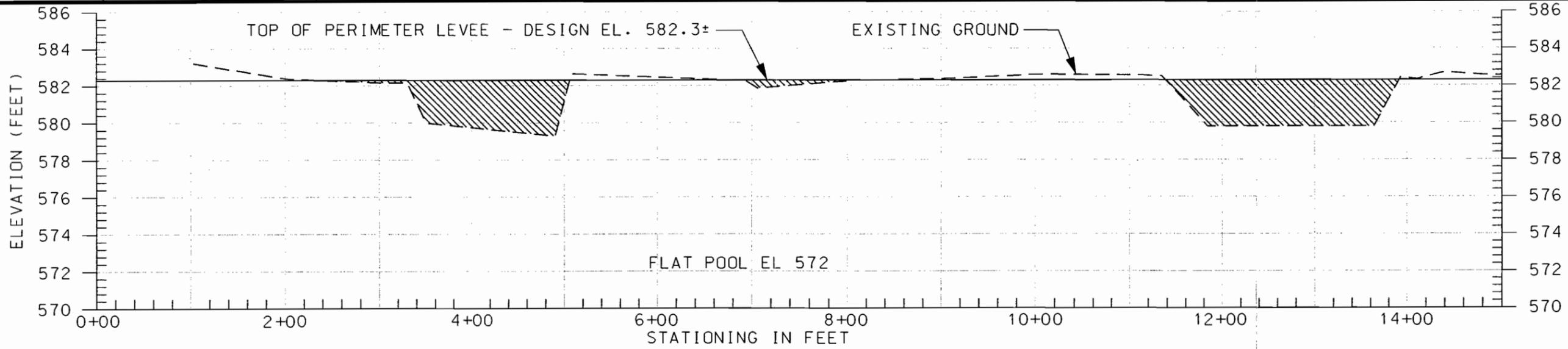
**DETAIL - GRATING SUPPORT BRACKET & GRATING** (D)  
NO SCALE



- GENERAL GRATING NOTES:**
- BAND ALL EDGES OF GRATING.
  - DIMENSIONS SHOWN ON DETAIL SHALL BE VERIFIED PRIOR TO FABRICATION. DIMENSIONS SHALL BE ADJUSTED AS REQUIRED TO MATCH GRATING SUPPORT BRACKET DIMENSIONS.
  - HINGES SHALL ALLOW MINIMUM 270° MOTION OF HATCHES.



**LADDER SECTION**  
1 0 1 2'



LEGEND:  
 SCOUR AREAS

NOTE:  
 REGRADE LEVEE AS A MINIMUM TO DESIGN EL. 582.3 OR TO MATCH EXISTING GROUND AT EITHER END OF SCOUR AREAS FROM STA. 0+00 TO NEW SETBACK LEVEE.

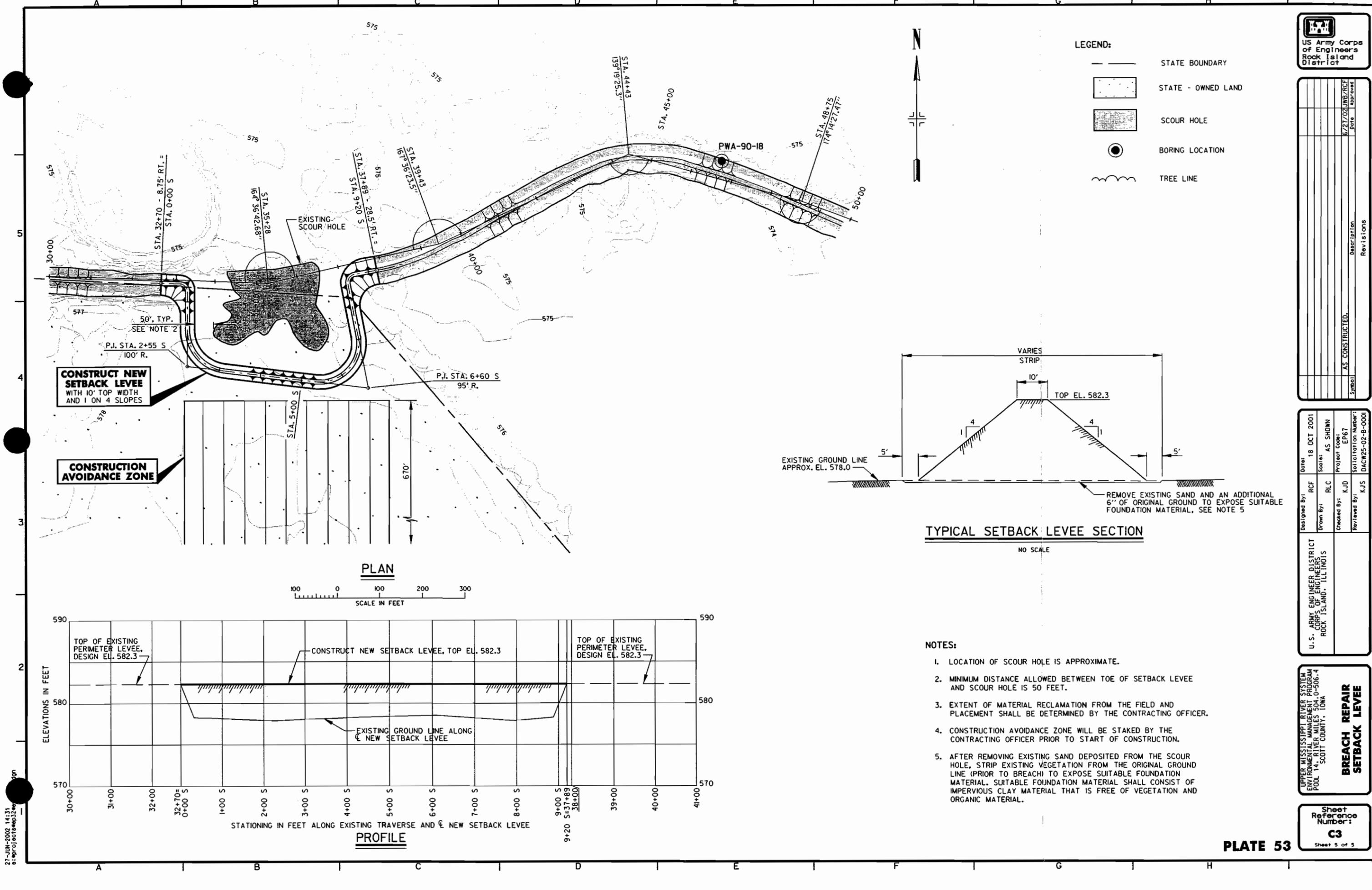


| Symbol | Description    | Date    | Approved |
|--------|----------------|---------|----------|
|        | AS CONSTRUCTED | 6/27/02 | JMG/RCF  |

|              |     |                      |                  |
|--------------|-----|----------------------|------------------|
| Designed By: | RCF | Date:                | 18 OCT 2001      |
| Drawn By:    | PDU | Scale:               | AS SHOWN         |
| Checked By:  | KJD | Project Code:        | EP67             |
| Reviewed By: | KJS | Solicitation Number: | DACW25-02-B-0001 |

