



US Army Corps  
of Engineers ®  
Rock Island District

## **OPERATION AND MAINTENANCE MANUAL**

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### **LONG ISLAND DIVISION (GARDNER DIVISION) HABITAT REHABILITATION AND ENHANCEMENT**

### **UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM**

### **POOL 21 UPPER MISSISSIPPI RIVER MILES 332.5 - 340.2 ADAMS COUNTY, ILLINOIS**

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**JUNE 2006**

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**1. GENERAL**

**1.1 Introduction**

**1.1.1. Purpose and Scope**

**1.1.1.1.** This manual serves as a guide for the operation and maintenance of the Long Island Division Habitat Rehabilitation and Enhancement (HREP) project. It provides operation and maintenance instructions for the major features of this Environmental Management Project. The instructions are consistent with the general procedures presented in the September 2000 Definite Project Report (DPR). This document is written for project and management personnel who are familiar with the project and does not contain detailed information which is common to site personnel or which is presented in other existing manuals or regulations.

**1.1.1.2.** 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.

**1.1.1.3.** The intent of the maintenance instructions is to present preventive maintenance information consisting of systematic inspections and subsequent corrective actions, which should ensure long-term utilization of equipment and features. A timely preventive maintenance program reduces and virtually eliminates breakdown of essential equipment and prevents major damage to constructed features by early corrective action.

**1.1.1.4.** This manual provides the general standards of maintenance and establishes an initial frequency of maintenance inspections designed to ensure satisfactory project performance.

**1.1.2. Use of this Manual**

**1.1.2.1.** This manual is divided into the following sections:

- Section 1 Introduction
- Section 2 Project Background
- Section 3 Project Description
- Section 4 Inspections
- Section 5 Operation and Maintenance of Project Features
- Section 6 Project Rehabilitation or Abandonment
- Section 7 Performance Monitoring and Assessment

Sections 2 and 3 present project history and descriptions of actual features constructed for this project. Section 4 includes project inspection procedures, and Section 5 presents operation and maintenance instructions for each project feature. Section 6 provides rehabilitation and abandonment instructions in case of project damage. Section 7 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.

**1.1.2.2.** The attached drawings have been included to provide general project “as-built” plans and typical sections.

## **2. PROJECT BACKGROUND**

**2.1 Location.** The 6,300-acre Long Island Division HREP, formerly known as Gardner Division HREP, is located in Adams County, Illinois, in Pool 21 on the Mississippi River between river miles 332.5 and 340.2. The project is about 5 miles north of Quincy, Illinois. The Long Island Division HREP is part of the U.S. Fish and Wildlife Service (USFWS) Great River National Wildlife Refuge Complex. The project area is comprised of several islands, of which Long, Shandrew, and Flannigan Islands are the largest. The project area also contains a major backwater lake—Long Island Lake—and several important side chutes: Canton, O'Dell, Smoots, and Shandrew.

**2.2 Authorization.** The Long Island Division HREP was authorized by the 1985 Supplemental Appropriations Act (Public Law 99-88), Section 1103 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662), Section 405 of WRDA 1990 (Public Law 101-640), Section 107 of WRDA 1992 (Public Law 102-580), and Section 509 of WRDA 1999 (Public Law 106-53). The U.S. Army Corps of Engineers, Rock Island District, (Rock Island District) funded and constructed this project under these authorizations.

### **2.3 Planning, Design, and Construction Activities**

**2.3.1. Summary.** Table 2.1 provides a summary of planning, design, and construction activities associated with the Long Island Division HREP project.

**Table 2.1.** Summary of Planning and Construction Activities

Project Phase	Purpose	Project Milestone	Date Completed
<b>Pre-Project</b>	Identify and define problems and establish need of project	Fact Sheets SHPO <sup>1</sup> Concurrence	Late 1980s June 1999
<b>Engineering and Design</b>	Quantify project objectives, perform preliminary design, satisfy NEPA and permit requirements, develop performance evaluation plan, obtain project approval for construction	Draft DPR DPR Public Review & EA <sup>2</sup> NEPA <sup>3</sup> Public Review Obtain Section 401/404 Permits Final DPR & EA Approve Plans and Specifications Memorandum of Agreement with USFWS	October 1999 March 2000 March 2000 May 2000 September 2000 December 2000 December 2000
<b>Construction</b>	Finalize plans and specifications, obtain operation and maintenance agreement, advertise and award construction contracts, construct project	Invitation for Bids Bid Opening Award Contract Notice to Proceed Construction Complete	December 2000 January 2001 March 2001 March 2001 September 2004
<b>Channel O&amp;M<sup>4</sup></b>	Finalize plans and construct Chevron	Construction Completed	August 2005

<sup>1</sup> State Historical Preservation Office

<sup>2</sup> Environmental Assessment

<sup>3</sup> National Environmental Policy Act

<sup>4</sup> Operation and Maintenance

**2.3.2. Goals and Objectives.** Goals and objectives were formulated during the design phase. Table 2.2 provides a summary of project goals, objectives, and features.

**Table 2.2.** Project Goals, Objectives, and Features

Goals	Objectives	Project Features
Enhance Aquatic Habitat	Improve habitat for overwintering fish	Side channel dredging
	Reduce sedimentation in side channels	Emergent closure structure
	Increase aquatic habitat diversity	Shoreline and island protection
Restore and Protect Wetland and Terrestrial Habitat	Maintain terrestrial habitat	Shoreline and island protection
	Increase bottomland hardwood diversity and reduce forest fragmentation	Reforestation

**2.3.3. Project Design.** The project was designed by the Rock Island District. The U.S. Army Corp of Engineers funded 100 percent of the project. The project sponsors are the USFWS and Illinois Department of Natural Resources (ILDNR). Design considerations and investigations are presented in the Definite Project Report dated September 2000.

**2.3.4. Construction Contracts.** The construction contract (contract number DACW25-01-C-0008) was awarded to Magruder Construction Co., Inc. on March 23, 2001 in the amount of \$3,895,054.50. The contract was supervised by the Rock Island District, Construction Division.

**2.3.5. Construction Issues.**

**2.3.5.1** The Indiana bat exclusion period required, trees needed to be removed by the end of March. This entailed coordination among staff from the District's Natural Resources Management Section (OD-MN); Engineering Section (ED-D); Program and Project Management (PM-M); Construction Office (CD); US FWS; and the contractor.

**2.3.5.2.** The contractor identified more trees to remove on the shoreline than the USFWS anticipated. A workable compromise was reached so that the project was built from barges, which minimized tree removal.

**2.3.5.3.** A significant flood event occurred in the spring of 2001, prior to the bankline protection construction. This event caused additional erosion to the islands, requiring additional rock in order to provide adequate habitat protection. To offset the increased cost, Smoots Chute bankline protections were eliminated.

**2.3.5.4.** The CA6 bedding stone that was originally specified for the bankline protection was too small and was washing away with the increased current. As a result, RR5 was used instead of CA6 bedding stone on Island B, Island C (stationing 5+50 to 6+15), Island D, and Island E.

**2.3.5.5.** Due to the spring 2001 flood, an area of Canton Chute immediately downstream of the mouth of O'Dell Chute had silted in significantly. This would not allow fish ingress/egress into O'Dell Chute during overwintering periods. As a result, additional dredging was conducted in this area to ensure that project goals and objectives were met.

**2.3.6. Construction Status.** Bankline protection, dredging, closure structure construction, and some tree planting were completed by 2001. Additional tree planting took place in 2002 and 2003.

## 2.4 Project Costs. The actual project costs are presented in Table 2.3.

**Table 2.3. Actual Project Costs**

Item	Description	Quantity	U/M	Unit Price	Amount
0001	Closure Structure Access Dredging	1	LS		\$400,000.00
0002	Closure Structure Rock Notch				
0002AA	First 300 Cubic Yards	300	CY	\$45.00	\$13,500.00
0002AB	Over 300 Cubic Yards	260	CY	\$20.00	\$5,200.00
0003	Rock Closure Structure				
0003AA	First 3,854 Tons	3,854	TN	\$100.00	\$385,400.00
0003AB	Over 3,854 Tons	710	TN	\$25.00	\$17,750.00
0004	O'Dell Chute Dredging				
0004AA	First 45,000 Cubic Yards	33,916	CY	\$3.50	\$118,706.00
0004AB	Over 45,000 Cubic Yards	0	CY	\$2.50	0.00
0005	Bankline Protection Clearing	1	LS		\$45,000.00
0006	Bankline Protection Grading	1	LS		\$40,000.00
0007	Bankline Protection Bedding				
0007AA	First 10,000 Tons	10,000	TN	\$66.00	\$660,000.00
0007AB	Over 10,000 Tons	265.15	TN	\$35.00	\$9,280.25
0008	Bankline Protection Riprap				
0008AA	First 23,700 Tons	23,700	TN	\$68.50	\$1,623,450.00
0008AB	Over 23,700 Tons	4,491.21	TN	\$35.00	\$157,192.35
0009	Incorporate Dredged Material into Natural Soils of the Ag Field	1	LS		\$150,000.00
0010	Seeding	1	LS		\$50,000.00
0011	Planting of Container Grown Trees				
0011AA	Pin Oak (Quercus palustris)	1,005	EA	\$26.50	\$26,632.50
0011AB	Sycamore (Platanus occidentalis)	536	EA	\$26.50	\$14,204.00
0011AC	Burr Oak (Quercus macrocarpa)	670	EA	\$26.50	\$17,755.00
0011AD	Northern Pecan (Carya illinoensis)	670	EA	\$26.50	\$17,755.00
0011AE	Swamp White Oak (Quercus bicolor)	670	EA	\$26.50	\$17,755.00
0012	Weed Barrier Mats	3,551	EA	\$3.00	\$10,653.00
0013 <sup>1</sup>	Contractor Furnished Boat for Government Use	1	LS		\$7,500.00
0018	Additional Mob/Demob	1	LS		\$2,000.00
0019	Incorporate Canton Chute Dredged Material	1	LS		\$60,000.00
0020	Canton Chute Dredging	8,432	CY	\$6.12	\$51,603.84
0021	Seeding, Last Tree Planting Area (22 acres)	1	LS		\$2,750.00
0022	Herbicide Treatment, Last Tree Planting (1166 trees)	1	LS		\$0.0
0023	Mowing, Last Tree Planting Area (22 acres)	1	LS		\$4,3750.00
0024	Mowing, Last Tree Planting Area (22 acres)	1	LS		\$4,3750.00
0026	Option F, Mowing 1 <sup>st</sup> and 2 <sup>nd</sup> Tree Planting Areas (58 acres)	1	LS		\$7,375.00
<b>Construction Total</b>					<b>\$3,920,211.94</b>
	Chevron <sup>1</sup>	7917	Tons	\$39.10	\$309,555
<b>Real Estate</b>					<b>\$3,334.28</b>
<b>Definite Project Report</b>					<b>\$612,419.00</b>
<b>Plans and Specifications</b>					<b>\$74,488.43</b>
<b>Engineering and Design</b>					<b>\$60,200.81</b>
<b>Construction Management</b>					<b>\$144,946.97</b>
<b>PROJECT TOTAL</b>					<b>\$5,125,156.43</b>

<sup>1</sup> US Army Corps of Engineers Operation and Maintenance office funded and constructed the Chevron at the head of LaGrange Island.

**2.5. Project References.** Table 2.4. summarizes related project references.

**Table 2.4.** Project References

Title	Date	Purpose
Upper Mississippi River System Environmental Management Program, Definite Project Report with Integrated Environmental Assessment (R-15F), Long Island Division Habitat Rehabilitation and Enhancement, U.S. Army Corps of Engineers, Rock Island	Sep 2000	Provides planning, engineering, and sufficient construction details of the selected plan for project approval processes
Manufacturer's Data (Shop Drawings)	Nov 2001	Provides detailed operation and maintenance instructions for specific pieces of equipment as recommended by the manufacturer
Construction As-Builts	Mar 2005	Provides as-built construction drawings
Initial Performance Evaluation Report	Aug 2003	Provides summary of project performance based on project post-construction monitoring

### 3. PROJECT DESCRIPTION

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

Table 3.1. Project Feature Summary

Item	Quantity	Unit of Measure
<b>Side Channel Dredging</b>		
<i><b>O'Dell Chute Dredging</b></i>		
Length	5,000	feet
Bottom Width	60	feet
Depth Below Flat Pool	7.5	feet
<i><b>Canton Chute Dredging</b></i>		
Length	1250	feet
Bottom Width	50	feet
Depth Below Flat Pool	7.5	feet
<b>Emergent Closure Structure</b>		
Height Above Flat Pool	4	feet
Height Below Flat Pool	6	feet
Structure Top Width	14	feet
Upstream Facing Slope	2:1	horizontal:vertical
Downstream Facing Slope	3:1	horizontal:vertical
Length	271	feet

**Table 3.1. Project Feature Summary**

Item	Quantity	Unit of Measure
<b>Shoreline and Island Protection</b>		
<b><i>Island A</i></b>		
Linear Length of Protection	420	feet
Riprap Thickness	2	feet
Bedding Stone Thickness	1	feet
<b><i>Island B</i></b>		
Linear Length of Protection	900	feet
Riprap Thickness	2	feet
Bedding Stone Thickness	1	feet
<b><i>Island C</i></b>		
Linear Length of Protection	615	feet
Riprap Thickness	2	feet
Bedding Stone Thickness	1	feet (5+00 to 1+00)
<b><i>Island D</i></b>		
Linear Length of Protection	925	feet
Riprap Thickness	3	feet
<b><i>Island E</i></b>		
Linear Length of Protection	400	feet
Riprap Thickness	3	feet
<b><i>Shandrew Island</i></b>		
Linear Length Protection	615	feet
Riprap Thickness	2	feet
Bedding Stone Thickness	1	feet
<b>Chevron</b>		
Riprap	7917	tons
Height Above Flat Pool	3	feet
Structure Top Width	10	feet
Slope	2:1	horizontal: vertical
Linear Length	1182	feet
<b><i>Tie Back Section</i></b>		
Height Above Flat Pool	3	feet
Top Width	5	feet
Slope	2:1	horizontal: vertical
Linear Length	100	feet
<b><i>Bank Protection</i></b>		
Height Above Flat Pool	6	feet
Top Width	5	feet
Slope	2:1	horizontal: vertical
Linear Length	300	feet
<b>Reforestation</b>		
<b><i>Dredged Material Placement</i></b>		
Length Parallel to O'Dell Chute	5600	feet
Width	520	feet
<b><i>Mast Tree Plantings</i></b>		
Number of Pin Oak	1,005	trees
Number of Sycamore	536	trees
Number of Bur Oak	670	trees
Number of Northern Pecan	670	trees
Number of Swamp White Oak	670	trees
<b>Total Trees</b>	<b>3,551</b>	<b>trees</b>

**3.2 General Description.** The Long Island Division HREP restores and protects wetland and terrestrial habitat as well as aquatic habitat. Features used include side channel dredging, an emergent closure structure, shoreline and island protection, chevron, and reforestation.

**3.3 Side Channel Dredging.** The downstream end of O'Dell Chute was dredged for approximately 5,000 linear feet. The O'Dell Chute dredge cut had a 60-foot bottom width. Dredging was also conducted for approximately 1,250 linear feet in Canton Chute starting at the confluence of O'Dell Chute and Canton Chute and progressing downstream. This dredge cut was added during construction to assure access to the O'Dell Chute dredged cut because the flood silted in this area. The Canton Chute dredge cut had a 50-foot bottom width, and no benefits were claimed or expected from this dredging. Both the O'Dell Chute and Canton Chute were dredged 7.5 feet below flat pool to ensure that the 6-foot minimum desired channel depth below flat pool would be maintained throughout the 50-year project life. No dredging was needed to gain access for the rock closure structure—Shandrew Chute—due to the high water at the time of construction.

**3.4 Emergent Closure Structure.** The closure structure spans 271 feet or the entire width of O'Dell Chute just downstream of the closure structure access dredging. On average, approximately 4 feet of the structure is emergent above the flat pool elevation of 470 feet. On average, approximately 6 feet of the structure is submerged, or below the flat pool elevation. The closure structure was designed to be emergent 90 percent of the time. The top of the structure is 14 feet wide. The upstream facing slope measures 2 horizontal to 1 vertical, and the downstream slope measures 3 horizontal to 1 vertical. The closure structure is keyed on the upstream side of the structure, with a 10-foot wide rock layer extending 3 feet into the bed of O'Dell Chute.

**3.5 Shoreline and Island Protection.** Approximately 3,875 linear feet of shoreline are protected. The heads of Island A, Island B, and Shandrew Island have 2-foot thick riprap layer on top of 1-foot thick bedding stone layer for protection, whereas the heads of Island D and Island E have 3 feet of riprap layer because the current was washing away the bedding stone. Lastly, the head of Island C has only 1-foot thick bedding stone and 2-foot thick riprap from station 5+00 to 1+00. The rest of the stations for Island C used 3-foot riprap instead of bedding stone. The slope of this protection has a maximum slope of 2 horizontal to 1 vertical and a 6-foot toe.

**3.6 Chevron.** The Chevron was built in August 2005. It spans approximately 1,182 linear feet out in front of LaGrange Island near river mile 337. This structure is created with riprap that was placed approximately 3 feet above flat pool (470 feet). The top of the Chevron is 10 feet wide with the upstream and downstream slopes being 2 horizontal to 1 vertical. The west side on the chevron is tie-backed (100 linear feet) along the bankline of LaGrange Island at an elevation of 3 feet above flat pool with a top width of 5 feet. The east side of the Chevron was left open for fish habitat. On the east side of LaGrange Island, approximately 300 linear feet of LaGrange Island bankline is protected with riprap. The bank protection is 6 feet above flat pool and has 2:1 slopes. See Plates 36 and 37.

**3.7 Reforestation.** Reforestation took place over a 3-year time period to ensure that the risk of tree mortality was diffused over time. As of October 2003, all 3,551 trees had been planted on the highest 80 acres of Long Island's 184-acre eastern agricultural field. The dredged disposal from O'Dell Chute channel was deposited and incorporated into the soil. Also this area was seeded in September 2002 with 70 acres Redtop (4 pounds/acre), and 10 acres with Redtop (4 pounds/acre) and Virginia Wild Rye (6 pounds/acre).

Year 1 tree planting took place in November 2001, with 345 Pin Oaks, 184 Sycamores, 230 Bur Oaks, 230 Northern Pecan, and 230 Swamp White Oaks planted on the most northern section of the eastern agricultural field (approximately 29 acres).

Year 2 tree planting took place in November 2002, with 330 Pin Oaks, 176 Sycamores, 220 Bur Oaks, 220 Northern Pecan, and 220 Swamp White Oaks planted next to first year planting (approximately 29 acres).

Lastly, Year 3 tree planting took place in October 2003, with 330 Pin Oaks, 176 Sycamores, 220 Bur Oaks, 220 Northern Pecan, and 220 Swamp White Oaks planted on the most eastern section of the eastern agricultural field (approximately 22 acres). Due to the spring flooding in 2004, the last tree planting was reseeded with Redtop (10 pounds/acre), Alsike Clover (1 pounds/acre), and Ryegrass (15 pounds/acres).

The minimum size of trees was 5/8-inch caliper and five feet in height. The trees were planted at 30-foot intervals on berms parallel to O'Dell Chute. The berms were plowed in prior to each tree planting. The berms were approximately 30 feet apart. Lastly, all trees received weed barrier mats. The weed barrier mats were placed in each successive spring after the trees were planted.

In November 2003, all the tree plantings were inspected and the weed growth around the trees was uncontrollable. To remedy this situation, mowing took place to manage the weed growth and to reduce the risk of tree mortality. Year 1 and Year 2 tree plantings were mowed in August of 2004. Year 3 tree planting was mowed in July and August of 2004. Herbicide treatment was not used due to the time of year.

## **4. INSPECTIONS**

**4.1 General.** An active maintenance program is based on inspections and subsequent servicing, adjustment, or repair. An effective maintenance program ensures project serviceability by timely and thorough inspections, thereby avoiding or reducing maintenance costs. Also, by documenting the condition of the project, a baseline for consideration of rehabilitation can be established for project damage resulting from a major storm or flood event. The two types of inspections for the project are: (1) project inspections by the site manager and (2) joint inspections by the site manager and personnel from the Rock Island District.

**4.2 Project Inspection by Site Manager.** The project inspection should be performed by the site manager or an appropriate representative for the purpose of noting routine deficiencies and initiating corrective actions. This inspection will be performed at periods not exceeding 12 months and will follow inspection guidance presented in subsequent sections of this manual. It is suggested that the inspection be conducted every May, which is representative of after-spring flood conditions. Additional project inspections should occur as necessary after high water events or as scheduled by the site manager. A project inspection checklist has been developed. (See Appendix B.) It is suggested that the site manager furnish a copy of the completed checklist to the U.S. Army Corps of Engineers, Rock Island District, ATTN: EMP Project Manager, CEMVR-PM-M, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61204-2004, immediately following each project inspection.

### **4.3 Joint Inspection by Site Manager and U.S. Army Corps of Engineers, Rock Island District**

**4.3.1. Routine.** A joint inspection by the site manager and the Rock Island District shall be made in accordance with ER 1110-2-100, the Project Cooperation Agreement, and the Memorandum of Agreement between USFWS and the Department of the Army, attached as Appendix A. The purpose of this inspection is to assure that adequate maintenance is being performed as presented in the DPR and this manual. The Rock Island District Engineer or authorized representative should have access to all portions of the constructed project upon coordination with the site manager for this purpose.