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM  
 POOL 14, RIVER MILES 504.0-506.4  
 SCOTT COUNTY, IOWA  
**SCOUR REPAIR STATION 0+00 TO STATION 40+00**

Sheet Reference Number:  
**C2**  
 Sheet 4 of 5



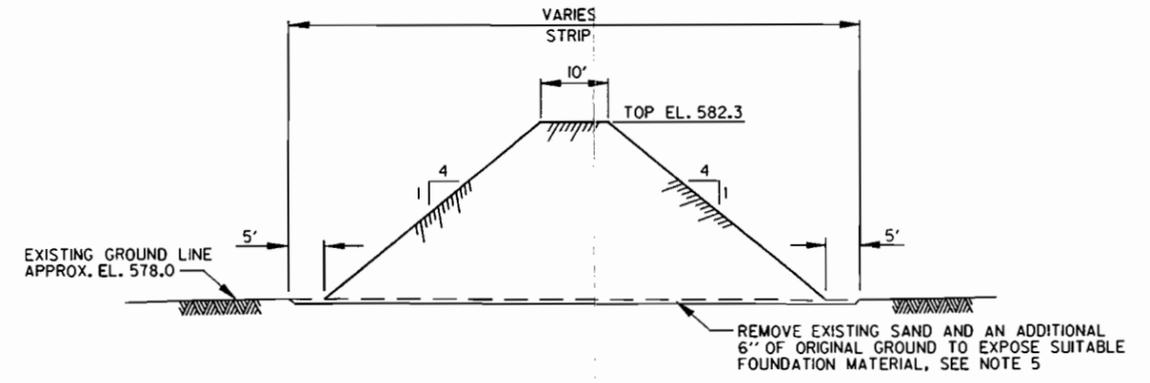
**LEGEND:**

- STATE BOUNDARY
- STATE - OWNED LAND
- SCOUR HOLE
- BORING LOCATION
- TREE LINE



**CONSTRUCT NEW SETBACK LEVEL WITH 10' TOP WIDTH AND 1 ON 4 SLOPES**

**CONSTRUCTION AVOIDANCE ZONE**



**TYPICAL SETBACK LEVEL SECTION**

NO SCALE

**NOTES:**

1. LOCATION OF SCOUR HOLE IS APPROXIMATE.
2. MINIMUM DISTANCE ALLOWED BETWEEN TOE OF SETBACK LEVEL AND SCOUR HOLE IS 50 FEET.
3. EXTENT OF MATERIAL RECLAMATION FROM THE FIELD AND PLACEMENT SHALL BE DETERMINED BY THE CONTRACTING OFFICER.
4. CONSTRUCTION AVOIDANCE ZONE WILL BE STAKED BY THE CONTRACTING OFFICER PRIOR TO START OF CONSTRUCTION.
5. AFTER REMOVING EXISTING SAND DEPOSITED FROM THE SCOUR HOLE, STRIP EXISTING VEGETATION FROM THE ORIGINAL GROUND LINE (PRIOR TO BREACH) TO EXPOSE SUITABLE FOUNDATION MATERIAL. SUITABLE FOUNDATION MATERIAL SHALL CONSIST OF IMPERVIOUS CLAY MATERIAL THAT IS FREE OF VEGETATION AND ORGANIC MATERIAL.

US Army Corps of Engineers  
Rock Island District

| Symbol         | Description | Date            | Revisions |
|----------------|-------------|-----------------|-----------|
| AS CONSTRUCTED |             | 6/27/05 JMB/RCE | Approved  |

|                  |                  |
|------------------|------------------|
| Date:            | 18 OCT 2001      |
| Scale:           | AS SHOWN         |
| Project Code:    | EP67             |
| Soil/Log Number: | DACW25-02-B-0001 |
| Designed By:     | RCF              |
| Drawn By:        | RLC              |
| Checked By:      | KJD              |
| Reviewed By:     | KJS              |

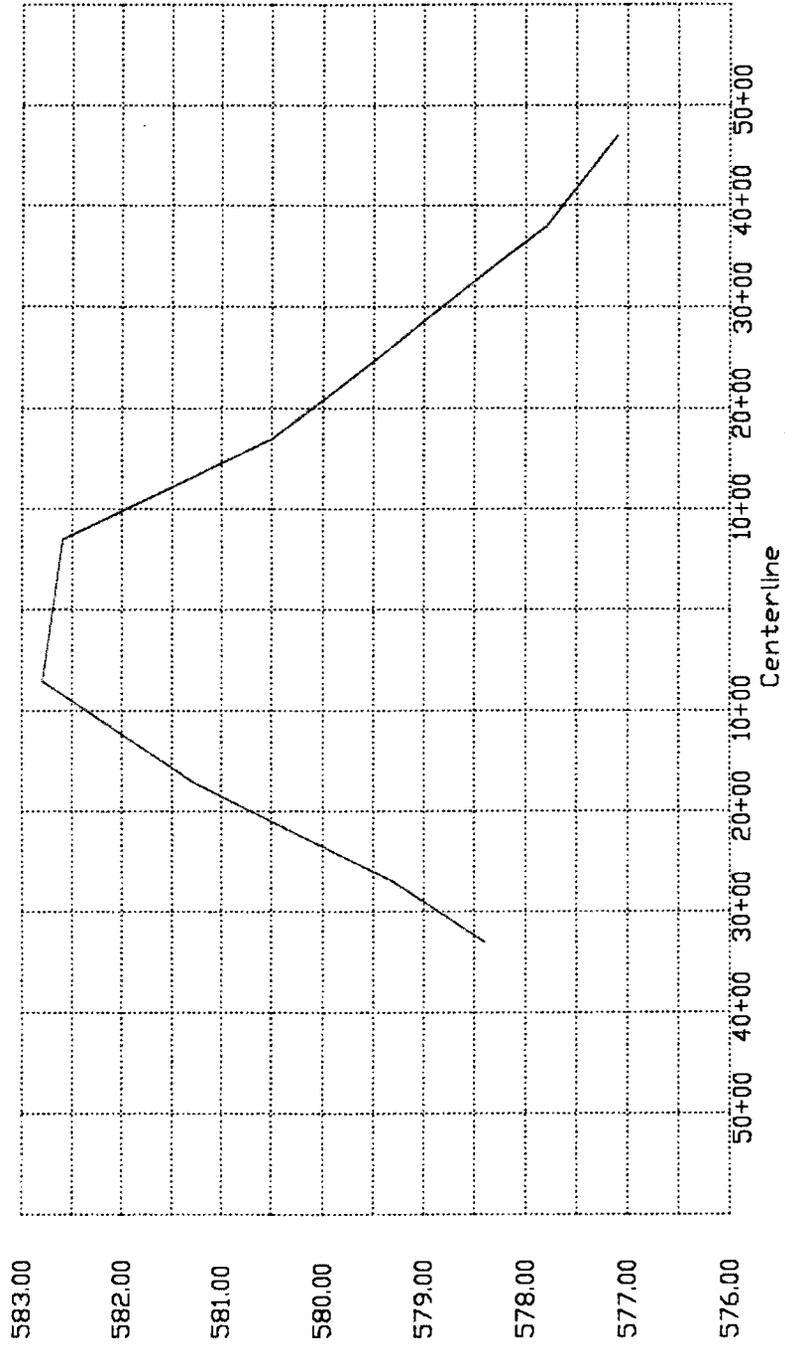
UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 14, RIVER MILES 504.0-506.4  
SCOTT COUNTY, IOWA

**BREACH REPAIR SETBACK LEVEL**

Sheet Reference Number:  
**C3**  
Sheet 5 of 5

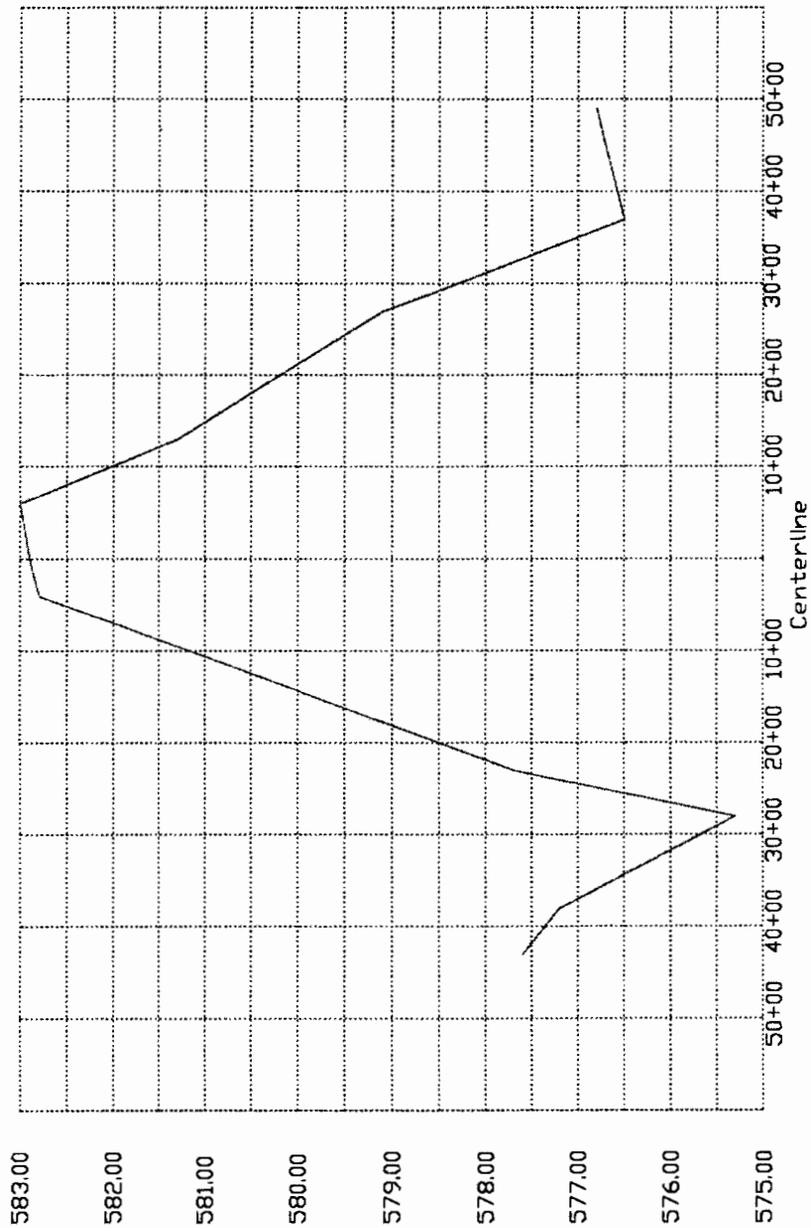
27-JUN-2002 14:31  
6: apr of cts sep 32 sep