**4.3.2. Catastrophic.** A joint inspection by the site manager and the Corps of Engineers should be formally requested by the site manager immediately following a specific storm or flood event which causes damage exceeding the annual operation and maintenance as specified in this manual and the DPR. The project inspections by the site manager and joint inspections results will be the basis for determining maintenance responsibility and potential rehabilitation by the Corps of Engineers.

## 5. OPERATION AND MAINTENANCE OF PROJECT FEATURES

**5.1 General.** This section presents operation and maintenance instructions for the major project features. All features were designed and constructed to minimize operation and maintenance requirements.

**5.1.1.** Steps will be taken by the site manager to correct conditions disclosed by project inspections or joint inspections. Regular maintenance and repair measures will be accomplished during the appropriate season as scheduled by the site manager to ensure structure serviceability. Appropriate advance measures will be taken to ensure the availability of adequate labor and materials to meet contingencies.

**5.1.2.** Project features shall be continuously maintained and operated to obtain maximum benefits. No encroachment or trespass, which will adversely affect the efficient operation or maintenance of the project, 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 Rock Island District. Such improvements or alterations that 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. Drawings or prints showing improvements or alterations as finally constructed shall be furnished to the Rock Island District Engineer after completion of such work.

**5.1.3.** The estimated Operation and Maintenance costs are presented in Table 5.1.

**Table 5.1.** Estimated Annual Operation and Maintenance Costs (November 2002)

Item	Quantity	Unit	Unit Price	Total Cost
<b>Operation</b>	0			\$0
<b>Maintenance</b>				
Shoreline Protection Inspection	40	Hr	\$55.00	\$2,200
Riprap for Shoreline <sup>1</sup>	29	Ton	\$43.00	\$1,247
Riprap for Closure Structure	5	Ton	\$43.00	\$215
Planting Maintenance	67	Acre	\$15.00	\$1,005
Inlet sedimentation dredging <sup>2</sup>				-
Rehabilitation <sup>3</sup>				-
<b>Subtotal</b>				<b>\$4,667</b>
Contingencies (20%)				\$933
<b>Total</b>				<b>\$5,600</b>

<sup>1</sup> Maintenance of riprap will not occur annually due to the cost of mobilizing equipment for such a small amount of riprap.

<sup>2</sup> Inlet sedimentation dredging cannot be accurately measured. The sponsor will only perform dredging if it is necessary and if funding is available.

<sup>3</sup> Rehabilitation cannot be accurately measured. Rehabilitation is the reconstructive work that significantly exceeds the annual operation and maintenance requirements identified above and that is needed as a result of major storms or flood events.

## **5.2 Side Channel Dredging**

**5.2.1. Operation.** There are no operation requirements for side channel dredging.

**5.2.2. Maintenance.** The site manager shall make annual observations of the dredged portions of O'Dell and Canton Chutes, as well as Shandrew Chute, to determine the approximate depth. The site manager shall make periodic inspections to observe any significant sedimentation. Fish activity and fish kills shall be reported. Also, any adverse conditions such as undesirable debris, waste materials, and unauthorized structures shall be reported. Steps should be taken to remedy adverse conditions disclosed by the inspections.

## **5.3 Emergent Closure Structure**

**5.3.1. Operation.** There are no operation requirements for the emergent closure structure.

**5.3.2. Maintenance.** The site manager shall periodically make project inspections of the emergent closure structure at least once per year. Any loss or displacement of rock and erosion shall be noted. Replacement of rock may be necessary to maintain the general state of the emergent closure structure feature for the life of the project. Also, any adverse conditions such as undesirable debris, waste materials, or unauthorized structures shall be recorded. Steps shall be taken to remedy adverse conditions disclosed by the inspections.

## **5.4 Shoreline and Island Protection**

**5.4.1. Operation.** There are no operation requirements for the shoreline and island protection features.

**5.4.2. Maintenance.** The site manager shall periodically make project inspections of the shoreline and island protection features. Any loss or displacement of rock and erosion shall be noted. Replacement of rock may be necessary to maintain the general state of the shoreline and island protection features for the life of the project. Also, any adverse condition such as undesirable debris, waste materials, or unauthorized structures shall be recorded. Steps shall be taken to remedy adverse conditions disclosed by the inspections.

## **5.5 Chevron**

**5.5.1. Operation.** There are no operation requirements for the chevron.

**5.5.2. Maintenance.** The site manager shall periodically make project inspections of the Chevron structure, bankline protection, and tieback features. Any loss or displacement of rock and erosion shall be noted. Replacement of rock may be necessary to maintain the general state of the Chevron structure, bankline protection, and tieback feature for the life of the project. Also, any adverse condition such as undesirable debris, waste materials, or unauthorized structures shall be recorded. Steps shall be taken to remedy adverse conditions disclosed by the inspections.

## **5.6 Reforestation**

**5.6.1. Operation.** There are no operation requirements for reforestation.

**5.6.2. Maintenance.** The Rock Island District will monitor survival and growth of mast trees through annual inspections of the planting sites. Mortality of any trees shall be reported. The site manager shall perform remedial action as necessary to ensure survival of the mast trees. Mast tree plantings shall be inspected immediately following a high water event to determine any detrimental impacts. The site manager shall keep records of any herbicide applications and corrective actions used to ensure survival after high water events or other adverse events.

## **6. PROJECT REHABILITATION OR ABANDONMENT**

**6.1 General.** As stated in the Memorandum of Agreement between the USFWS and the Corps (Appendix A), the Corps will be responsible for the Federal share of any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements as identified in this manual and the Definite Project Report and that is needed as a result of specific storm or flood events.

**6.2 Project Rehabilitation or Abandonment.** Should inspection of the project area following a major flood or natural disaster disclose substantial damage to any of the major components of the project that appears to exceed the annual operation and maintenance as specified in this manual and the Definite Project Report, the Rock Island District and the USFWS shall meet and discuss the appropriate course of action in light of the original project design. The inspections by the site manager (as summarized in the submitted checklist) and the joint inspections with the Rock Island District will be the basis for determining maintenance responsibility by the USFWS versus potential rehabilitation by the Rock Island District. Repair of damage attributable to lack of maintenance is a USFWS responsibility.

The options of rehabilitation or abandonment of the project may be considered at such time that damage exceeds O&M requirements. Any decision would be carried forth only upon written mutual agreement of the USFWS and the Corps. Included within such agreement would be a description of the agreed-upon course of action and funding responsibilities, if any.

## 7. PERFORMANCE MONITORING AND ASSESSMENT

**7.1 General.** The purpose of this section is to summarize monitoring and data collection aspects of the project. Table 7.1 shows the expected costs for performance monitoring and assessment. Table 7.2 presents the principle types, purposes, and responsibility of monitoring and data collection. Table 7.5 summarizes actual monitoring and data parameters grouped by project phase, responsible agency, and data collection intervals. Drawings of the monitoring plan that has been established at the Long Island Division HREP can be found in the plates. Changes to the monitoring plan shall be coordinated with the USFWS, ILDNR, and the U.S. Army Corps of Engineers.

**7.2 Post-Construction.** Tables 7.3 and 7.4 present the post-construction monitoring plan. Monitoring includes both quantitative and qualitative data from federal and state agencies, research organizations, and the site manager. The monitoring parameters were developed to measure the effectiveness of the stated goals and objectives. Monitoring data, including annual field observations by the site manager, are used to evaluate the performance of the project. The site manager shall refer to Section 5, Operation and Maintenance of Project Features, and the inspection checklist in Appendix B for a more complete description of field observations.

**Table 7.1.** Estimated Post-Construction Annual Monitoring Costs (November 2002 price levels)

Item	Annual Cost
<b>Expected monitoring costs</b>	
Water Quality Monitoring	\$ 7,500.00
Survey Transects (1 per 5 years)	\$ 20,000.00
Site Visits/Coordination/Report Preparation (Major Report)	\$ 20,000.00
Site Visits/Coordination/Report Preparation (Minor Report)	\$ 5,000.00
Natural Resource Data	\$ 2,000.00
<b>Total cost per year post construction</b>	
Year 1	\$ 14,500.00
Year 2	\$ 29,500.00
Years 3, 4, 6-9, 11-14, 16-19, 21-24, 26-29, 31-34, 36-39, 41-44, 46-49 (Minor Reports)	\$ 14,500.00
Years 5, 10, 15, 20, 25, 30, 35, 40, 45, 50 (Major Reports)	\$ 49,500.00

**Table 7.2. Monitoring and Performance Evaluation Matrix**

Project Phase	Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
<b>Pre-Project</b>	Sedimentation Problem Analysis	Define system-wide problem. Evaluate planning assumptions.	USFWS	USGS <sup>1</sup> (UMESC <sup>2</sup> )	HREP	--
	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.	Corps	Field Station or Sponsor through Cooperative Agreements or Corps	HREP/ Sponsor	See Table 7-5 for implementation information.
<b>Design</b>	Data Collection for Design	Include quantification of project objectives, design of project, and development of performance evaluation plan.	Corps	Corps	HREP	See Table 7-5 for implementation information
<b>Construction</b>	Construction Monitoring	Assess construction impacts; assure permit conditions are met.	Corps	Corps	HREP	See State Section 401 Stipulations.
<b>Post-Construction</b>	Performance Evaluation Monitoring	Determine success of project as related to objectives.	Corps / Sponsor	Sponsor and Corps	HREP / Sponsor	See Tables 7-3 and 7-4 for the complete monitoring plan. See Table 7-5 for implementation information

<sup>1</sup> US Geological Survey

<sup>2</sup> Upper Mississippi Environmental Sciences Center

**Table 7.3. Post-Construction Monitoring Plan for Aquatic Habitat Features**

<b>Goal – Enhance Aquatic Habitat</b>								
<b>Objectives</b>	<b>Project Feature</b>	<b>Field Observations</b>	<b>Monitoring Activities by Government Agencies and Research Organizations</b>	<b>Suggested Unit of Measurement for Monitoring Activities</b>	<b>Year 0 Without Alternative</b>	<b>Year 1 Target With Alternative</b>	<b>Year 25 Target With Alternative</b>	<b>Year 50 Target With Alternative</b>
Increase habitat for overwintering fish	Side channel dredging	Depth of channel, sedimentation, debris, waste materials, unauthorized structures, fish and fishing activity including fish kills	Sedimentation transections (hydrographic surveying)	Acres with depth of 6 feet or greater below flat pool	Unknown	39 acres	39 acres	39 acres
			Fish surveys	Fish presence or absence; species of fish; reports of kills	Unknown, see Definite Project Report for general conditions	Data indicative of desirable fish populations	Data indicative of desirable fish populations	Data indicative of desirable fish populations
Reduce sedimentation in side channels	Emergent closure structure	Observed depths in channel, rock conditions, undesirable debris, waste materials	Sediment transects	Depth below flat pool L/D 21	Varies	-8ft	-7ft	-6ft
Increase aquatic habitat diversity	Shoreline and island protection	Presence of fish and fishing activity including fish kills	Fish surveys	Fish presence or absence; species of fish; reports of kills	Unknown, see Definite Project Report for general conditions	Data indicative of desirable fish diversity	Data indicative of desirable fish diversity	Data indicative of desirable fish diversity

**Table 7.4.** Post-Construction Monitoring Plan for Wetland and Terrestrial Habitat Features

<b>Goal – Restore and Protect Wetland and Terrestrial Habitat</b>								
<b>Objectives</b>	<b>Project Feature</b>	<b>Field Observations</b>	<b>Monitoring Activities by Government Agencies and Research Organizations</b>	<b>Suggested Unit of Measurement for Monitoring Activities</b>	<b>Year 0 Without Alternative</b>	<b>Year 1 Target With Alternative</b>	<b>Year 25 Target With Alternative</b>	<b>Year 50 Target With Alternative</b>
Maintain terrestrial habitat	Shoreline and island protection	Rock condition, undesirable debris, waste materials, unauthorized structures	Survey, aerial photography, or mapping	Linear Feet of rip-rapped shoreline	0	Same as Constructed	Same as Constructed	Same as Constructed
Increase bottomland hardwood diversity and reduce forest fragmentation	Reforestation	Tree and seeding condition, effective acreage, wildlife use, herbicide applications, tree mortality	Mast Tree Survey	Percent Survival	Not applicable; trees not planted yet	100%	50%	20%

Table 7.5. Resource Monitoring and Data Collection Summary<sup>1</sup>

TYPE MEASUREMENT	Water Quality Data						Engineering Data			Natural Resource Data			Sampling Agency
	Pre-Project Phase		Design Phase		Post-Const. Phase		Pre-Project Phase	Design Phase	Post-Const. Phase	Pre-Project Phase	Design Phase	Post-Const. Phase	
	Apr-Sep	Oct-Mar	Apr-Sep	Oct-Mar	Jun-Sep	Dec-Mar							
<b>POINT MEASUREMENTS</b>													
<i><b>Water Quality Stations</b></i> <sup>2</sup>													
Turbidity	2W	M			2W	M							Corps
Secchi Disk Transparency	2W	M			2W	M							Corps
Suspended Solids	2W	M			2W	M							Corps
Dissolved Oxygen	2W	M			2W	M							Corps
Specific Conductance	2W	M			2W	M							Corps
Water Temperature	2W	M			2W	M							Corps
pH	2W	M			2W	M							Corps
Total Alkalinity	2W	M			2W	M							Corps
Chlorophyll	2W	M			2W	M							Corps
Velocity	2W	M			2W	M							Corps
Water Depth	2W	M			2W	M							Corps
Ice Thickness	-	M			-	M							Corps
Snow Depth	-	M			-	M							Corps
Wind Direction	2W	M			2W	M							Corps
Wind Velocity	2W	M			2W	M							Corps
Wave Height	2W	M			2W	M							Corps
Air Temperature	2W	M			2W	M							Corps
Percent Cloud Cover	2W	M			2W	M							Corps
Elutriate Analysis <sup>3</sup>		1											Corps
<i><b>Boring Stations</b></i> <sup>4</sup>													
Geotechnical Borings							1						Corps

**Table 7.5.** Resource Monitoring and Data Collection Summary<sup>1</sup>

TYPE MEASUREMENT	Water Quality Data						Engineering Data			Natural Resource Data			Sampling Agency
	Pre-Project Phase		Design Phase		Post-Const. Phase		Pre-Project Phase	Design Phase	Post-Const. Phase	Pre-Project Phase	Design Phase	Post-Const. Phase	
	Apr-Sep	Oct-Mar	Apr-Sep	Oct-Mar	Apr-Sep	Oct-Mar							
<b>TRANSECT MEASUREMENTS</b>													
<i>Sedimentation Transects</i> <sup>5</sup>													
Hydrographic Soundings							1	1	5Y				Corps
<b>BIOLOGICAL MEASUREMENTS</b>													
<i>Mast Tree Survey</i>										1	1	5Y	Corps
<i>Mapping</i> <sup>6</sup>													
Aerial Photography / Remote Sensing											1		Corps
<i>Fish Surveys</i> <sup>7</sup>													
Electrofishing												Y	ILDNR

## LEGEND

W = Weekly      nW = n-Week interval  
M = Monthly      nY = n-Yearly interval  
Y = Yearly      1,2,3, ... = number of times data are collected within designated project phase

<sup>1</sup> See Appendix E for monitoring sites

<sup>2</sup> Water Quality Stations

Pre-Project - W-M336.6S, W-M333.8Q, W-M333.0N, W-M332.7M, W-M333.3K

Post-Project - W-M336.6S

<sup>3</sup> Elutriate Analysis - E-M366.1M, E-M334.2N, E-M333.4M

<sup>4</sup> Corps of Engineers Geotechnical Borings

Station Code	Geotechnical Boring	Date
GD-94-1	Long Island Lake	February 8, 1994
GD-96-1	O'Dell Chute	September 19, 1996
GD-96-2	O'Dell Chute	September 19, 1996
GD-96-3	O'Dell Chute	September 19, 1996
GD-96-4	O'Dell Chute	September 19, 1996
GD-96-5	Shandrew Island Chute	September 19, 1996
GD-96-6	Shandrew Island Chute	September 19, 1996
GD-96-7	Shandrew Island Chute	September 19, 1996
GD-96-8	Shandrew Island Chute	September 19, 1996
GD-96-9	Shandrew Island Chute	September 19, 1996
GD-96-10	Shandrew Island Chute	September 19, 1996
GD-96-11	Shandrew Island Chute	September 19, 1996

<sup>5</sup> Sedimentation Transects

Pre-Project Phase - SM337.0U, SM337.0S, SM336.5S, SM336.6K, SM336.6L, SM336.5R, SM336.4F, SM336.4H, SM335.2G, SM335.2F, SM334.1N, SM334.1M, SM332.8L, SM 332.8K

Post-Project Phase - SM336.5S, SM336.5R, SM335.0X, SM334.2X

<sup>6</sup> Mapping (Pre-Construction Phase)

April 1994 Color Aerial Photography

July 1995 Infrared Aerial Photography

November 1995 Black and White Aerial Photography

September 1996 Color Oblique Photography

Brown's photographs and maps for these river miles also were reviewed (dated early 1930's)

<sup>7</sup> Annual electrofishing surveys are currently planned by the ILDNR at Long Island Division. Results can be obtained from the Aledo ILDNR field office. Interpretation of the data should be performed by a fisheries biologist or by using *Fishes of Illinois* by Phillip Smith.

**OPERATION AND MAINTENANCE MANUAL  
UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM**

**LONG ISLAND DIVISION (GARDNER DIVISION)  
HABITAT REHABILITATION AND ENHANCEMENT  
POOL 21, MISSISSIPPI RIVER MILES 332.5 – 340.2  
ADAMS COUNTY, ILLINOIS**

**APPENDIX A**

**MEMORANDUM OF AGREEMENT**

**MEMORANDUM OF AGREEMENT  
BETWEEN  
THE UNITED STATES FISH AND WILDLIFE SERVICE  
AND  
THE DEPARTMENT OF THE ARMY  
FOR  
GARDNER DIVISION HABITAT  
REHABILITATION AND ENHANCEMENT  
OF THE  
UPPER MISSISSIPPI RIVER SYSTEM  
AT  
MISSISSIPPI RIVER POOL 21, ADAMS COUNTY, ILLINOIS**

**I. PURPOSE**

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

**II. BACKGROUND**

Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, authorizes construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. The project area is managed by the USFWS and is on land managed as a national wildlife refuge. Under conditions of Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, 100% of the construction costs of those fish and wildlife features for the Gardner Division Refuge area are the responsibility of the DOA, and pursuant to Section 107 (b) of the Water Resources Development Act of 1992, Public Law 102-580, 100% of the cost of operation and maintenance for the Gardner Division Refuge Area are the responsibility of USFWS.

**III. GENERAL SCOPE**

The project to be accomplished pursuant to this MOA shall consist of the following: a. Dredging 5,000 feet of O'Dell Chute and constructing an emergent closure structure at the upstream end of the chute. b. Protecting the shorelines and head ends of selected islands. and c. Planting 67 acres of mast-producing trees on the dredged material placement site located on Long Island's eastern agricultural field.

#### IV. RESPONSIBILITIES

##### A. DOA is responsible for:

1. Construction. Construction of the project which consists of constructing; Mast Tree Planting, Island Stabilization/Rock Stabilization, Shandrew Island Dredging, O'Dell Chute Dredging, Deep Aquatic Habitat, Long Island Draw Down, Closure Structure Enhancement.

2. Major Rehabilitation. The Federal share of any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements identified in the definite project report and that is needed as a result of specific storm or flood events.

3. Construction Management. Subject to and using funds appropriated by the Congress of the United States, and in accordance with Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, DOA will construct the Gardner Division Refuge Area, Illinois, Fish and Wildlife Enhancement Project as described in the "Upper Mississippi River System Environmental Management Program Definite Project Report (R-16PR) with Integrated Environmental Assessment Gardner Division Refuge Area dated September, 2000 applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The USFWS will be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed. If DOA encounters potential delays related to construction of the project, DOA will promptly notify USFWS of such delays.

4. Maintenance of Records. The DOA will keep books, records, documents, and other evidence pertaining to costs and expenses incurred in connection with construction of the project to the extent and in such detail as will properly reflect total costs. The DOA shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the project and resolution of all relevant claims arising therefrom, and shall make available at its offices, at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the USFWS.

##### B. The USFWS is responsible for Operation, Maintenance and Repair:

Upon completion of construction as determined by the District Engineer, Rock Island, the USFWS shall accept the Project and shall operate, maintain, and repair the project as defined in the definite project report entitled Upper Mississippi River System Environmental Management Program Definite Project Report (R-16PR)

with Integrated Environmental Assessment Gardner Division Refuge Area dated September, 2000, in accordance with Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580.