EMERGENCY LEVEE REPAIR  
PRINCETON, IOWA  
DACW 24-02-C-0011



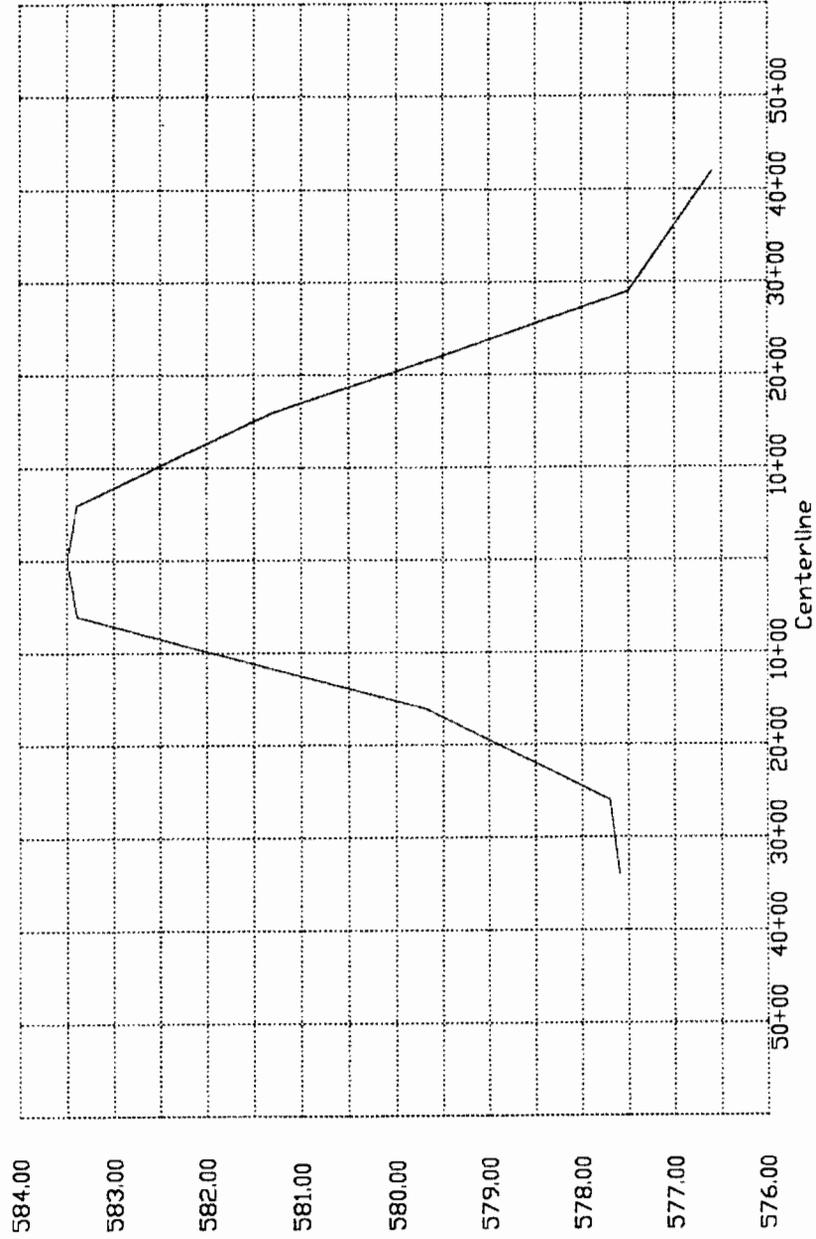
4+00 MAINLINE LEVEE

EMERGENCY LEVEE REPAIR  
PRINCETON, IOWA  
DACW 24-02-C-0011



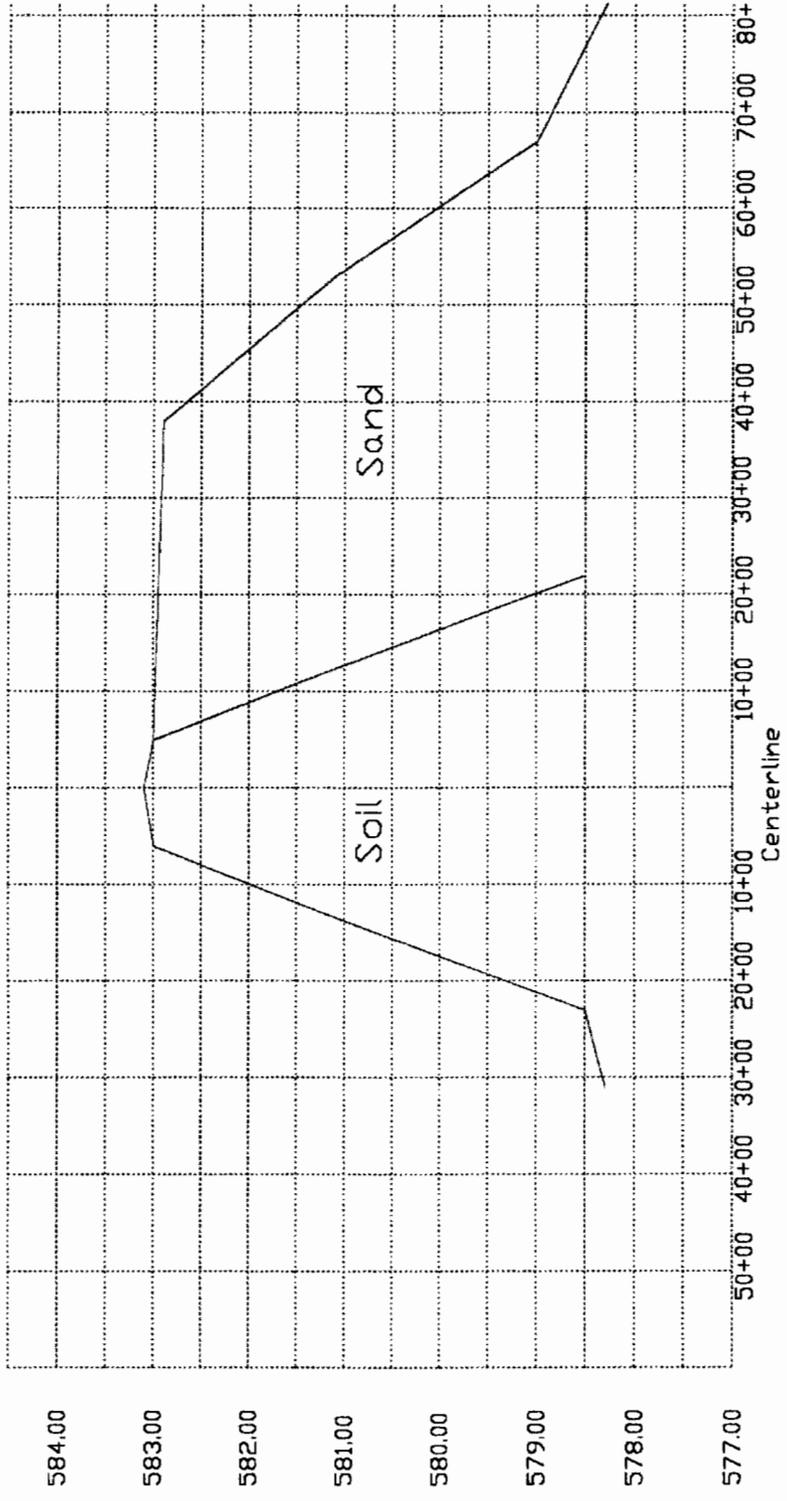
13+00 MAINLINE LEVEE

EMERGENCY LEVEE REPAIR  
PRINCETON, IOWA  
DACW 24-02-C-0011



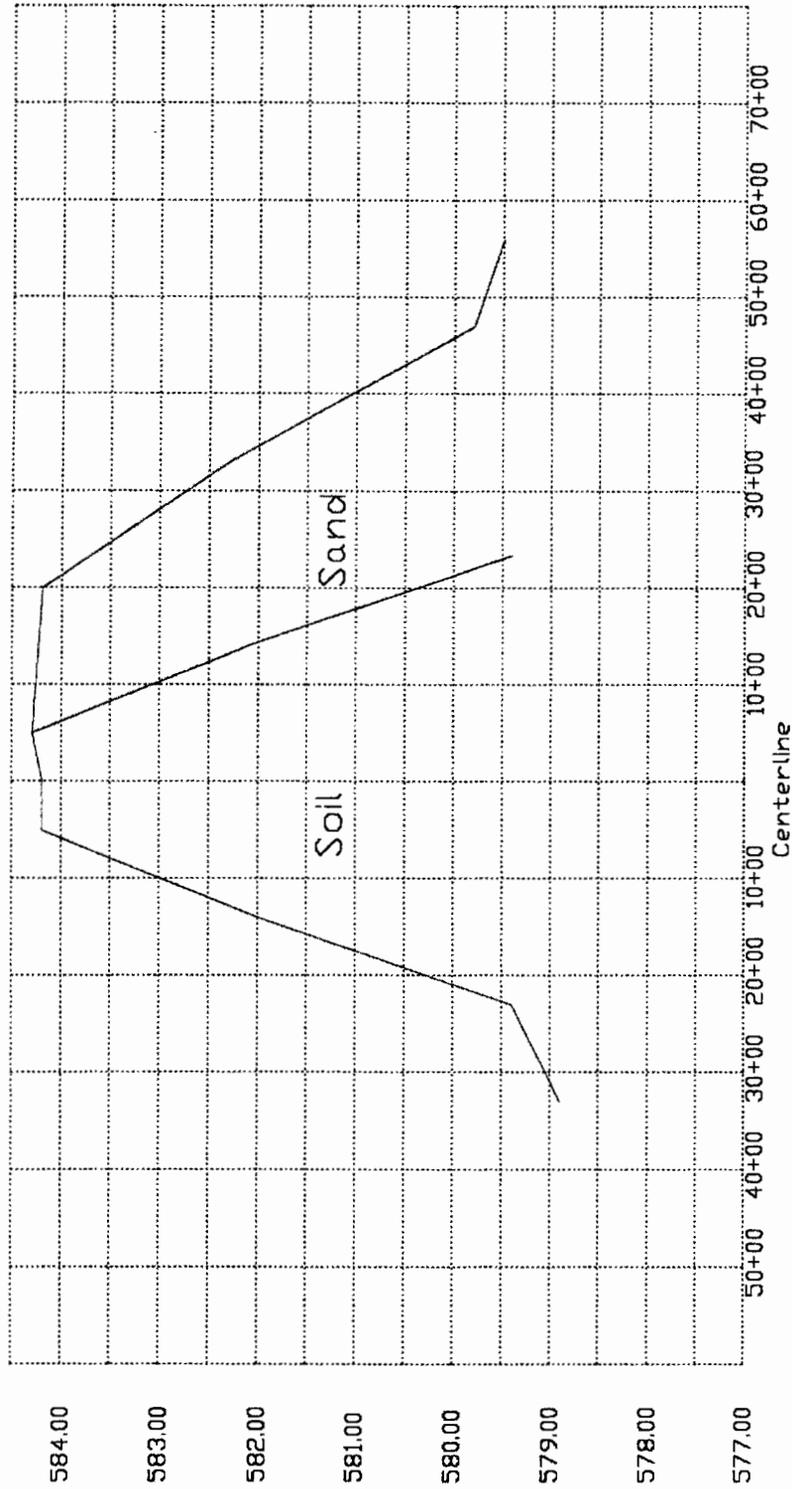
16+00 MAINLINE LEVEE

EMERGENCY LEVEE REPAIR  
PRINCETON, IOWA  
DACW 24-02-C-0011



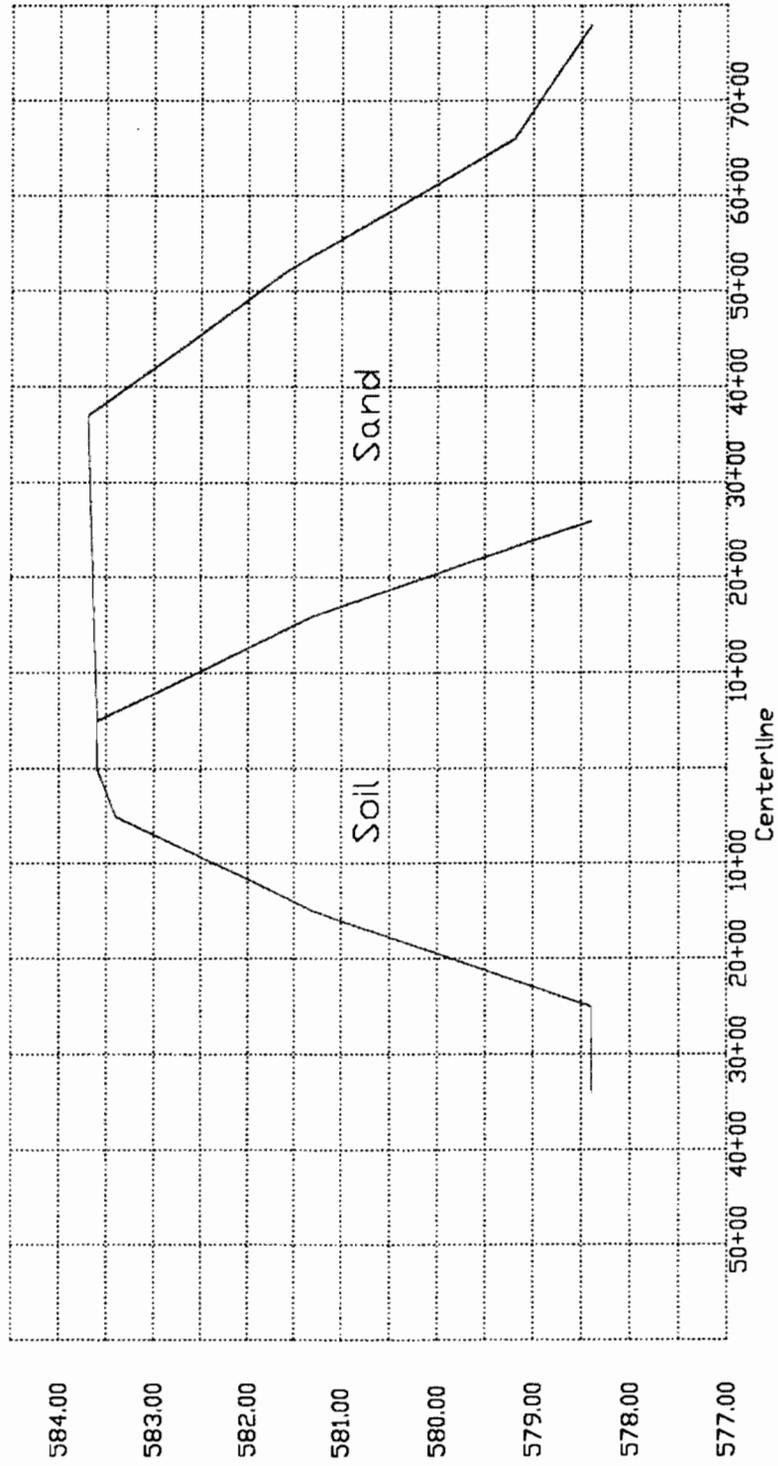