#### V. MODIFICATION AND TERMINATION

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

#### VI. REPRESENTATIVES

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


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


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

#### VII. EFFECTIVE DATE OF MOA

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

#### THE DEPARTMENT OF THE ARMY THE U.S. FISH AND WILDLIFE SERVICE

BY:   
WILLIAM J. BAYLES  
Colonel, U.S. Army  
District Engineer

BY:   
WILLIAM H. HARTWIG  
Regional Director  
U.S. Fish and Wildlife Service

Marvin E. Moriarty  
Acting Regional Director

DATE: 11 Dec 2000

DATE: December 7, 2000

**OPERATION AND MAINTENANCE MANUAL  
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ADAMS COUNTY, ILLINOIS**

**APPENDIX B**

**SITE MANAGER'S  
PROJECT INSPECTION AND MONITORING RESULTS**

## SITE MANAGER'S PROJECT INSPECTION AND MONITORING RESULTS

Inspected By \_\_\_\_\_ Date \_\_\_\_\_

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

### 1. PROJECT INSPECTION

Item	Condition
A. Side Channel Dredging	
( ) Fish and fishing activity	_____
( ) Fish kills	_____
( ) Approximate depth of channel	_____
( ) Significant sedimentation	_____
( ) Undesirable debris	_____
( ) Waste materials	_____
( ) Unauthorized structures	_____
( ) Other	_____
B. Emergent Closure Structure	
( ) Rock condition/replacement	_____
( ) Undesirable debris	_____
( ) Waste materials	_____
( ) Unauthorized structures	_____
( ) Other	_____
C. Shoreline and Island Protection	
( ) Fish and fishing activity	_____
( ) Fish kills	_____
( ) Rock condition/replacement	_____
( ) Undesirable debris	_____
( ) Waste materials	_____
( ) Unauthorized structures	_____
( ) Other	_____

**Item**

**Condition**

**D. Chevron**

- ☐ Fish and fishing activity
- ☐ Fish kills
- ☐ Rock condition/replacement
- ☐ Erosion Problems
- ☐ Undesirable debris
- ☐ Waste materials
- ☐ Unauthorized structures
- ☐ Other

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**E. Reforestation**

- ☐ Tree and seedling condition
- ☐ Tree growth (disease, insects, weeds, etc.)
- ☐ Tree mortality
- ☐ Herbicide applications
- ☐ Other

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**2. COMMENTS**

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Site Manager

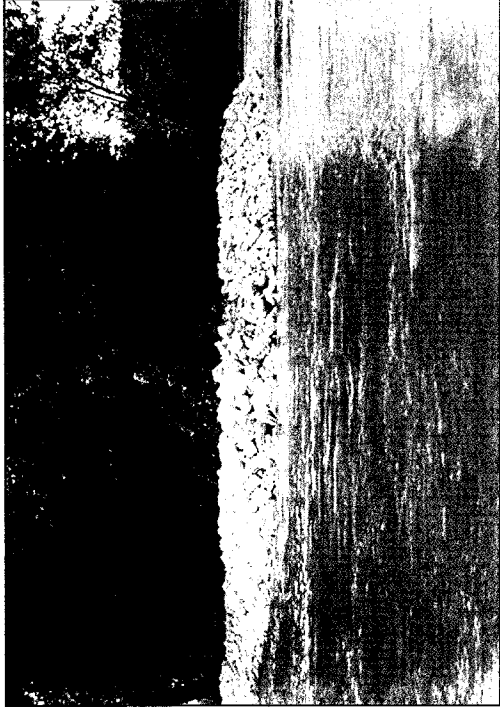
**OPERATION AND MAINTENANCE MANUAL  
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ADAMS COUNTY, ILLINOIS**

**APPENDIX C**

**PHOTOS**



**Photo 1.** O'Dell Chute Closure Structure



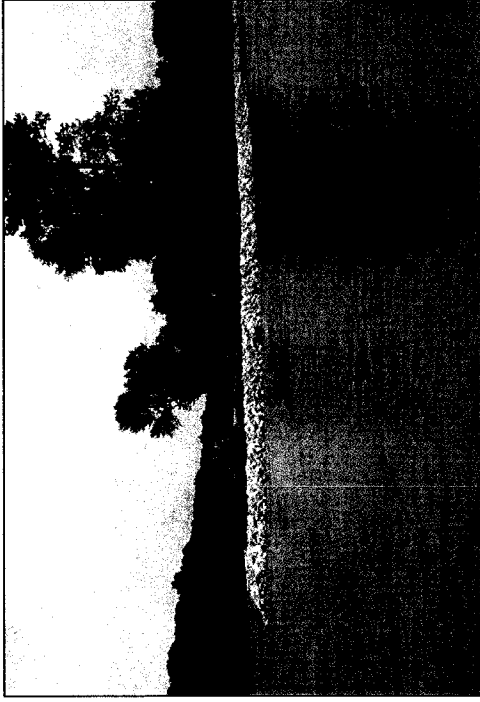
**Photo 3.** Island A Head End



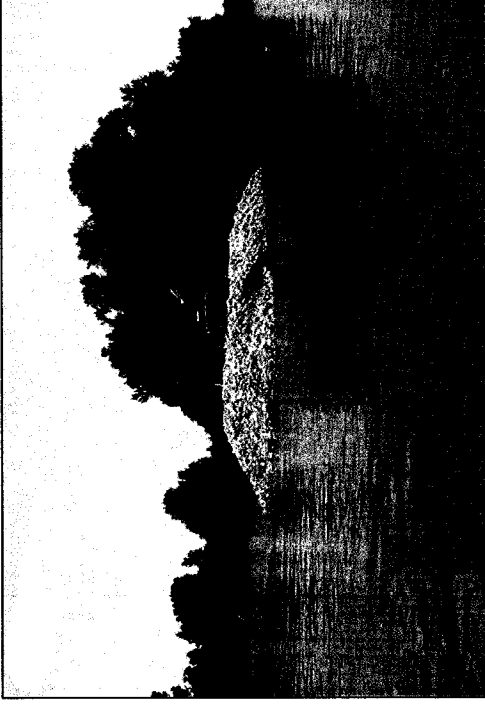
**Photo 2.** O'Dell Chute Closure Structure



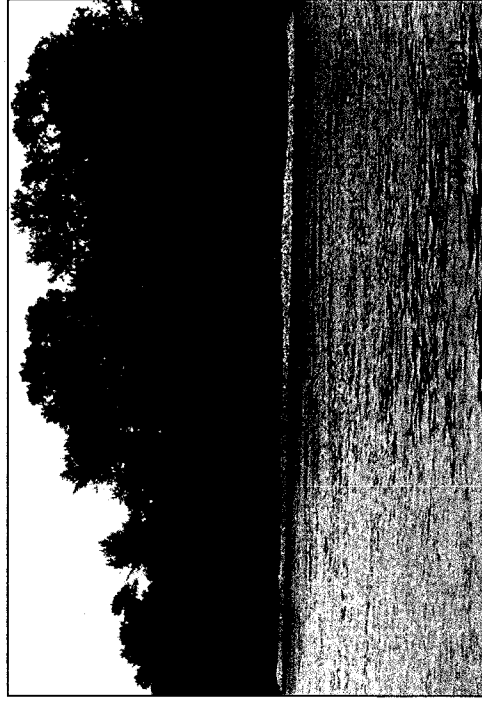
**Photo 4.** Island A Tied-in End



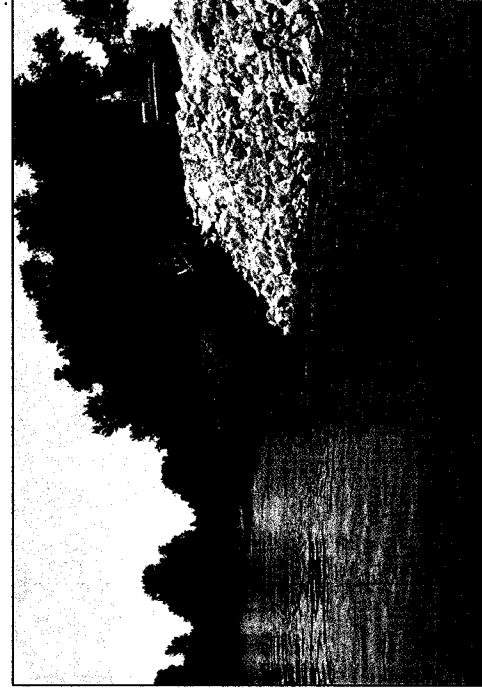
**Photo 5. Island B**



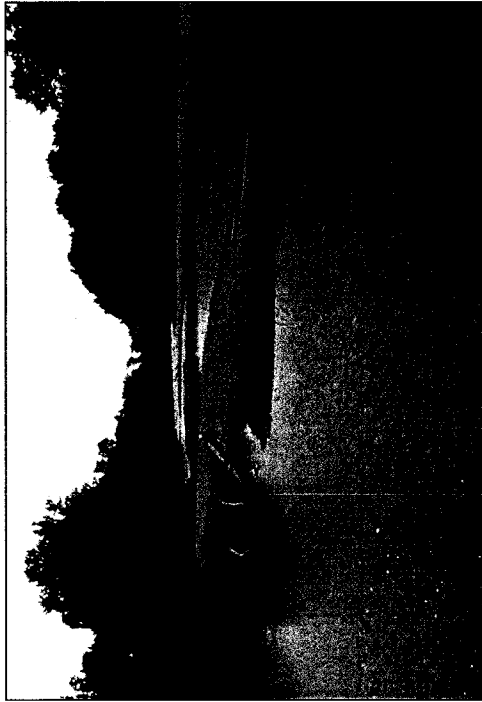
**Photo 7. Island D**



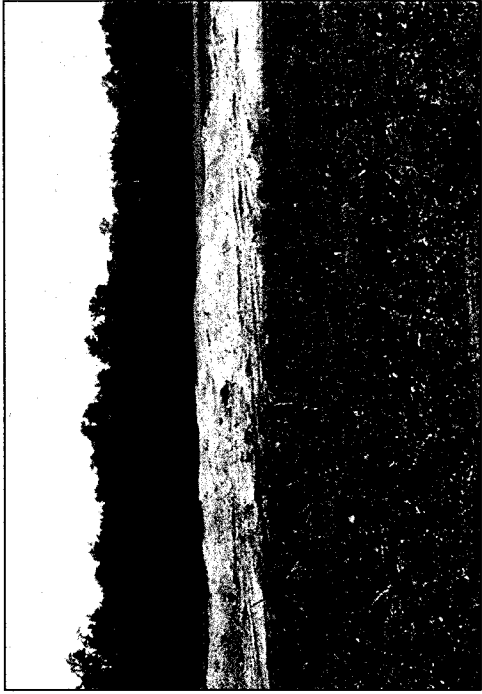
**Photo 6. Shandrew Island**



**Photo 8. Island D**



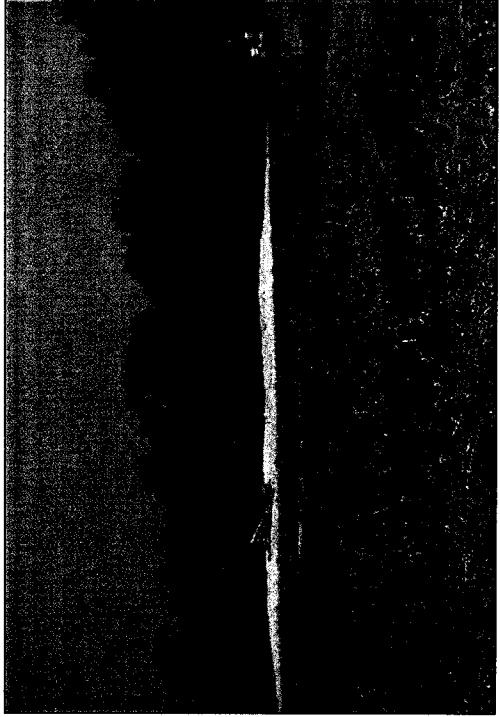
**Photo 9.** Downstream of Closure Structure



**Photo 11.** Southern Edge of Placement Site



**Photo 10.** Dredging



**Photo 12.** Northern End of Placement Site



**Photo 13.** Planting of Mast-Producing Trees

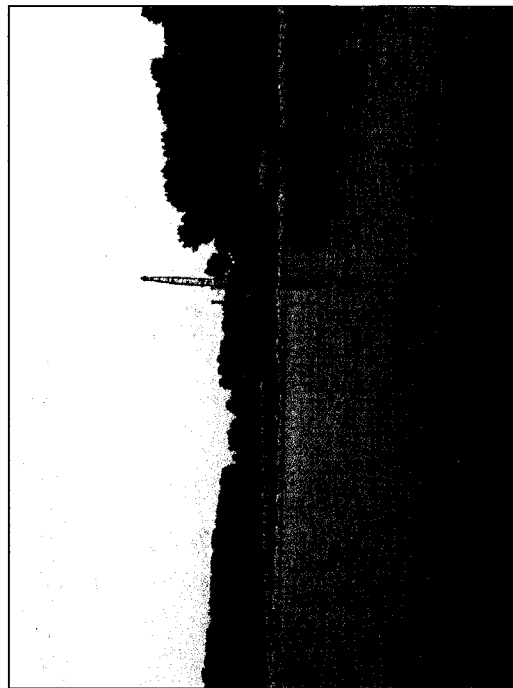


**Weed Barrier Mat**

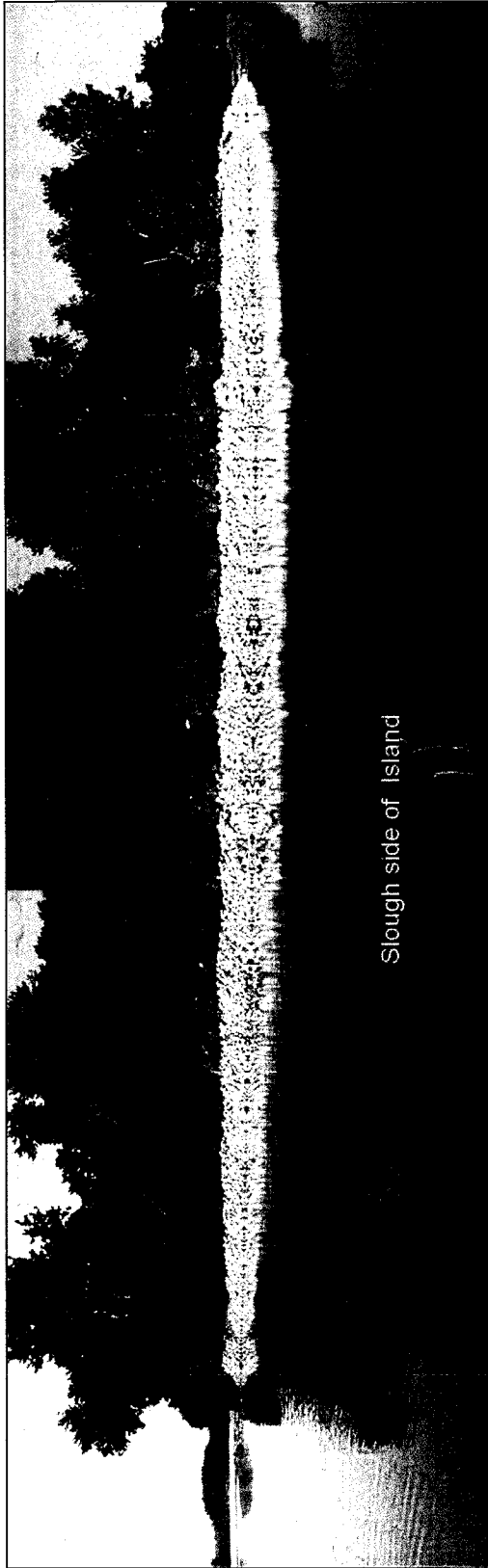
**Photo 15.** Weed Problem (November 12, 2004)



**Photo 14.** Year 3 Tree Planting (November 12, 2004)

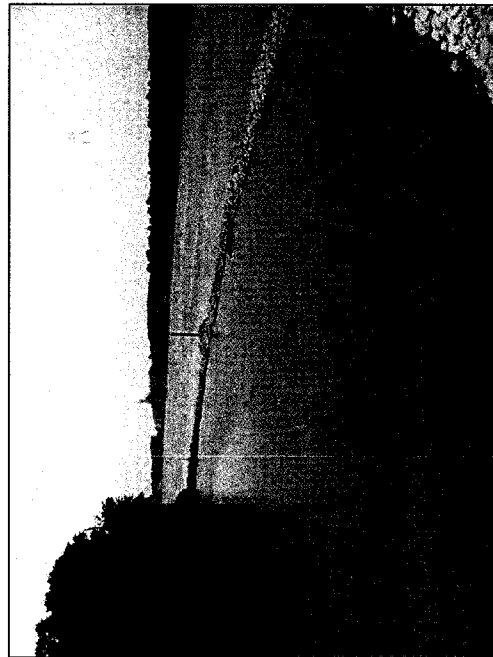


**Photo 16.** East Side of Chevron (August 13, 2005)



Slough side of Island

**Photo 17.** Bank Protection on the East Side of Island (August 13, 2005)



**Photo 18.** West Side of the Chevron

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POOL 21, MISSISSIPPI RIVER MILES 332.5 – 340.2  
ADAMS COUNTY, ILLINOIS**

**APPENDIX D  
DISTRIBUTION LIST**

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Karen Westphall  
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Rick Mollahan  
Illinois Department of Natural Resources  
One Natural Resources Way  
Springfield, IL 62702-1271

US Army Corps of Engineers, Mississippi Valley Division  
PO Box 80  
Vicksburg, MS 39181-0080  
Attn: CEMVD-MD-PR (Susan Smith)

US Army Corps of Engineers, Rock Island Rock Island District  
Clock Tower Building  
PO Box 2004  
Rock Island, Illinois 61204-0004  
Attn:

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CEMVR-PM-M (2 hard copies and digital copy)  
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CEMVR-ED-H (digital copy)  
CEMVR-ED-HQ (digital copy)  
CEMVR-ED-S (digital copy)

**OPERATION AND MAINTENANCE MANUAL  
UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM**

**LONG ISLAND DIVISION (GARDNER DIVISION)  
HABITAT REHABILITATION AND ENHANCEMENT  
POOL 21, MISSISSIPPI RIVER MILES 332.5 – 340.2  
ADAMS COUNTY, ILLINOIS**


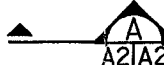


**PLATES**

INDEX		
SHEET NO.	SHEET REF. NO.	TITLE OF DRAWING
1	X1	COVER SHEET
2	X2	INDEX OF DRAWINGS AND GENERAL NOTES
3	X3	LOCATION PLAN AND VICINITY MAP
4	C1	SITE PLAN
5	C2	BORING LOCATIONS
6	C3	BORING LOGS I
7	C4	BORING LOGS II
8	C5	PERIMETER LEVEE PLAN & PROFILE STA. 0+00P TO 11+50P
9	C6	PERIMETER LEVEE PLAN & PROFILE STA. 11+50P TO 24+00P
10	C7	PERIMETER LEVEE PLAN & PROFILE STA. 24+00P TO 38+00P
11	C8	PERIMETER LEVEE PLAN & PROFILE STA. 38+00P TO 49+00P
12	C9	PERIMETER LEVEE PLAN & PROFILE STA. 49+00P TO 59+00P
13	C10	PERIMETER LEVEE PLAN & PROFILE STA. 59+00P TO 64+37P
14	C11	MSMJ PLAN & PROFILE STA. 0+00U TO 8+23U
15	C12	MSMJ PLAN & PROFILE STA. 8+23U TO 21+23U
16	C13	MSMJ PLAN & PROFILE STA. 21+23U TO 35+58U
17	C14	MSMJ PLAN & PROFILE STA. 35+58U TO 50+34U
18	C15	TYPICAL NEW PERIMETER & MSMJ SECTIONS
19	C16	NEW STOPLOG & SPILLWAY DETAILS
20	C17	EXISTING HERON ROOKERY & UNEXPLODED ORDINANCE SITE PLAN
21	C18	BORROW SITE PLAN AND SECTION
22	S100	STOPLOG STRUCTURE GENERAL PLAN
23	S101	STOPLOG STRUCTURE MASONRY & REINFORCING
24	S102	STOPLOG DETAILS
25	S103	STOPLOG STRUCTURE MISCELLANEOUS DETAILS
26	S104	STOPLOG STRUCTURE GUARDRAIL DETAILS
27	S105	STOPLOG STRUCTURE SETTLEMENT PLATE DETAIL
28	M1	WELL DETAILS AND MISCELLANEOUS DETAILS
29	E1	ELECTRICAL SERVICE PLACEMENT
30	E2	ELECTRICAL ONE - LINE DIAGRAM AND DETAILS

## GENERAL NOTES:

- THE SCOPE OF WORK CONSISTS OF, BUT MAY NOT BE LIMITED TO:
  - CONSTRUCT MOIST SOIL MANAGEMENT UNIT (MSMU) USING ON SITE BORROW;
  - CONSTRUCT NEW STOPLOG STRUCTURE. SEE S105 FOR STOPLOG SETTLEMENT PLATE DETAIL, CONSTRUCTION SEQUENCING, AND SCHEDULING.
  - CONSTRUCT NEW WELL AND EARTHEN BERM TO SERVE AS THE WELL PLATFORM.
  - SEED AND FERTILIZE SLOPES OF NEWLY CONSTRUCTED LEVEES.
- THE ENTIRE CONSTRUCTION SITE IS HIGHLY INFLUENCED BY VARYING RIVER STAGES. SEE HYDRAULIC DATA SHEETS IN SPECIFICATIONS.
- THE CONTRACTOR SHALL COORDINATE WITH THE POWER COMPANY FOR PRIMARY SERVICE INSTALLATION AS SHOWN ON SHEET E-1. THE COST OF THE UTILITY COMPANY WORK SHALL BE PAID BY THE CONTRACTOR AS SPECIFIED.
- CONSTRUCTION ACCESS IS RESTRICTED BY HIGH AND/OR LOW WATER. ACCESS SHALL BE ASCERTAINED BY THE BIDDER DURING ADVERTISEMENT.
- THE MAJORITY OF THE TOPOGRAPHICAL CONTOURS SHOWN WERE DEVELOPED FROM FIELD DATA TAKEN IN 1999. ACTUAL CONTOURS MAY VARY.
- THE LAYOUT OF PROJECT FEATURES SHALL BE FIELD STAKED BY THE CONTRACTOR AND APPROVED BY THE CONTRACTING OFFICER PRIOR TO CONSTRUCTION. CLEARING AND GRUBBING LIMITS SHALL BE MARKED AND APPROVED BY CONTRACTING OFFICER BEFORE CONSTRUCTION.
- "P" DESIGNATOR AFTER STATIONING DENOTES NEW PERIMETER LEVEE ALIGNMENT AND "U" DESIGNATOR AFTER STATIONING DENOTES NEW MOIST SOIL UNIT LEVEE ALIGNMENT.
- HERON ROOKERY ZONES AND RESTRICTIONS ARE ILLUSTRATED ON C-17.
- ORDINANCE AVOIDANCE ZONE BOUNDARY AND RESTRICTIONS ARE ILLUSTRATED ON C-17.
- PROPOSED STAGING AREA IS WITHIN THE CONSTRUCTION WORK LIMITS. CONTRACTOR SHALL TAKE INTO CONSIDERATION HIGH WATER LEVELS AND STAGE EQUIPMENT ACCORDINGLY TO PREVENT WATER DAMAGE TO EQUIPMENT. SEE SPECIFICATIONS FOR HYDRAULIC DATA.
- EXCAVATION IN BORROW AREAS SHALL HAVE SLOPES NOT LESS THAN 1.5H:1V.