1+00 SETBACK LEVEE

EMERGENCY LEVEE REPAIR  
 PRINCETON, IOWA  
 DACW 24-02-C-0011

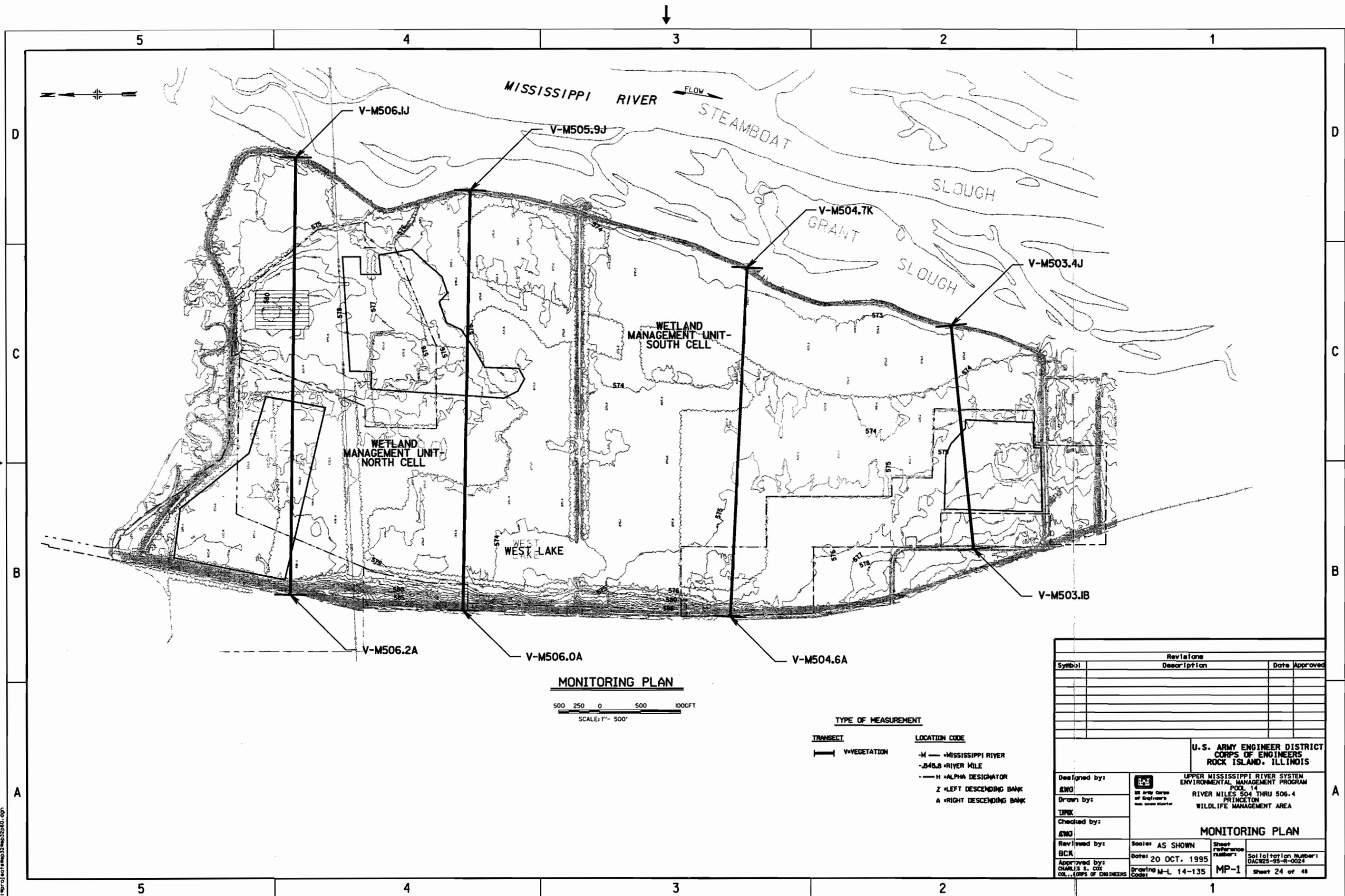


4+00 SETBACK LEVEE

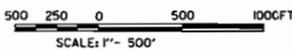
EMERGENCY LEVEE REPAIR  
PRINCETON, IOWA  
DACW 24-02-C-0011