## LEGEND

-  INDICATES SECTION OR ELEVATION IDENTIFICATION  
IF DRAWN ON SAME SHEET
-  INDICATES SECTION IDENTIFICATION
-  INDICATES DETAIL IDENTIFICATION  
IF DRAWN ON SAME SHEET
-  INDICATES DETAIL IDENTIFICATION
- SHEET REFERENCE NUMBER FROM WHICH SECTION IS TAKEN
- SHEET REFERENCE NUMBER ON WHICH SECTION IS DRAWN
- SHEET REFERENCE NUMBER FROM WHICH DETAIL IS TAKEN
- SHEET REFERENCE NUMBER ON WHICH DETAIL IS DRAWN

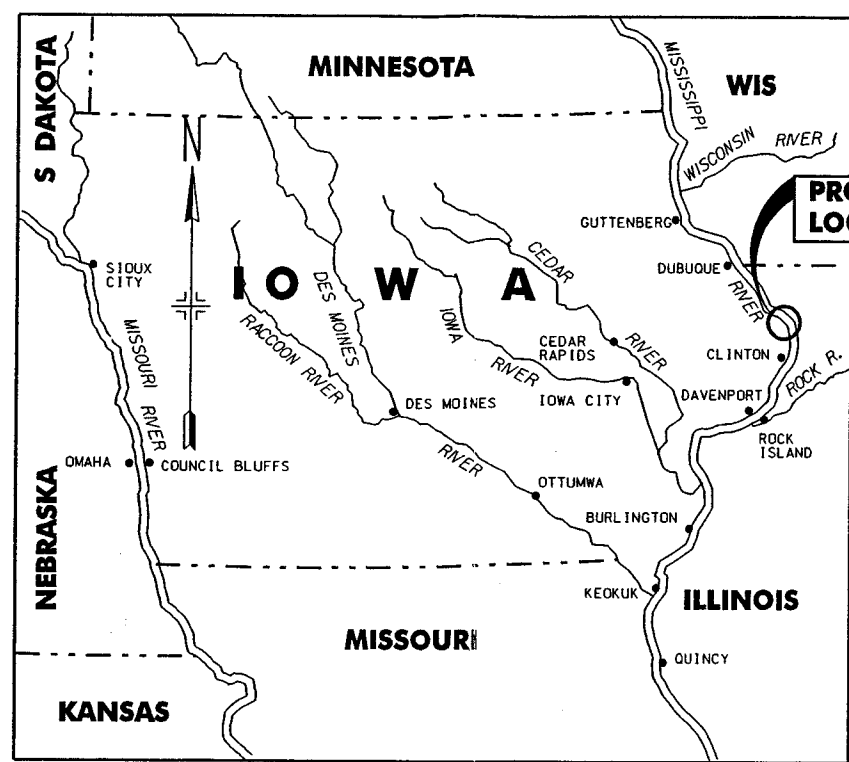
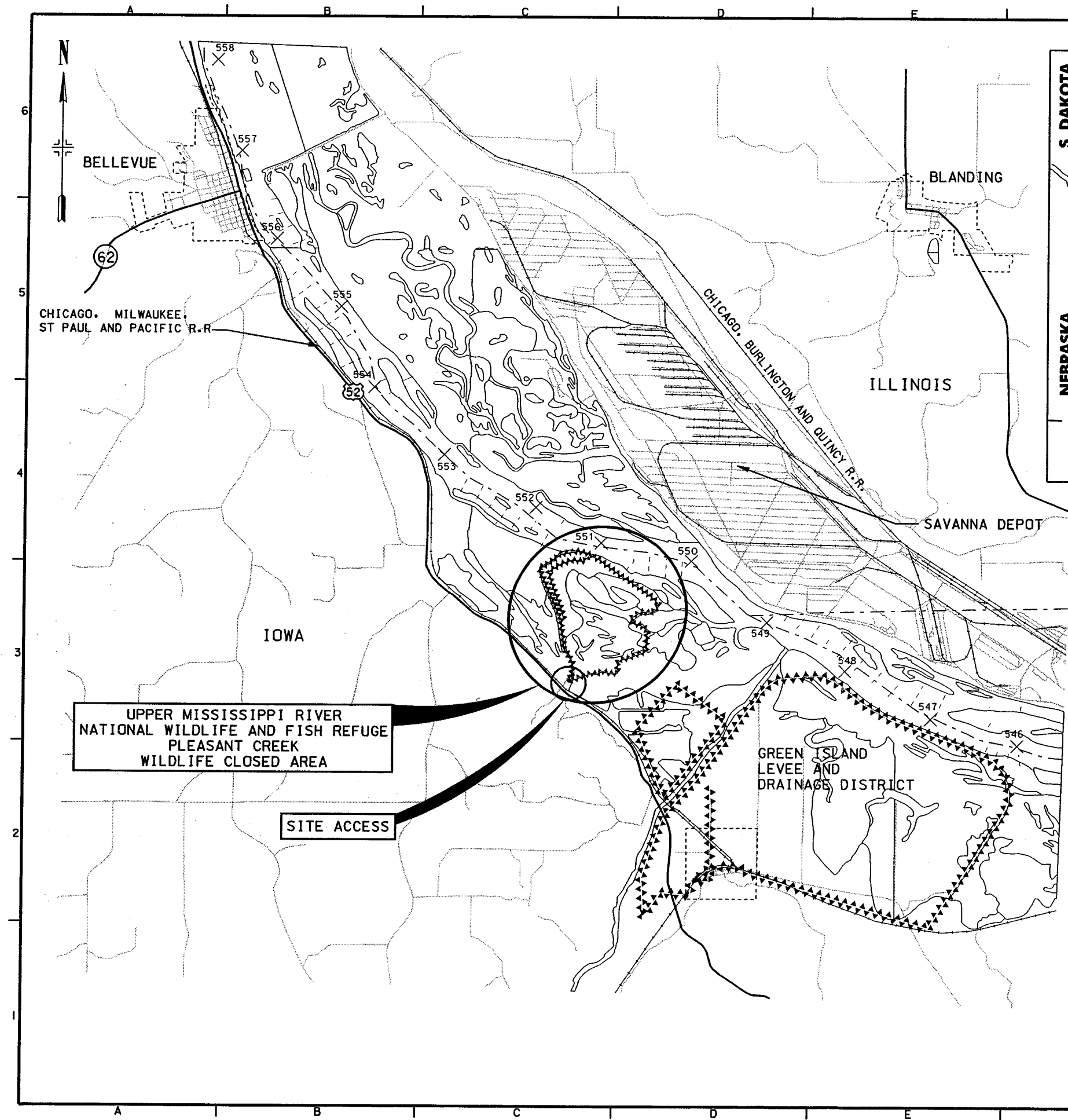


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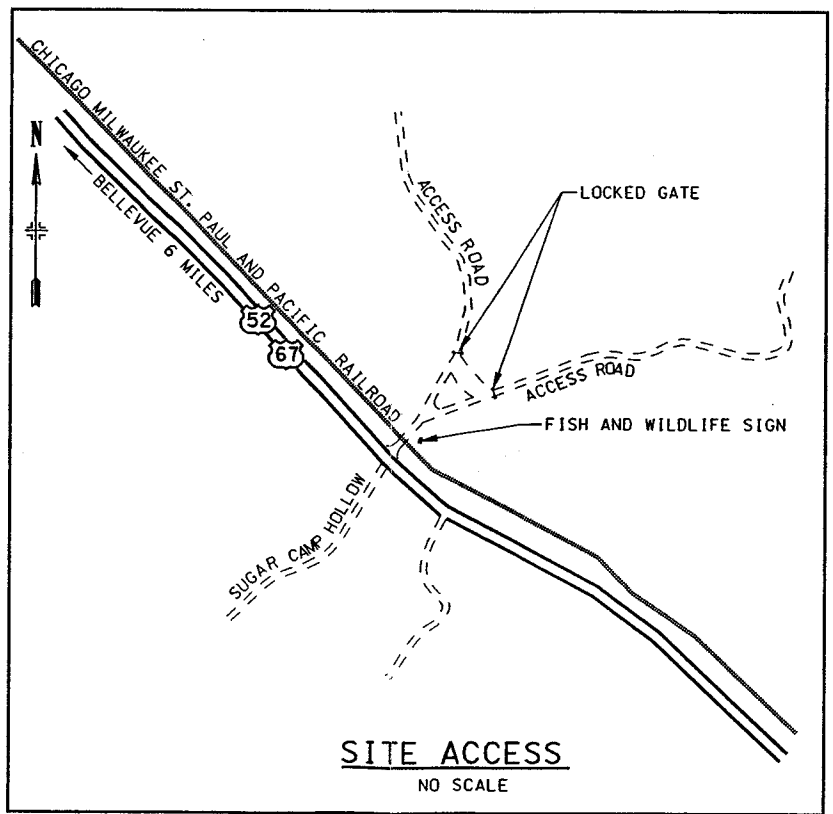
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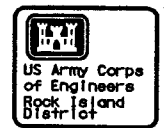
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**VICINITY MAP**  
 25 0 25 50 75  
 SCALE IN MILES



3000 0 3000 6000'  
 SCALE IN FEET



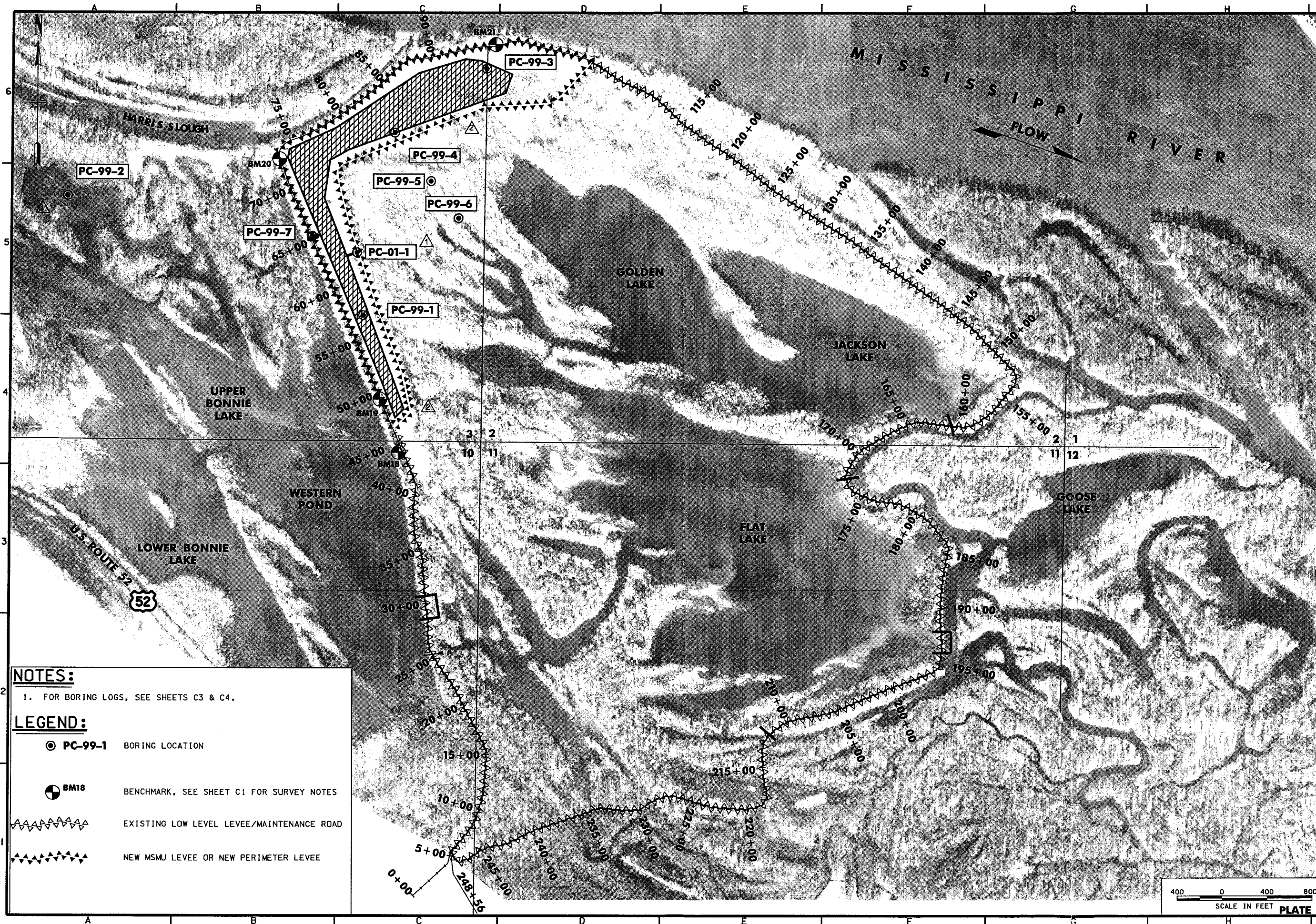
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Symbol	Base	Revised

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UPPER MISSISSIPPI RIVER  
 ENVIRONMENTAL MANAGEMENT PROGRAM  
 POOL 13, RM 548.7 THRU 552.8  
 PLEASANT CREEK HABITAT  
 REHABILITATION AND ENHANCEMENT  
**LOCATION PLAN  
 AND VICINITY MAP**

Sheet  
 Reference  
 Number:  
**X3**  
 Sheet 3 of 30





**NOTES:**

1. FOR BORING LOGS, SEE SHEETS C3 & C4.

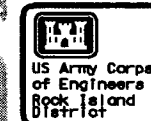
**LEGEND:**

● PC-99-1 BORING LOCATION

● BM18 BENCHMARK, SEE SHEET C1 FOR SURVEY NOTES

————— EXISTING LOW LEVEL LEVEE/MAINTENANCE ROAD

————— NEW MSMU LEVEE OR NEW PERIMETER LEVEE



Date	Revised As Constructed	Minor Revisions	Revisions
4/03/03	SAZ/DAJ	SAZ/GJM	Approved
6/22/01	SAZ/GJM	SAZ/GJM	Revisions

Date	22 MARCH 2001
Designed By	SAZ
Drawn By	DBM
Checked By	EGR
Reviewed By	GJM
Project Code	ep62
Salvage Number	DAC925-01-S-0007

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

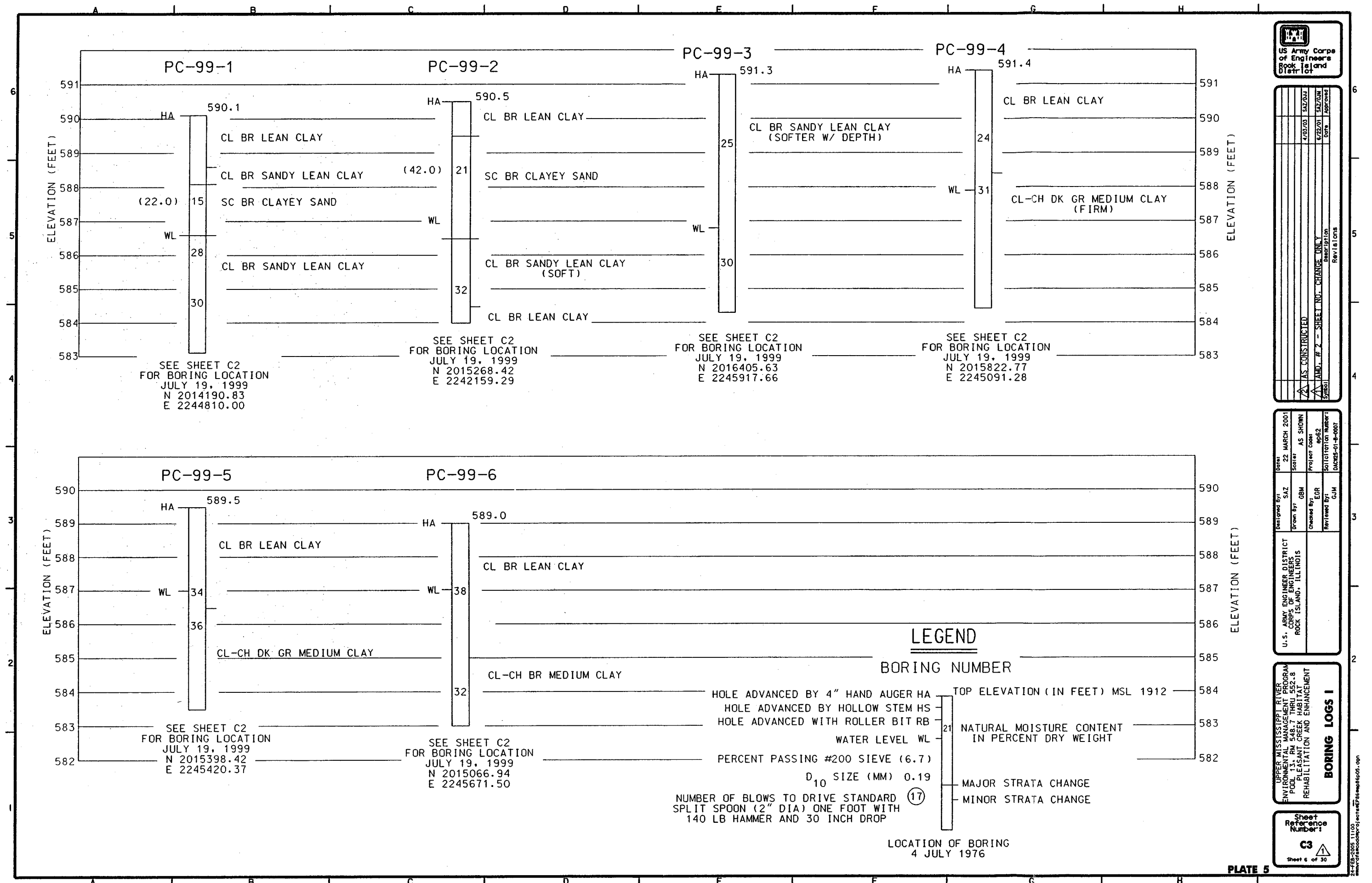
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ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT

**BORING LOCATIONS**

Sheet  
Reference  
Number:  
**B1**  
Sheet 5 of 30

400 0 400 800  
SCALE IN FEET

**PLATE 4**

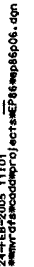




Sheet  
Reference  
Number:

**C4**

Sheet 7 of 30



BEGIN PERIMETER LEVEE RESTORATION APPROX. STA. 40+80

EXISTING E ROAD

PI STA. 6+69.62P  
N = 2013286.28  
E = 2245056.44

PI STA. 8+20.66P  
N = 2013406.56  
E = 2245000.73

PI STA. 7+21.55P  
N = 2012882.54  
E = 2245152.66

PI STA. 3+70.00P  
N = 2012982.54  
E = 2245152.66

PI STA. 0+33.22P  
Δ = 20°12'01.04" LEFT  
D = 114°35'29.61"  
R = 50'  
T = 8.91'  
L = 17.63'  
E = 0.79'  
PC STA. 0+24.31P  
PT STA. 0+41.94P

NEW PERIMETER LEVEE ALIGNMENT

NEW MSMJ LEVEE ALIGNMENT, SEE SHEETS C11 TO C14 FOR PLAN AND PROFILE

PLAN

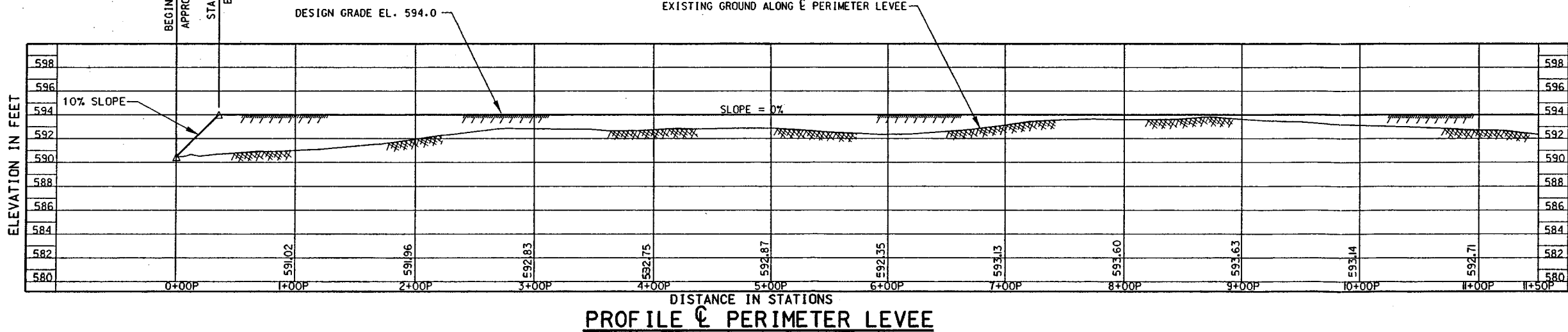
SCALE IN FEET  
50 0 50 100'

NOTES:

1. FOR BORROW AREA SEE SHEET C1.
2. FOR TYPICAL PERIMETER LEVEE SECTION SEE SHEET C15.

BM18-REFERENCE

BM19-REFERENCE



KEY PLAN

1600 800 0 1600  
SCALE IN FEET



Revised	Date	By	Description
1	7/22/07	LEU/DJH	APPROVED
2	7/22/07	LEU/DJH	REVISED AS CONSTRUCTED
3	7/22/07	LEU/DJH	AMEND. #2 - SHEET NO. CHANGE ONLY

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	Designed By: LEU Drawn By: TPD/SDB Checked By: RTN Reviewed By: DJH	Date: 22 MARCH 2003 Scale: AS SHOWN Project Code: 0662 Solicitation Number: DACW25-01-B-0007
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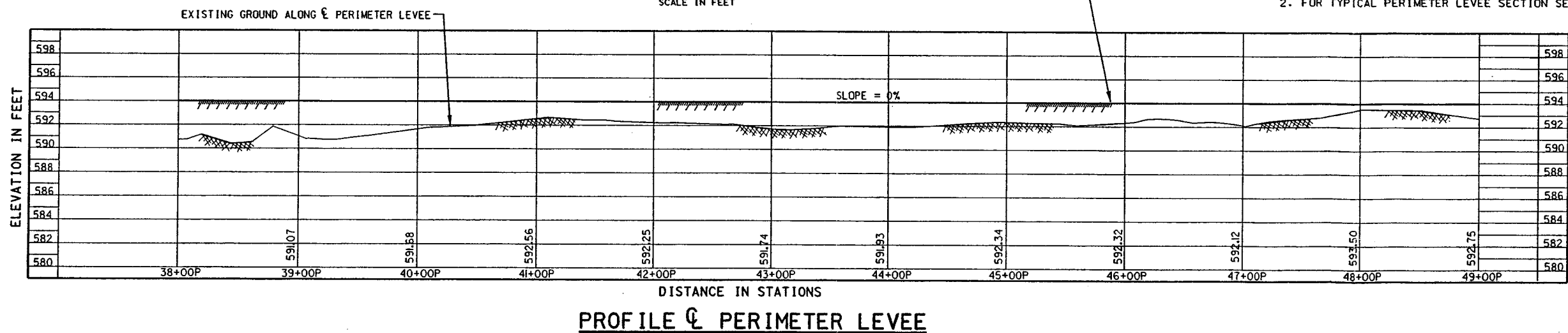
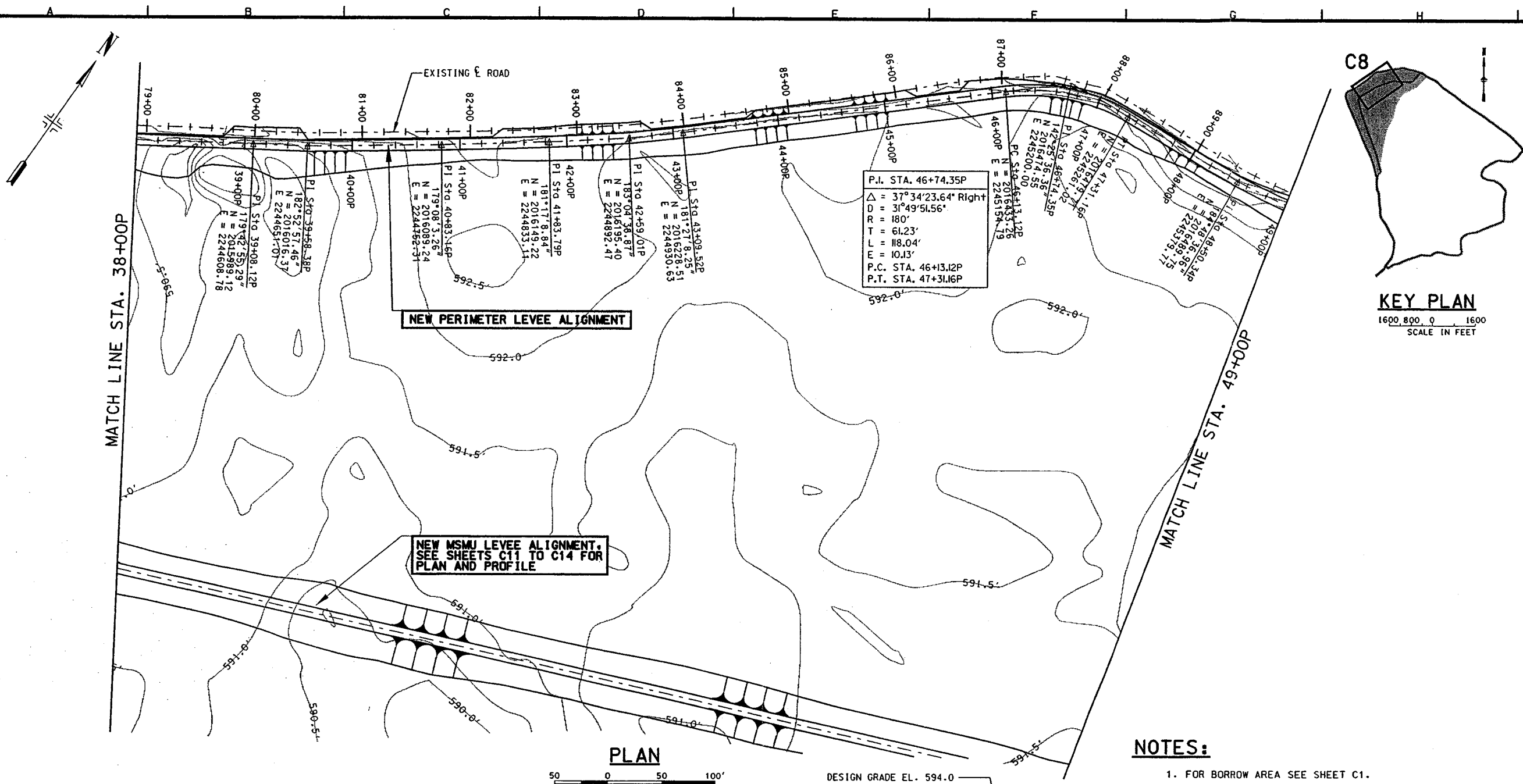
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ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
PERIMETER LEVEE PLAN  
& PROFILE STA. 0+00P TO STA. 11+50P

Sheet  
Reference  
Number:  
C5  
Sheet 6 of 30

PLATE 7





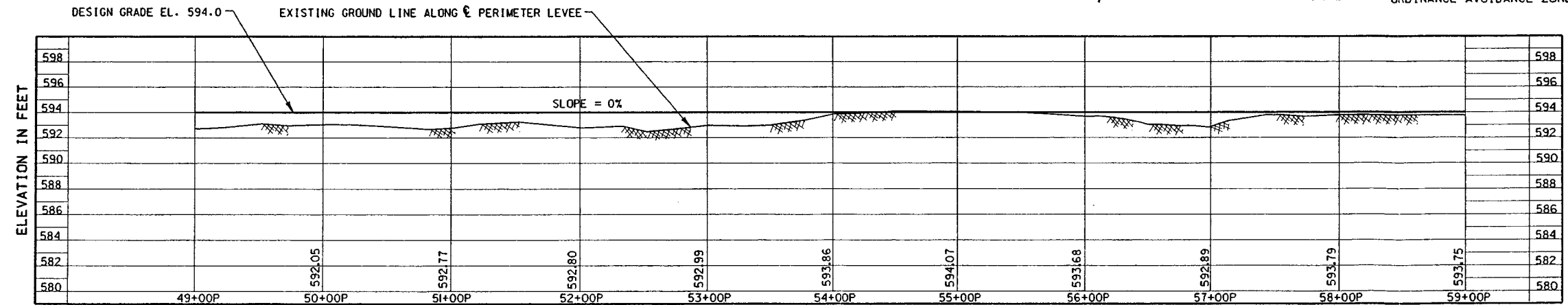
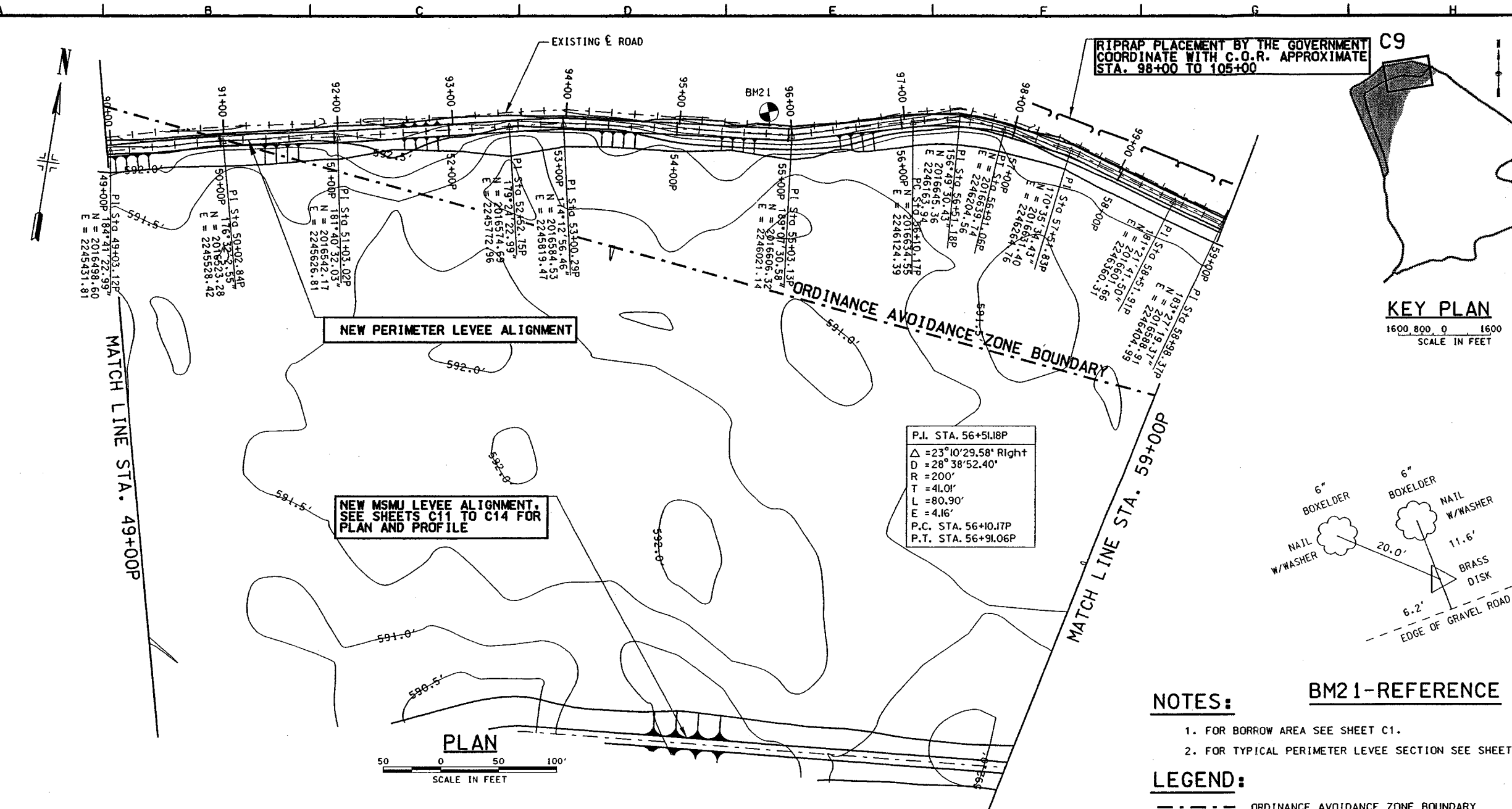


Symbol	Description	Revisions
AS CONSTRUCTED		
AND. # 2 - SHEET NO. CHANGE ONLY		

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UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**PERIMETER LEVEE STA.  
& PROFILE STA.  
38+00P TO STA. 49+00P**

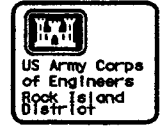
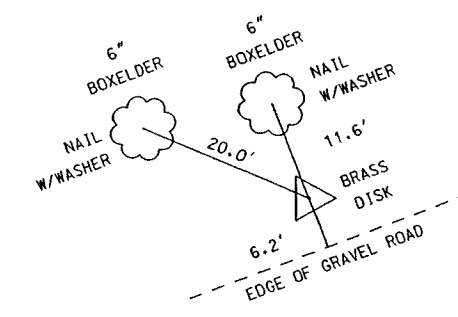
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Reference  
Number:  
**C8**  
Sheet 11 of 30



PROFILE OF PERIMETER LEVEE



- NOTES:**
- 1. FOR BORROW AREA SEE SHEET C1.
  - 2. FOR TYPICAL PERIMETER LEVEE SECTION SEE SHEET C15.
- LEGEND:**
- ORDINANCE AVOIDANCE ZONE BOUNDARY



Symbol	Description	Revisions
AS CONSTRUCTED	AS SHOWN	
AMOUNT # 2 - SHEET NO. CHANGE ONLY	AS SHOWN	
DATE	DATE	
1/03/03	1/03/03	
6/22/01	6/22/01	

U.S. ARMY ENGINEER DISTRICT	DESIGNED BY: LEU	CHECKED BY: TPD/SDB	DATE: 22 MARCH 2001
CORPS OF ENGINEERS	DRAWN BY: TPD/SDB	PROJECT CODE: RTN	SCALE: AS SHOWN
ROCK ISLAND, ILLINOIS	REVIEWED BY: DUH	PROJECT NUMBER: 062	SHEET NUMBER: 1
		DATE: 01-9-00	

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**PERIMETER LEVEE PLAN  
& PROFILE STA. 49+00P TO STA. 59+00P**

Sheet  
Reference  
Number  
**C9**  
Sheet 12 of 30

RIPRAP PLACEMENT BY THE GOVERNMENT  
COORDINATE WITH C.O.R. APPROX.  
STA. 98+00 TO 105+00

PI Sta 63+69.69P  
170°35'40.64"  
N = 2016464.29  
E = 2246858.44

PI Sta 63+97.14P  
N = 2016457.46  
E = 2246885.03  
POE Sta 64+37.41P  
N = 2016434.81  
E = 2246918.53

TIE INTO EXISTING GROUND  
@ STA. 105+40

NEW PERIMETER  
LEVEE ALIGNMENT

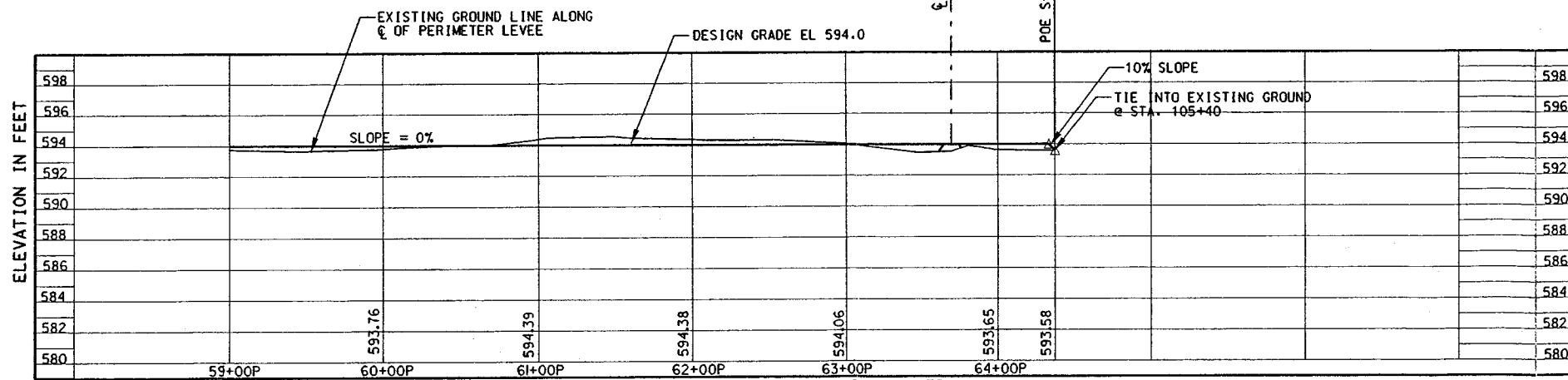
NEW MSMJ LEVEE ALIGNMENT  
SEE SHEETS C11 TO C14 FOR  
PLAN AND PROFILE

ORDINANCE AVOIDANCE ZONE BOUNDARY

MATCH LINE STA. 59+00P

PLAN

SCALE IN FEET  
50 0 50 100'



PROFILE C PERIMETER LEVEE

C10

KEY PLAN

SCALE IN FEET  
1600 800 0 1600

### NOTES:

1. FOR BORROW AREA SEE SHEET C1.
2. FOR TYPICAL PERIMETER LEVEE SECTION SEE SHEET C15.

### LEGEND:

ORDINANCE AVOIDANCE ZONE BOUNDARY



Symbol	Description	Date	Revisions
AS CONSTRUCTED	AS CONSTRUCTED	4/03/03	LEU/DJL
AMEND. # 2 - SHEET NO. CHANGE ONLY	AMEND. # 2 - SHEET NO. CHANGE ONLY	6/22/01	LEU/DJL

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	DESIGNED BY: LEU DRAWN BY: TPD/SDB CHECKED BY: RTN REVIEWED BY: DJL	DATE: 22 MARCH 2001 SCALE: AS SHOWN PROJECT CODE: ep62 SOLICITATION NUMBER: DACR25-01-B-0007
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UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POLYMER BRIDGE AND EMBANKMENT  
REHABILITATION AND ENHANCEMENT  
PERIMETER LEVEE PLAN  
& PROFILE STA. 59+00P TO STA. 64+37P

Sheet  
Reference  
Number:  
**C10**  
Sheet 13 of 30

PLATE 12

BEGIN MSMU LEVEE  
CONSTRUCTION  
STA. 0+00U

NEW PERIMETER LEVEE ALIGNMENT. SEE  
SHEETS C5 TO C10 FOR PLAN AND PROFILE



Revised	By	Date	Description
1	LEU/00U	7/07/00	MSMU ALIGNMENT CHANGE
2	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
3	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
4	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
5	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
6	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
7	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
8	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
9	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE
10	LEU/00U	8/22/01	MSMU ALIGNMENT CHANGE

Designed By	Drawn By	Checked By	Reviewed By	Date	Project Code	Sheet Code	Revision
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U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS				SHEET NO. 1 OF 1			

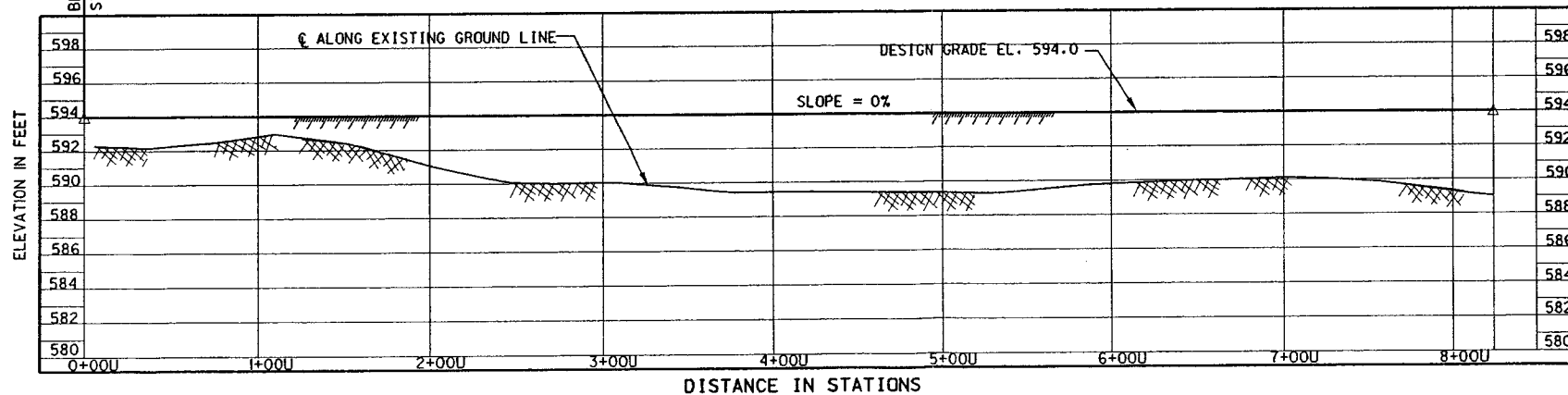
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PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
MSMU PLAN & PROFILE  
STA. 0+00U TO 8+23U