7+50 SETBACK LEVEE



**MONITORING PLAN**



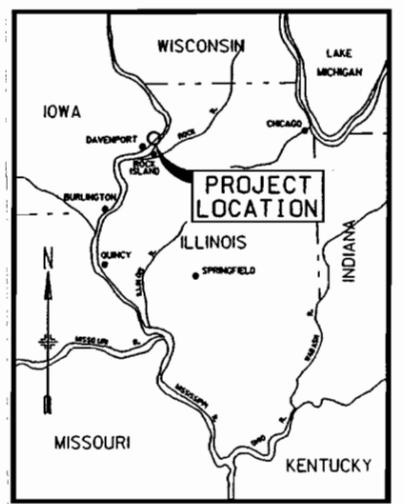
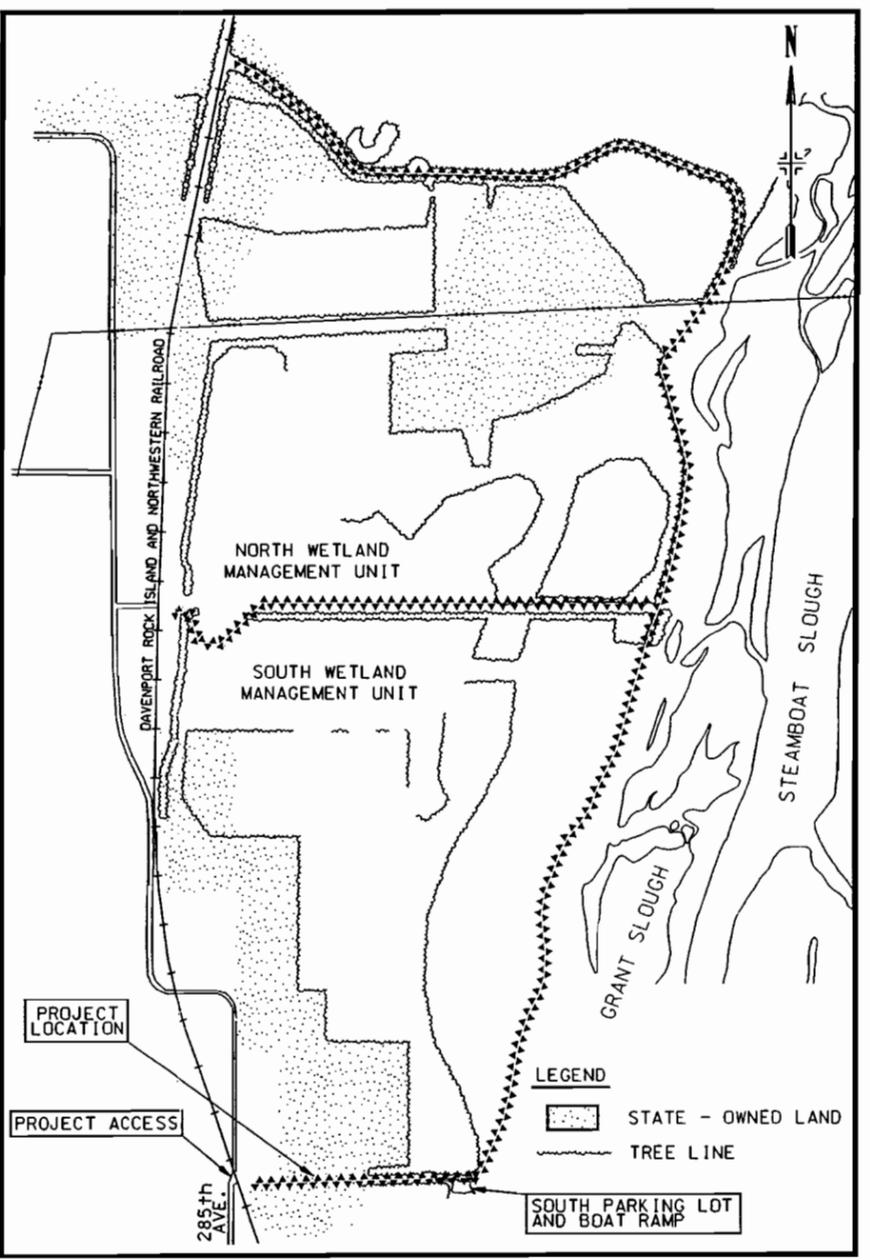
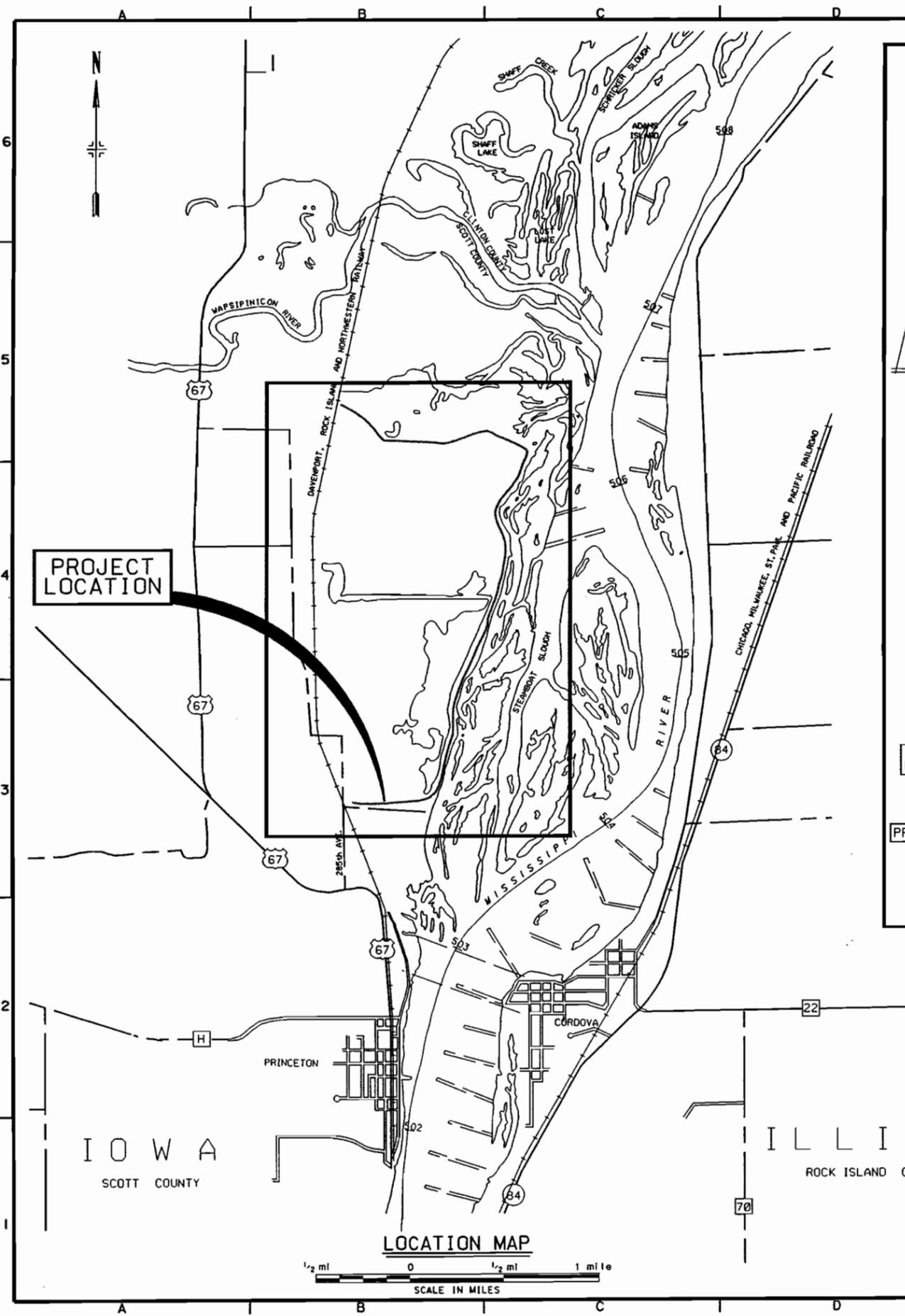
- TYPE OF MEASUREMENT**
- |                 |                           |
|-----------------|---------------------------|
| <b>TRANSECT</b> | <b>LOCATION CODE</b>      |
| — V-VEGETATION  | -M — MISSISSIPPI RIVER    |
|                 | -S46.8 — RIVER MILE       |
|                 | -H — ALPHA DESIGNATOR     |
|                 | Z — LEFT DESCENDING BANK  |
|                 | A — RIGHT DESCENDING BANK |