Sheet  
Reference  
Number:  
C11  
Sheet 14 of 30

## NOTES:

1. FOR TYPICAL MSMU LEVEE SECTION SEE C15.

PLATE 13



PROFILE  $\text{C}$  MSMU LEVEE

## PLAN

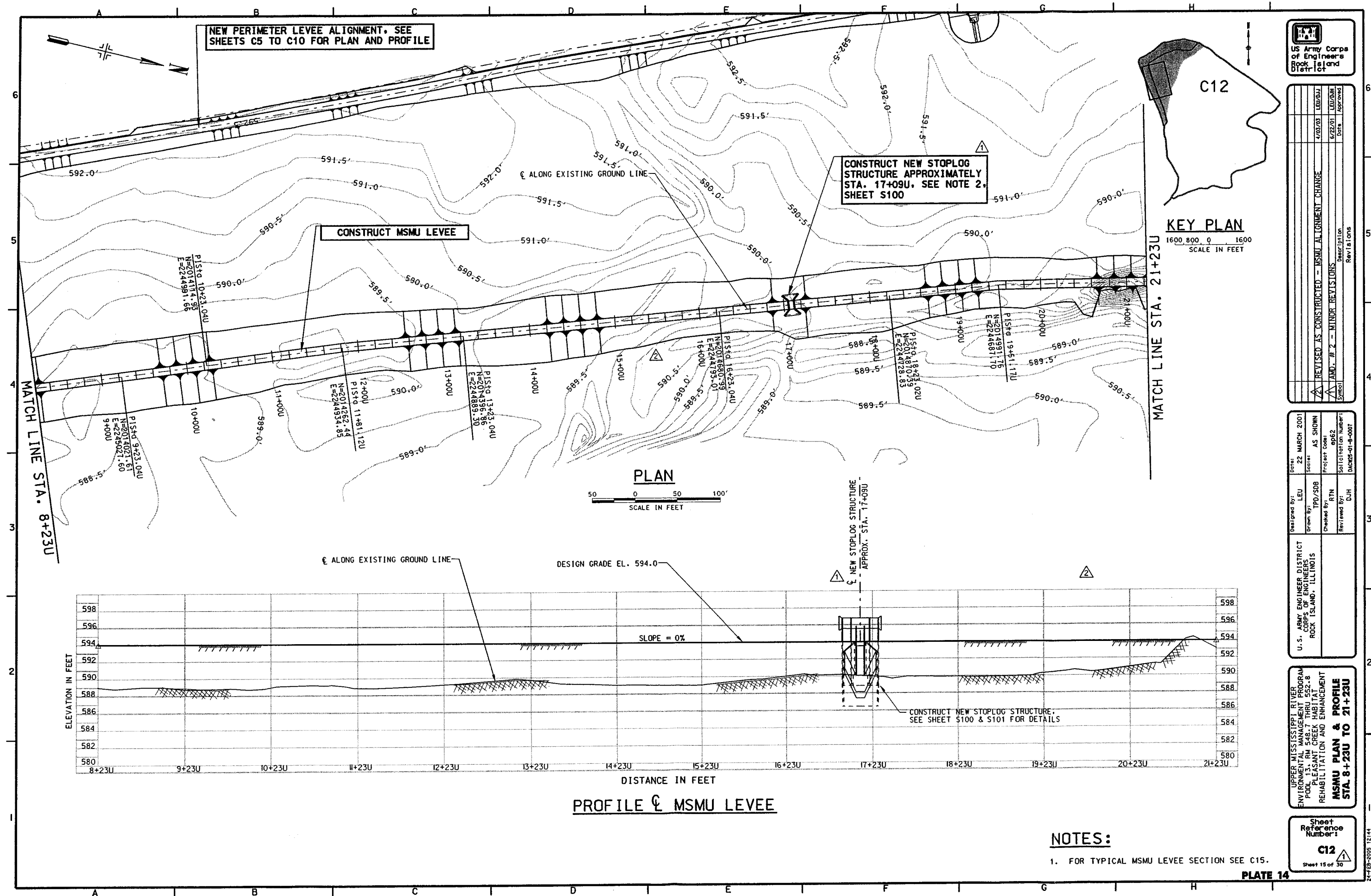
50 0 50 100  
SCALE IN FEET

C11

## KEY PLAN

1600 800 0 1600  
SCALE IN FEET

MATCH LINE STA. 8+23U





REVISIONS	DATE	DESCRIPTION
1	7/20/03	LEU/AMU
2	6/22/03	LEU/AMU
3	6/22/03	LEU/AMU
4	6/22/03	LEU/AMU
5	6/22/03	LEU/AMU
6	6/22/03	LEU/AMU
7	6/22/03	LEU/AMU
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50	6/22/03	LEU/AMU

DESIGNED BY	LEU	DATE	22 MARCH 2001
DRAWN BY	TPD/SDB	SCALE	AS SHOWN
CHECKED BY	RTN	PROJECT CODE	0962
REVIEWED BY	DJH	SOLICITATION NUMBER	DAK02-01-B-0007
U.S. ARMY ENGINEER DISTRICT	ROCK ISLAND, ILLINOIS		

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT  
PROGRAM  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
MSMU PLAN & PROFILE  
STA. 21+23U TO 35+58U

Sheet  
Reference  
Number  
C13  
Sheet 16 of 30

KEY PLAN  
1600 800 0 1600  
SCALE IN FEET

MATCH LINE STA. 35+58U

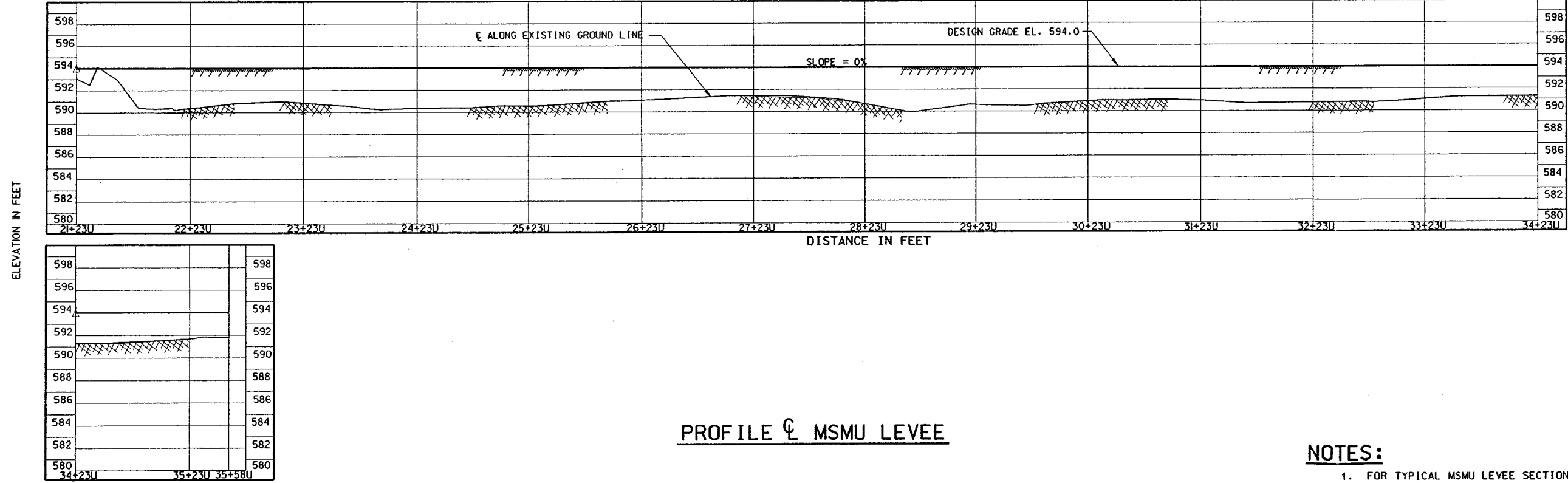
PLAN  
50 0 50 100  
SCALE IN FEET

PROFILE & MSMU LEVEE

NOTES:  
1. FOR TYPICAL MSMU LEVEE SECTION SEE C15.

PLATE 15

MATCH LINE STA. 21+23U

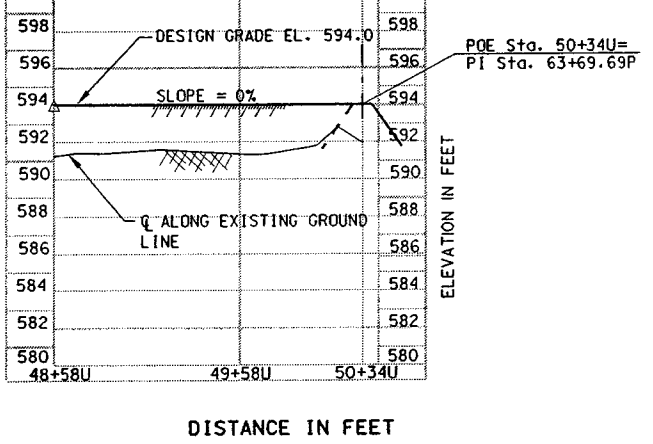
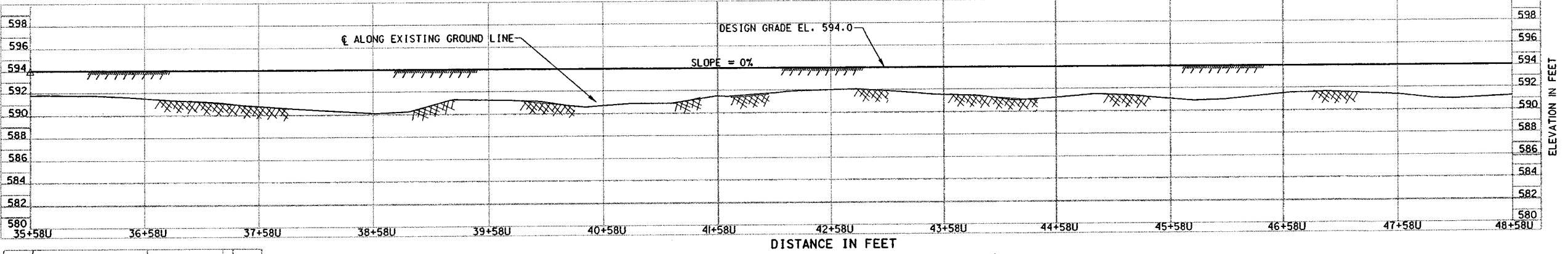
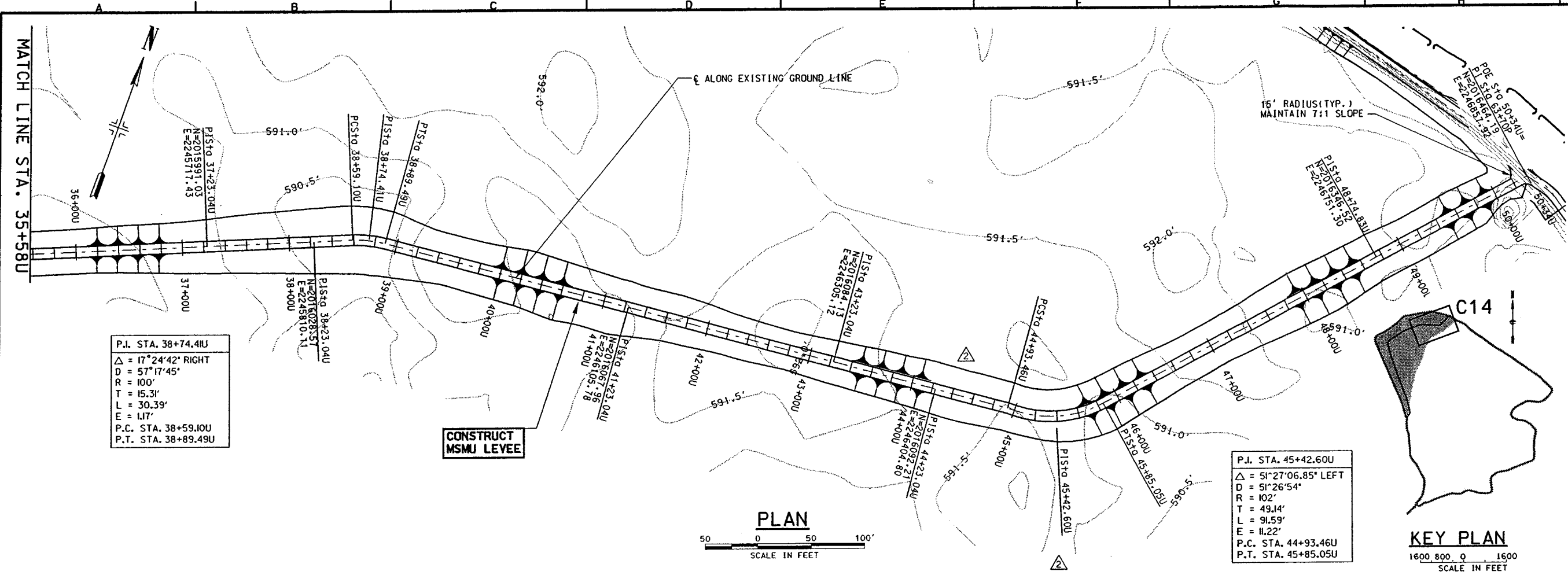


Symbol	Description	Date	Revisions
△	REVISED AS CONSTRUCTED - MSMU ALIGNMENT CHANGE	4/03/03	LEU/DJB
△	AMU # 2 - SHEET NO. CHANGE ONLY	6/22/01	LEU/DJB

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	Designed By: LEU Drawn By: TPD/SDB Checked By: RTN Reviewed By: DJH	Date: 22 MARCH 2001 Scale: AS SHOWN Project Code: 0062 Solicitation Number: DACW25-01-4-0007
----------------------------------------------------------------------------	------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**MSMU PLAN & PROFILE  
STA. 35+58U TO 50+34U**

Sheet  
Reference  
Number:  
**C14**  
Sheet 17 of 30



**NOTES:**  
1. FOR TYPICAL MSMU LEVEE SECTION SEE C15.

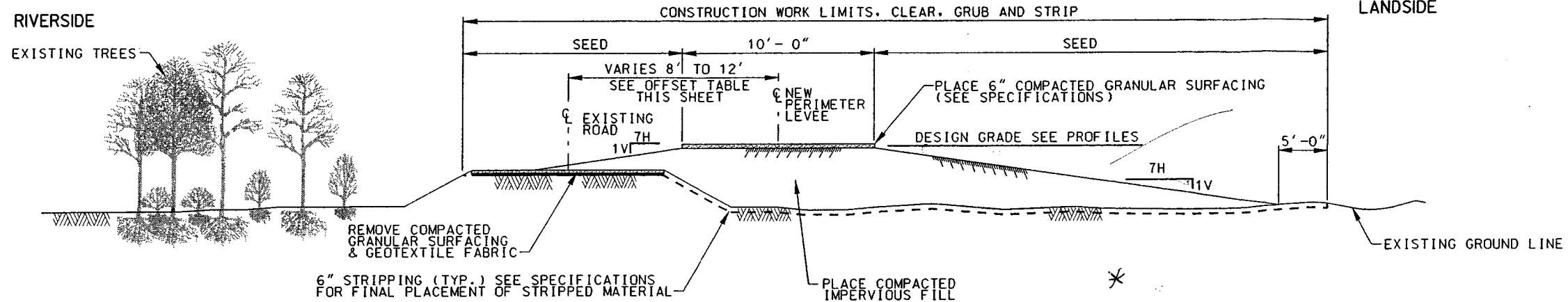


DESIGNED BY	LEU	DATE	4/03/03
DRAWN BY	TPD/SDB	DATE	6/22/01
CHECKED BY	RTN	DATE	
REVIEWED BY	DJH	DATE	
PROJECT CODE	dp62	DESCRIPTION	AMC # 2 - SHEET NO. CHANGE ONLY
SOLICITATION NUMBER	04M25-01-B-007	REVISIONS	

DESIGNED BY	LEU	DATE	22 MARCH 2001
DRAWN BY	TPD/SDB	DATE	AS SHOWN
CHECKED BY	RTN	DATE	dp62
REVIEWED BY	DJH	DATE	
PROJECT CODE	dp62	DESCRIPTION	AMC # 2 - SHEET NO. CHANGE ONLY
SOLICITATION NUMBER	04M25-01-B-007	REVISIONS	

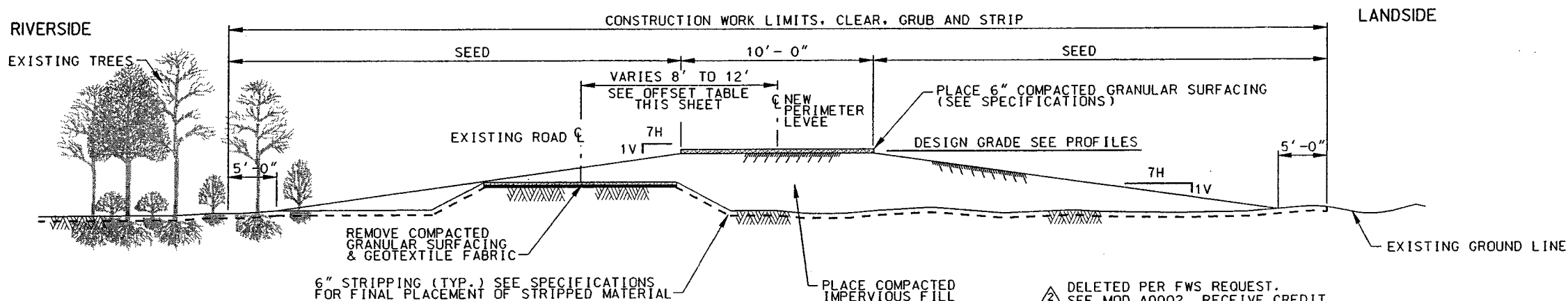
UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL PROGRAM  
FOURTH RIVER BASIN  
PLEASANT CREEK HABI TAT  
REHABILITATION AND ENHANCEMENT  
TYPICAL NEW PERIMETER  
& MSMU SECTIONS

Sheet  
Reference  
Number  
**C15**  
Sheet 15 of 30



TYPICAL PERIMETER LEVEE SECTION

STA. 3+00P TO STA. 11+00P  
STA. 14+00P TO STA. 18+00P  
STA. 23+00P TO STA. 36+00P  
STA. 43+00P TO STA. 64+37P  
NO SCALE



TYPICAL PERIMETER LEVEE SECTION

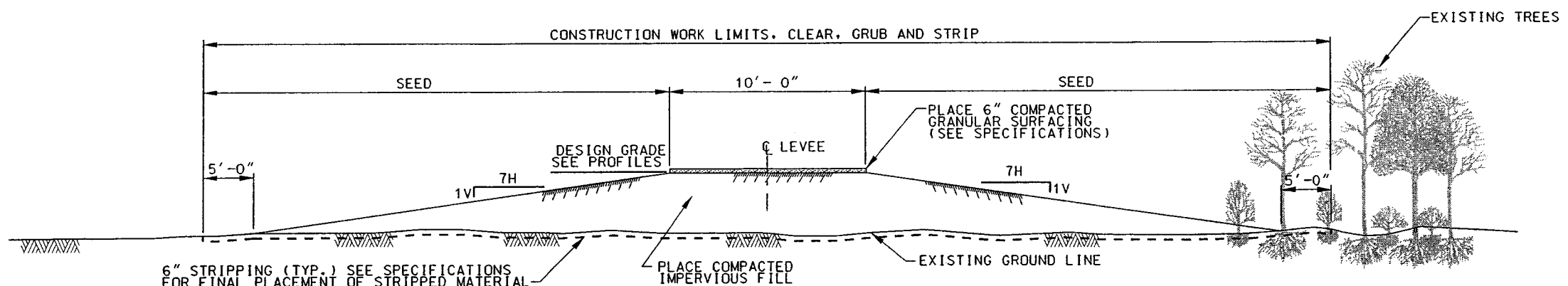
STA. 0+00P TO STA. 3+00P  
STA. 11+00P TO STA. 14+00P  
STA. 18+00P TO STA. 23+00P  
STA. 36+00P TO STA. 43+00P  
NO SCALE

DELETED PER FWS REQUEST.  
SEE MOD A0002. RECEIVE CREDIT.

OFFSET TABLE	
STATION	EXISTING ROAD TO NEW PERIMETER LEVEE
STA. 0+33P TO STA. 53+00P	12'
STA. 53+00P TO STA. 55+00P	TRANSITION
STA. 55+00P TO STA. 63+69P	8'

NOTES:

1. CONSTRUCT NEW 7H:1V PERIMETER LEVEE AT ELEVATION 594.0, AND PLACE 6" GRANULAR SURFACING ON TOP.
2. CONSTRUCT NEW 7H:1V MSMU LEVEE AT ELEVATION 594.0, AND PLACE 6" GRANULAR SURFACING ON TOP.



TYPICAL MOIST SOIL MANAGEMENT UNIT (MSMU) SECTION

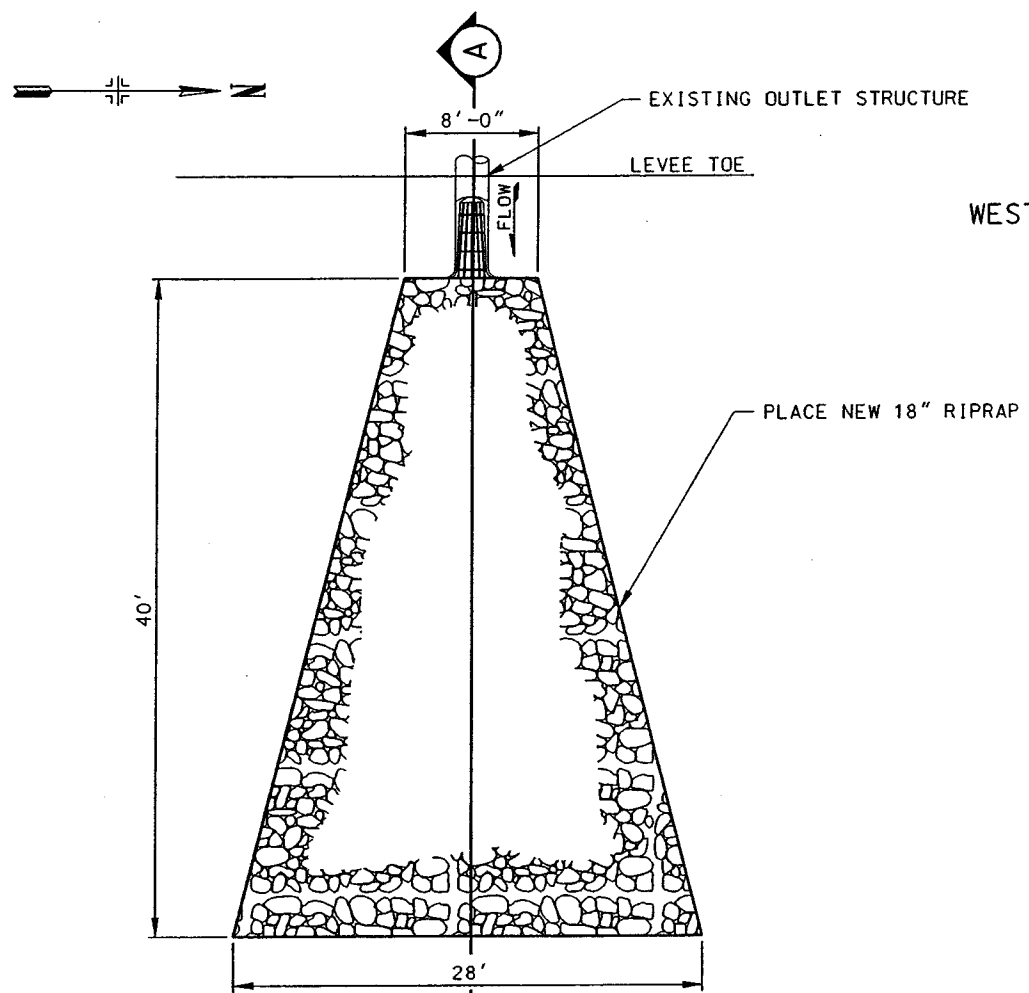
STA. 0+00U TO 50+34U  
NO SCALE

Symbol	Description	Date	Revisions
AS	AS CONSTRUCTED	4/23/03	LEU/DJH
AM	AMEND. # 2 - SHEET NO. CHANGE ONLY	8/22/01	LEU/DJH

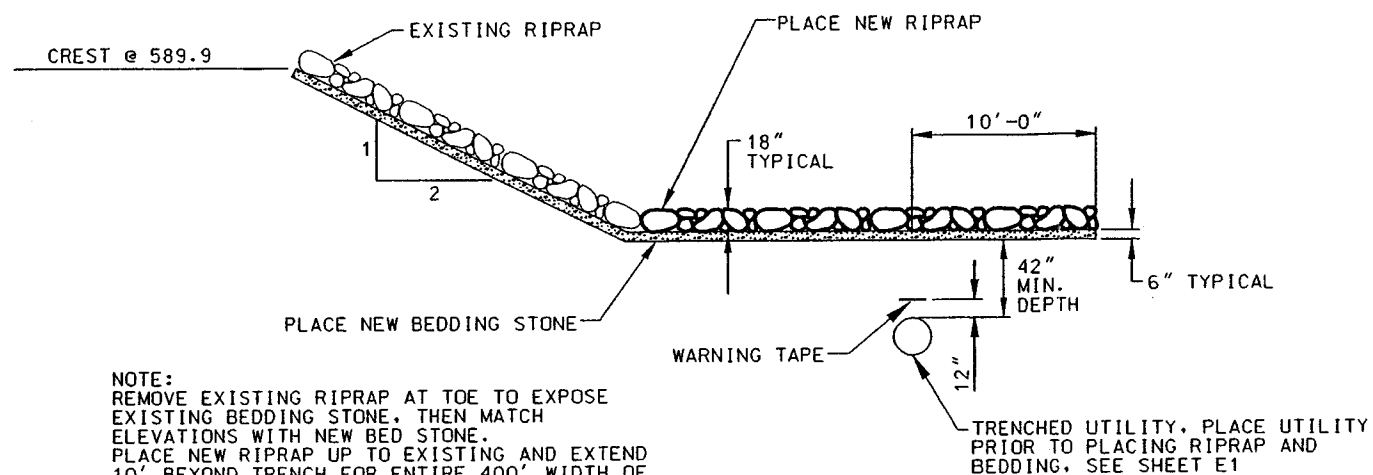
Designed By:	LEU	Date:	22 MARCH 2001
Drawn By:	TPD/SDB	Scale:	AS SHOWN
Checked By:	RTN	Project Code:	0062
Reviewed By:	DJH	Specification Number:	DACR25-01-8-007

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**NEW STOPLOG &  
SPILLWAY DETAILS**

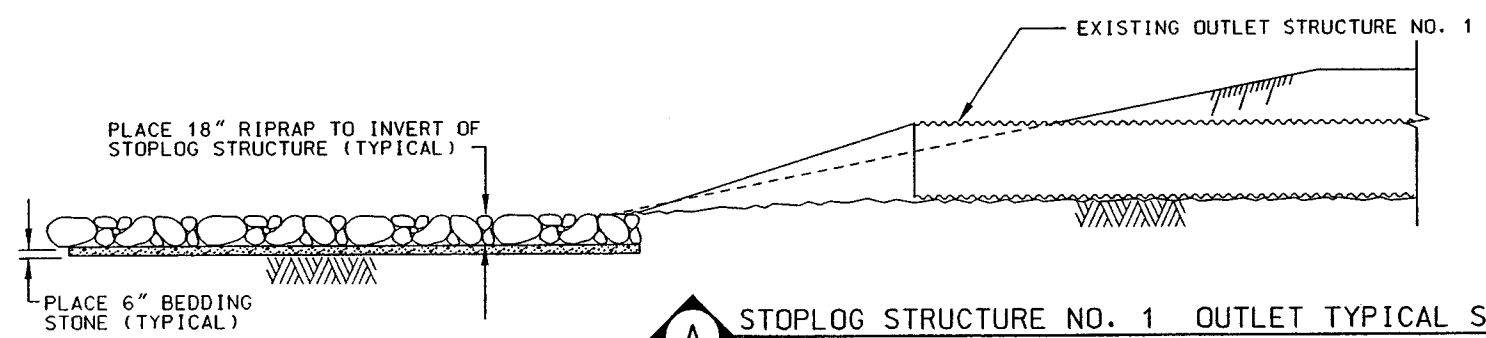
Sheet  
Reference  
Number:  
**C16**  
Sheet 19 of 30



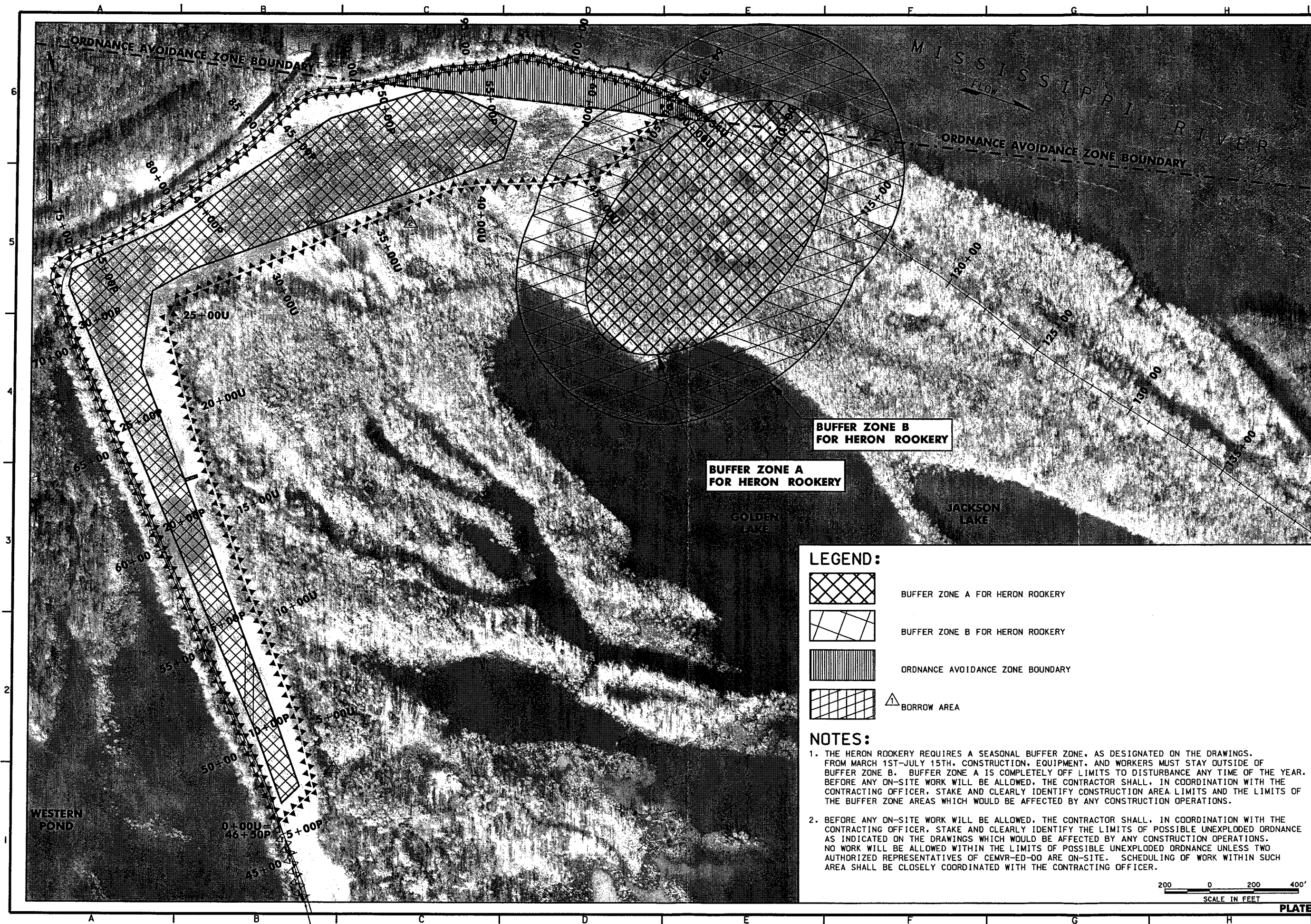
**STOPLOG STRUCTURE NO. 1 OUTLET DETAIL**  
C16  
NO SCALE



**UPPER SPILLWAY SECTION**  
C16 E1 C16  
NO SCALE



**STOPLOG STRUCTURE NO. 1 OUTLET TYPICAL SECTION**  
A  
NO SCALE



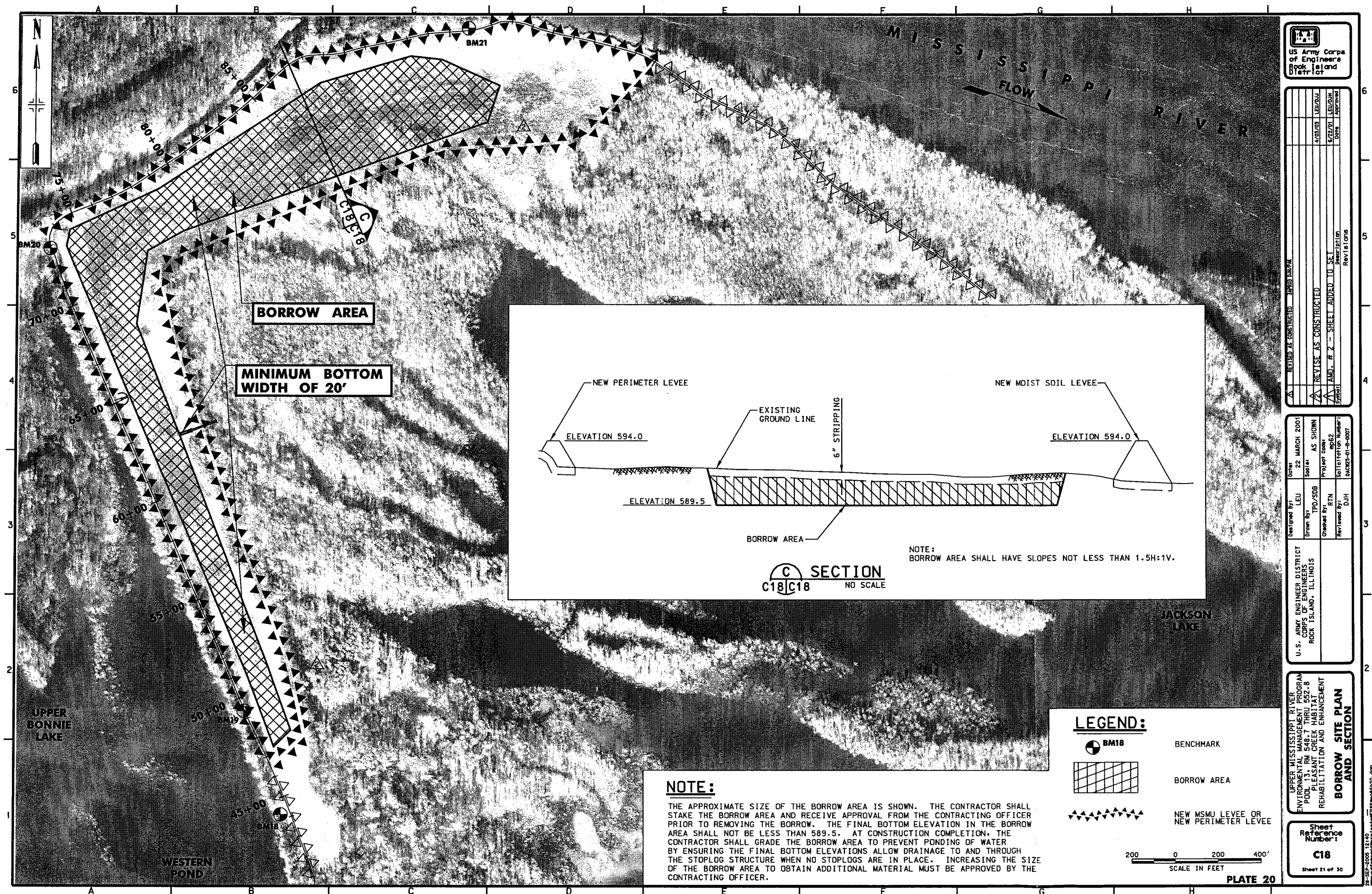
US Army Corps  
of Engineers  
Rock Island  
District

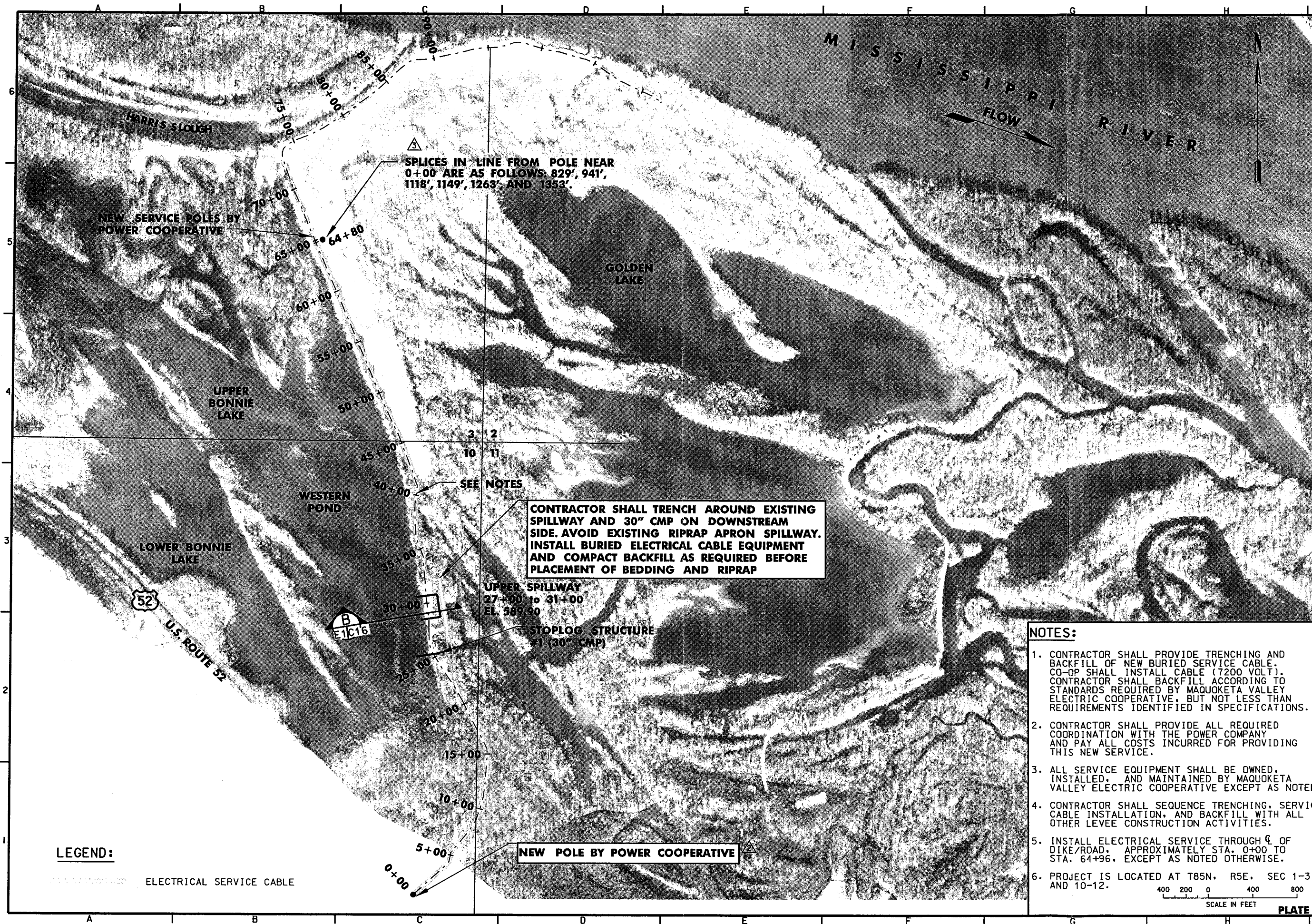
REVISED AS CONSTRUCTED	DATE	APPROVED
72	4/03/03	LEU/DJH
71	6/22/01	LEU/DJH
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DESIGNED BY	LEU	DATE	22 MARCH 2001
DRAWN BY	TPD/SDB	SHEET	AS SHOWN
CHECKED BY	RTN	PROJECT CODE	ep62
REVIEWED BY	DJH	SATURATION NUMBER	DACR25-01-B-0007
U.S. ARMY ENGINEER DISTRICT			
CORPS OF ENGINEERS			
ROCK ISLAND, ILLINOIS			

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND MANAGEMENT  
EXISTING HERON ROOKERY & UNEXPLODED  
ORDNANCE SITE PLAN

Sheet  
Reference  
Number  
**C17**  
Sheet 20 of 30





US Army Corps  
of Engineers  
Rock Island  
District

Symbol	Revision	Date
1	REVISION AS CONSTRUCTED	4/23/93
2	CHANGE	8/8/93
3	CHANGE	1/17/01
4	CHANGE	6/22/01
5	CHANGE	6/22/01
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Designed By	Drawn By	Checked By	Reviewed By	Scale	Date
BOB	TPD/SDB	KRR	MCH	AS SHOWN	22 MARCH 2001
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS					

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
FLOOD 13' IN 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT

**ELECTRICAL SERVICE  
PLACEMENT**

Sheet  
Reference  
Number:  
**E1**  
Sheet 23 of 30

- NOTES:**
1. CONTRACTOR SHALL PROVIDE TRENCHING AND BACKFILL OF NEW BURIED SERVICE CABLE. CO-OP SHALL INSTALL CABLE (7200 VOLT). CONTRACTOR SHALL BACKFILL ACCORDING TO STANDARDS REQUIRED BY MAQUOKETA VALLEY ELECTRIC COOPERATIVE, BUT NOT LESS THAN REQUIREMENTS IDENTIFIED IN SPECIFICATIONS.
  2. CONTRACTOR SHALL PROVIDE ALL REQUIRED COORDINATION WITH THE POWER COMPANY AND PAY ALL COSTS INCURRED FOR PROVIDING THIS NEW SERVICE.
  3. ALL SERVICE EQUIPMENT SHALL BE OWNED, INSTALLED, AND MAINTAINED BY MAQUOKETA VALLEY ELECTRIC COOPERATIVE EXCEPT AS NOTED.
  4. CONTRACTOR SHALL SEQUENCE TRENCHING, SERVICE CABLE INSTALLATION, AND BACKFILL WITH ALL OTHER LEVEE CONSTRUCTION ACTIVITIES.
  5. INSTALL ELECTRICAL SERVICE THROUGH C OF DIKE/ROAD, APPROXIMATELY STA. 0+00 TO STA. 64+96, EXCEPT AS NOTED OTHERWISE.
  6. PROJECT IS LOCATED AT T85N, R5E, SEC 1-3 AND 10-12.