| Revisions |             |               |
|-----------|-------------|---------------|
| Symbol    | Description | Date Approved |
|           |             |               |
|           |             |               |
|           |             |               |
|           |             |               |
|           |             |               |

|                                                                                     |                                                                                                                                                      |                                        |                                        |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|
| <b>U.S. ARMY ENGINEER DISTRICT<br/>CORPS OF ENGINEERS<br/>ROCK ISLAND, ILLINOIS</b> |                                                                                                                                                      |                                        |                                        |
| Designed by:<br><b>ENG</b>                                                          | UPPER MISSISSIPPI RIVER SYSTEM<br>ENVIRONMENTAL MANAGEMENT PROGRAM<br>POOL 14<br>RIVER MILES 504 THRU 506.4<br>PRINCETON<br>WILDLIFE MANAGEMENT AREA |                                        |                                        |
| Drawn by:<br><b>TRK</b>                                                             | <b>MONITORING PLAN</b>                                                                                                                               |                                        |                                        |
| Checked by:<br><b>ENG</b>                                                           | Scale: AS SHOWN                                                                                                                                      | Sheet Reference Number:<br><b>MP-1</b> | Solitation Number:<br>DACR25-95-R-0024 |
| Reviewed by:<br><b>BCR</b>                                                          | Date: 20 OCT. 1995                                                                                                                                   | Drawing M-L 14-135<br>Code:            |                                        |
| Approved by:<br><b>CHARLES S. COX<br/>COL., CORPS OF ENGINEERS</b>                  | Sheet 24 of 48                                                                                                                                       |                                        |                                        |

25-JUN-2002 10:25  
 e:\proj\enr\map32\map32p40.dgn

15-JUL-2005 01:53  
 emwdfscodmproj\ectrs\EP8\005\dmw\3x02.dgn



**GENERAL NOTES:**

1. THE SCOPE OF WORK GENERALLY CONSISTS OF, BUT IS NOT LIMITED TO:
  - A. LOWER APPROXIMATELY 2300 FEET OF OVERFLOW ROADWAY.
  - B. PLACE APPROXIMATELY 3 INCHES OF GRANULAR SURFACING.
2. THE ENTIRE INTERIOR OF THE CONSTRUCTION SITE IS PROTECTED BY LEVEES, AND THE GROUNDWATER LEVELS ARE HIGHLY INFLUENCED BY VARYING RIVER STAGES.
3. THE LAYOUT OF THE PROJECT FEATURES AND CONSTRUCTION WORK LIMITS AS SHOWN SHALL BE FIELD STAKED AND APPROVED BY THE CONTRACTING OFFICER PRIOR TO CONSTRUCTION.
4. THE MAJORITY OF THE TOPOGRAPHICAL CONTOURS SHOWN WERE DEVELOPED FROM FIELD AND AERIAL SURVEYS TAKEN PRIOR TO THE FLOOD OF 1993. ACTUAL CONTOURS MAY VARY.

| INDEX     |                |                                         |
|-----------|----------------|-----------------------------------------|
| SHEET NO. | SHEET REF. NO. | TITLE OF DRAWING                        |
| 1         | X1             | COVER SHEET                             |
| 2         | X2             | LOCATION MAPS, GENERAL NOTES, AND INDEX |
| 3         | C1             | SITE PLAN                               |
| 4         | C2             | LOWER OVERFLOW ROADWAY (SPILLWAY)       |



| Symbol | Description | Date | Approved |
|--------|-------------|------|----------|
|        |             |      |          |
|        |             |      |          |

|              |     |                       |                  |
|--------------|-----|-----------------------|------------------|
| Designed By: | RCF | Date:                 | 16 JULY 2002     |
| Drawn By:    | RLC | Scale:                | AS SHOWN         |
| Checked By:  | KJD | Project Code:         | EPT3             |
| Reviewed By: | KJS | Specification Number: | DACW25-02-0-0092 |

U.S. ARMY ENGINEER DISTRICT  
 ROCK ISLAND, ILLINOIS

UPPER MISSISSIPPI RIVER SYSTEM  
 ENVIRONMENTAL MANAGEMENT PROGRAM  
 POOL 14, RIVER MILES 504.0-506.4  
 SCOTT COUNTY, IOWA

**LOCATION MAPS,  
 GENERAL NOTES,  
 AND INDEX**

Sheet Reference Number:  
**X2**  
 Sheet 2 of 4