U.S. GOVERNMENT  
PROPERTY LINE

MAQUOKETA VALLEY  
ELECTRIC COOPERATIVE

RISER, POLE, AND TRANSFORMER PROVIDED,  
INSTALLED, OWNED, AND MAINTAINED BY  
MAQUOKETA VALLEY ELECTRIC COOPERATIVE

CONTRACTOR SHALL PROVIDE AND INSTALL  
SERVICE ENTRANCE CAP, RISER CONDUIT,  
AND SECONDARY WIRING PER CO-OP  
REQUIREMENTS AND NFPA 70

7200 VOLT LINE  
OWNED AND  
MAINTAINED BY  
ELECTRIC CO-OP

POLE (LOCATE ON GOVERNMENT  
PROPERTY NEAR US HWY 52)

UNDERGROUND SERVICE  
WIRE BY ELECTRIC CO-OP.  
TRENCHING & BACKFILLING BY  
CONTRACTOR, SEE SHEET E1

SERVICE TRANSFORMER  
POLE AT/NEAR WELL HEAD  
& ELECTRICAL PANELS

PRIMARY FUSE CUTOFF

POLE MOUNTED TRANSFORMER  
1 $\phi$ , 7200V-240/120V BY CO-OP

EQUIPMENT OWNED AND  
MAINTAINED BY CO-OP

EQUIPMENT OWNED AND  
MAINTAINED BY  
GOVERNMENT

ELECTRIC EQUIPMENT OWNERSHIP LINE

PEDESTAL (LOCATE ON TRANSFORMER POLE)  
CONTRACTOR SHALL PROVIDE PEDESTAL  
AND RISER AS REQUIRED BY THE  
COOPERATIVE

LIGHTNING ARRESTER

GROUNDING ROD

120 VOLT, 20A GFI  
RECEPTACLE LOCATED  
INSIDE CONTROLLER  
ENCLOSURE

3-3/0 AWG, 1-6 AWG GROUND IN 2" RIGID GALVANIZED  
STEEL CONDUIT

240V, 200 AMP, 2P, 1 $\phi$ , SOLID  
NEUTRAL FUSED DISCONNECT  
SWITCH IN NEMA 3R ENCLOSURE

3-3/0 AWG, 1-6 AWG GROUND  
IN 2" RIGID GALVANIZED STEEL  
CONDUIT

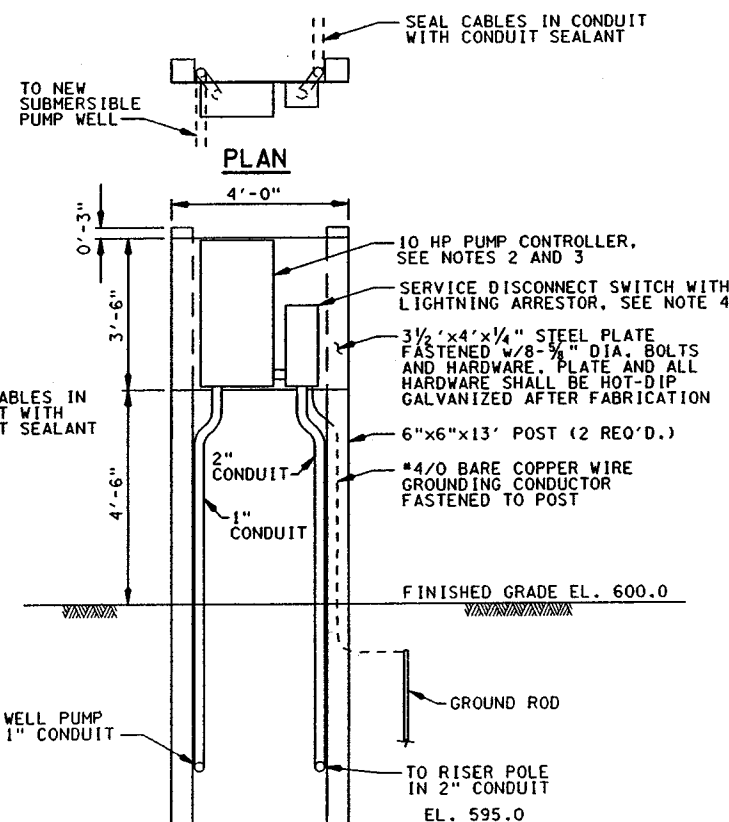
PUMP CONTROLLER, 240V, 1 $\phi$ , NEMA  
SIZE 1, NEMA 3R ENCLOSURE. (PUMP  
CONTROLLER AND ELECTRICAL CABLE TO BE  
FURNISHED BY PUMP MOTOR MANUFACTURER)

SUBMERSIBLE WELL PUMP  
10 HP, 240V, 1 $\phi$

NOTE:  
ALL EQUIPMENT SHALL BE  
PROVIDED AND INSTALLED BY  
CONTRACTOR EXCEPT AS NOTED

ONE-LINE DIAGRAM OF PUMP STATION POWER SERVICE

NO SCALE



FRONT ELEVATION

A SERVICE DISCONNECT & SIMPLEX PUMP CONTROLLER

NO SCALE

7200V PRIMARY SERVICE  
CABLE DIRECT BURIED  
ALONG LEVEE TO  
UTILITY ENTRANCE AT  
PROPERTY BOUNDARY

PRIMARY CONDUIT RISER

UTILITY TRANSFORMER  
7200V/120/240V

SECONDARY CLEVIS

DRIP LOOP

WEATHERHEAD

METER PEDESTAL  
NOT SHOWN

SERVICE  
GROUNDING  
CONDUCTOR

SEE MOD A00006 FOR  
INSTALLATION OF  
ELECTRICAL ENCLOSURE.

BOTTOM OF ELECTRICAL PANEL ELEV. 604.5

FINISHED GRADE ELEVATION 600.0

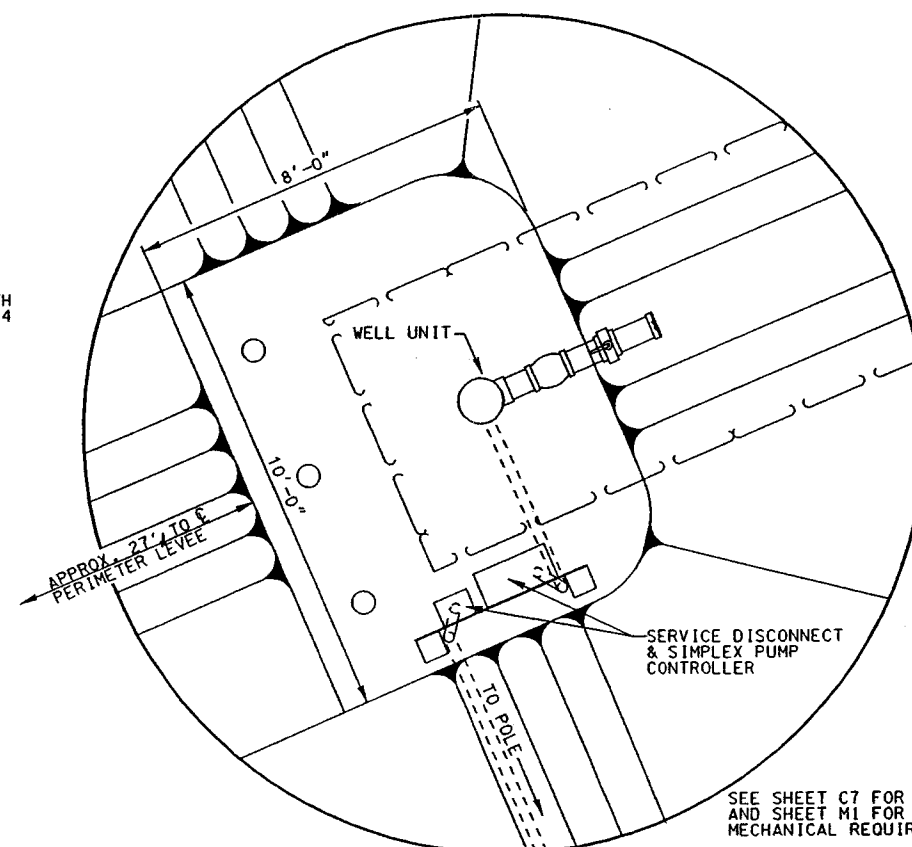
GROUND ROD

2/C - #6 AWG & 1-#8 AWG GROUND PUMP  
CABLE IN 1" RIGID GALVANIZED STEEL

10'-0" (MIN.) COORDINATE FINAL DISTANCES

UTILITY TRANSFORMER POLE ASSEMBLY

NO SCALE



PLAN - WELL AND CONTROLLER BERM

NO SCALE

#### ELECTRICAL DESIGN CRITERIA

1. PLEASANT CREEK EMP - PUMP (SPECIFIED UNDER MECHANICAL DIVISION 15)  
PUMP MOTOR SIZE: 10 HP  
MOTOR VOLTS: 230 VAC (240 VAC OPERATION), SINGLE PHASE  
MOTOR FLA: 50 AMPERES
2. MOTOR CIRCUIT PROTECTION: BY MANUFACTURER.  
MOTOR STARTER SECONDARY CIRCUIT CU WIRE SIZE: 6 AWG  
CONDUIT SIZE: 1 INCH RIGID GALVANIZED STEEL
3. PUMP CONTROLLER: SIMPLEX, 240 VAC, 2 POLE, FUSED DISCONNECT, FULL VOLTAGE NEMA SIZE 1 MOTOR STARTER WITH THERMAL OVERLOADS, NEMA 3R ENCLOSURE WITH GASKETED DOOR AND WITH INTERNAL DEADFRONT OPERATOR'S PANEL, PADLOCKABLE DOOR & DISCONNECT HANDLE. DEADFRONT TO INCLUDE OPERATOR INTERFACE FOR ON/OFF SELECTOR SWITCH, OVERLOAD RESET PUSHBUTTON, PUMP FAILURE PILOT LIGHT, AND RUNNING TIME METER, ALSO DEADFRONT TO CONTAIN 120 VAC, 20 AMP, GFI RECEPTACLE, INSTANTANEOUS TRIP FUSE OR BREAKER PROTECTED AT 20 AMPERES FOR USE AS CONVENIENT POWER FOR PANEL MAINTENANCE. ALL CONTROL COMPONENTS WILL BE REQUIRED TO BE LABELED WITH BLACK PHENOLIC/WHITE LETTER LABELS. ALL WIRES WILL BE REQUIRED TO BE NUMBERED AND LABELED WITH NYLON CLIP TYPE MARKERS. CONTROLLER SHOULD BE MANUFACTURED ITEMS AS SUPPLIED BY THE PUMP MANUFACTURER AND MUST MEET MINIMUM CRITERIA AS STATED TO MEET THE EXTREME ENVIRONMENT AND REMOTE LOCATION CONDITIONS THAT EXIST. CONTRACTOR WILL BE REQUIRED TO PROVIDE NOT LESS THAN 4 SPARE FUSES OF EACH TYPE & SIZE USED IN THIS INSTALLATION.
4. SERVICE DISCONNECT: RATED FOR SERVICE ENTRANCE USE, 240VAC, 2 POLE, SOLID NEUTRAL, GROUNDING BAR/POST, 200 AMP FUSED, NEMA 3R ENCLOSURE WITH DRAIN/BREATHER, PADLOCKABLE DOOR AND SWITCH HANDLE, MINIMUM SERVICE WIRE SIZE: 3/0 AWG CU, CONDUIT SIZE: 2 INCH RIGID GALVANIZED STEEL. INSTALL LIGHTNING ARRESTOR.
5. CONTRACTOR SHALL TRENCH AND BACKFILL TO STANDARDS AS REQUIRED BY MAQUOKETA VALLEY ELECTRIC COOPERATIVE, BUT NOT LESS THAN REQUIREMENTS IDENTIFIED IN SPECIFICATIONS.



Revisions	Date	Description
1	3/23/01	REVISED AS CONSTRUCTED TO UTILITY REQUIREMENTS
2	7/12/01	AND #4 - MINOR CHANGES TO UTILITY REQUIREMENTS
3	6/22/01	AND #2 - SHEET NO. CHANGE ONLY
4	6/22/01	AND #2 - SHEET NO. CHANGE ONLY

Designed By	22 MARCH 2001
Drawn By	Scale
Checked By	AS SHOWN
Reviewed By	Project Code
U.S. ARMY ENGINEER DISTRICT	0662
CORPS OF ENGINEERS	0662
ROCK ISLAND, ILLINOIS	0662

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT

Sheet  
Reference  
Number:  
E2  
Sheet 30 of 30

PLATE 22

PIPE BOLLARD DETAIL  
NO SCALE

PIPE BOLLARD PLAN  
NO SCALE

 **ROCK-LINED DITCH - SECTION**  
NO SCALE

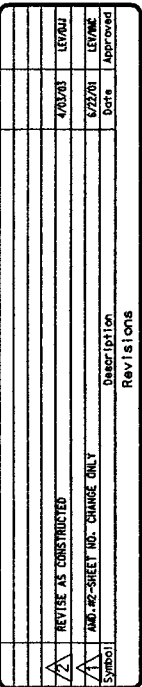
WELL SECTION  
NO SCALE

WELL UNIT ELEVATION  
NO SCALE

SUBMERSIBLE PUMP DATA	
DESIGN CAPACITY (GPM)	550
TOTAL HEAD (FT)	30
MINIMUM EFFICIENCY	70%
DISCHARGE SIZE (IN)	6
ELECTRICAL VOLTAGE	230
ELECTRICAL - PHASE	1

**NOTES:**

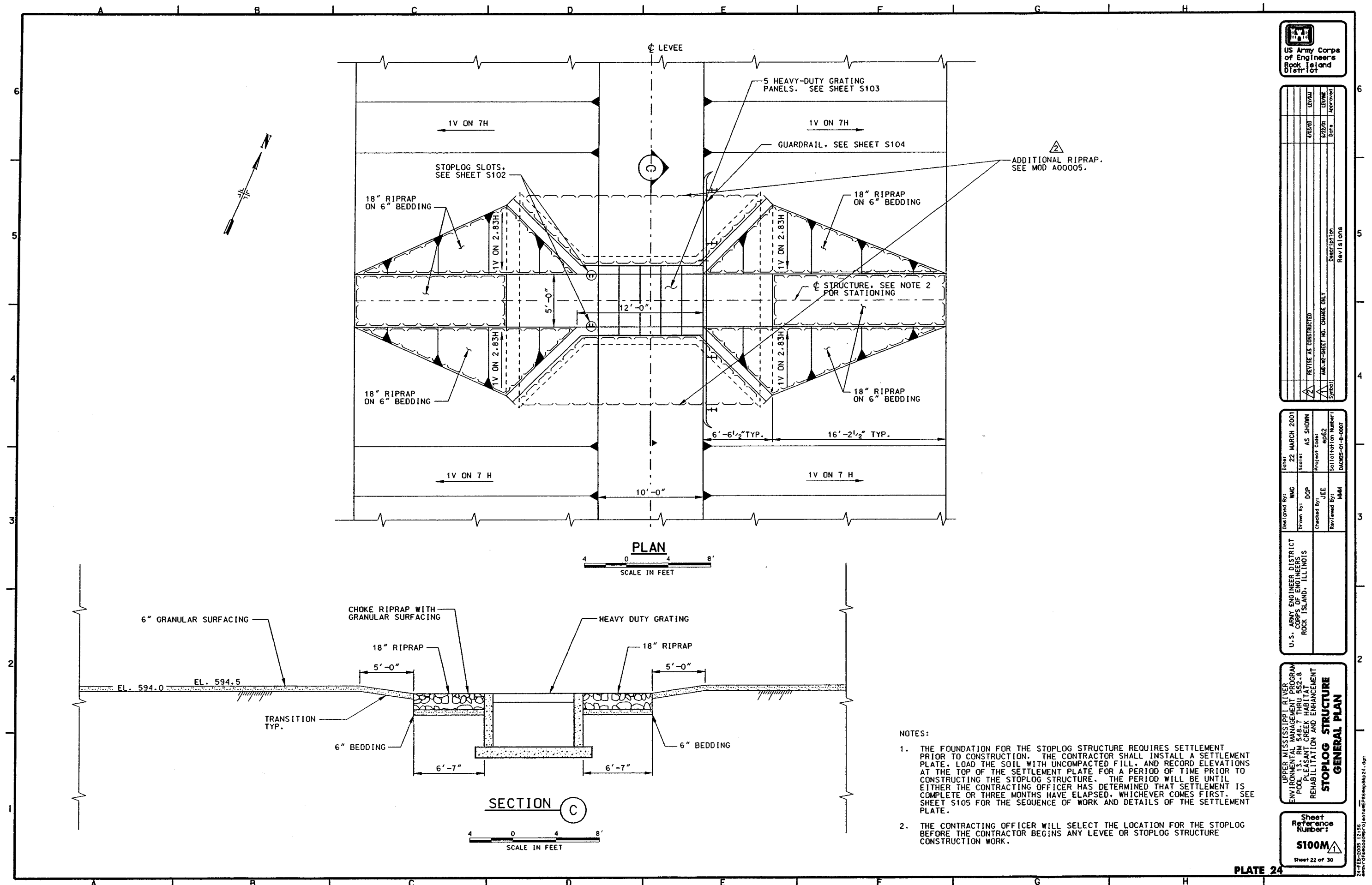
1. SCREEN LENGTH SHALL BE DETERMINED BY CONTRACTOR, SEE SPECS.
2. PROVIDE DRAIN HOLES ON RISER AS NECESSARY TO PREVENT STANDING WATER IN PIPE.
3. SEE SHEET E2 FOR CONTROL PANEL PLACEMENT.
4. PROVIDE METAL TAG ON GATE VALVE TO READ, "DO NOT ADJUST VALVE. PUMP DAMAGE MAY RESULT".



U.S. ARMY ENGINEER DISTRICT ENGINEER CENTER ROCK ISLAND, ILLINOIS	Des (and By): WMG	Date: 22 MARCH 2001
	Drawn By: DGP	Scale: AS SHOWN
	Checked By: JEE	Project Code: ep62
	Reviewed By: MMH	Collaboration Number: DAC02-01-B-0007

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**STOPLOG STRUCTURE  
GENERAL PLAN**

Sheet  
Reference  
Number:  
**S100M**   
Sheet 22 of 30

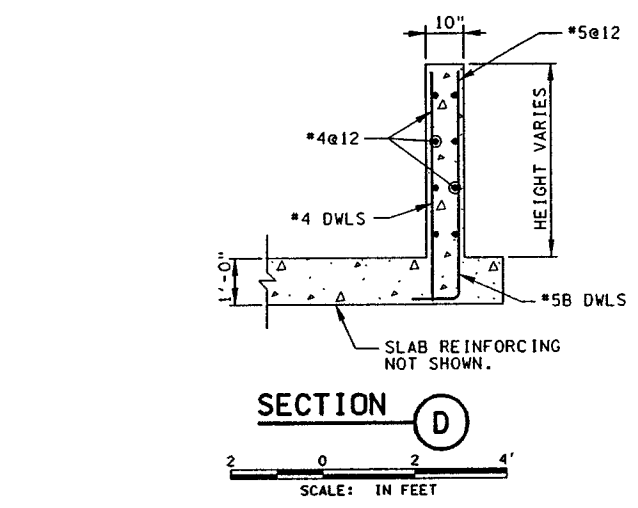
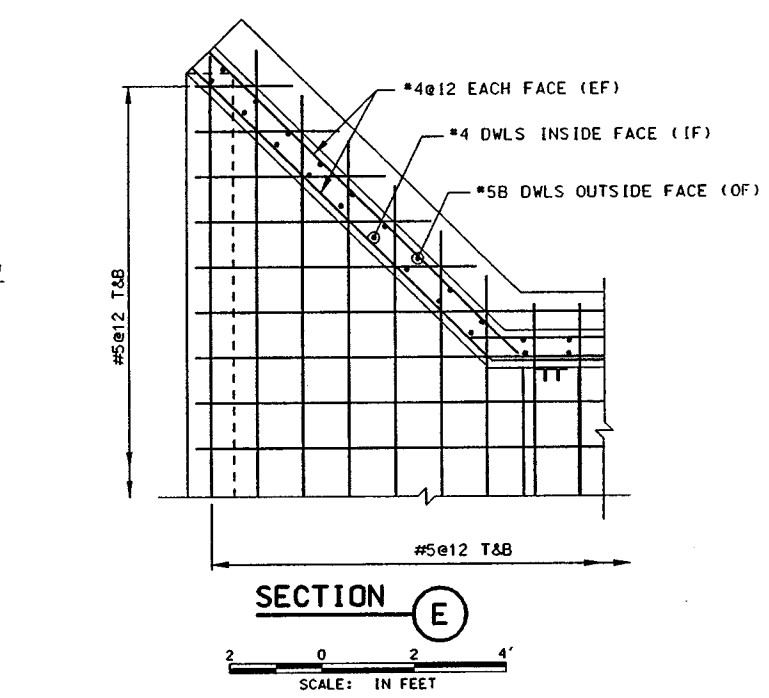
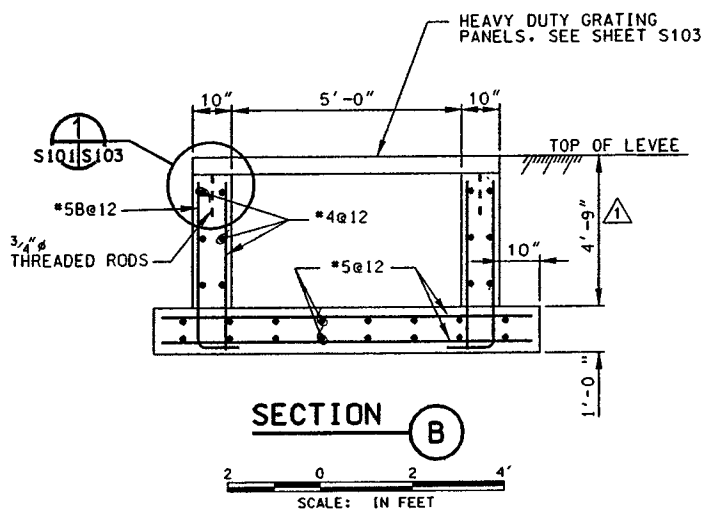
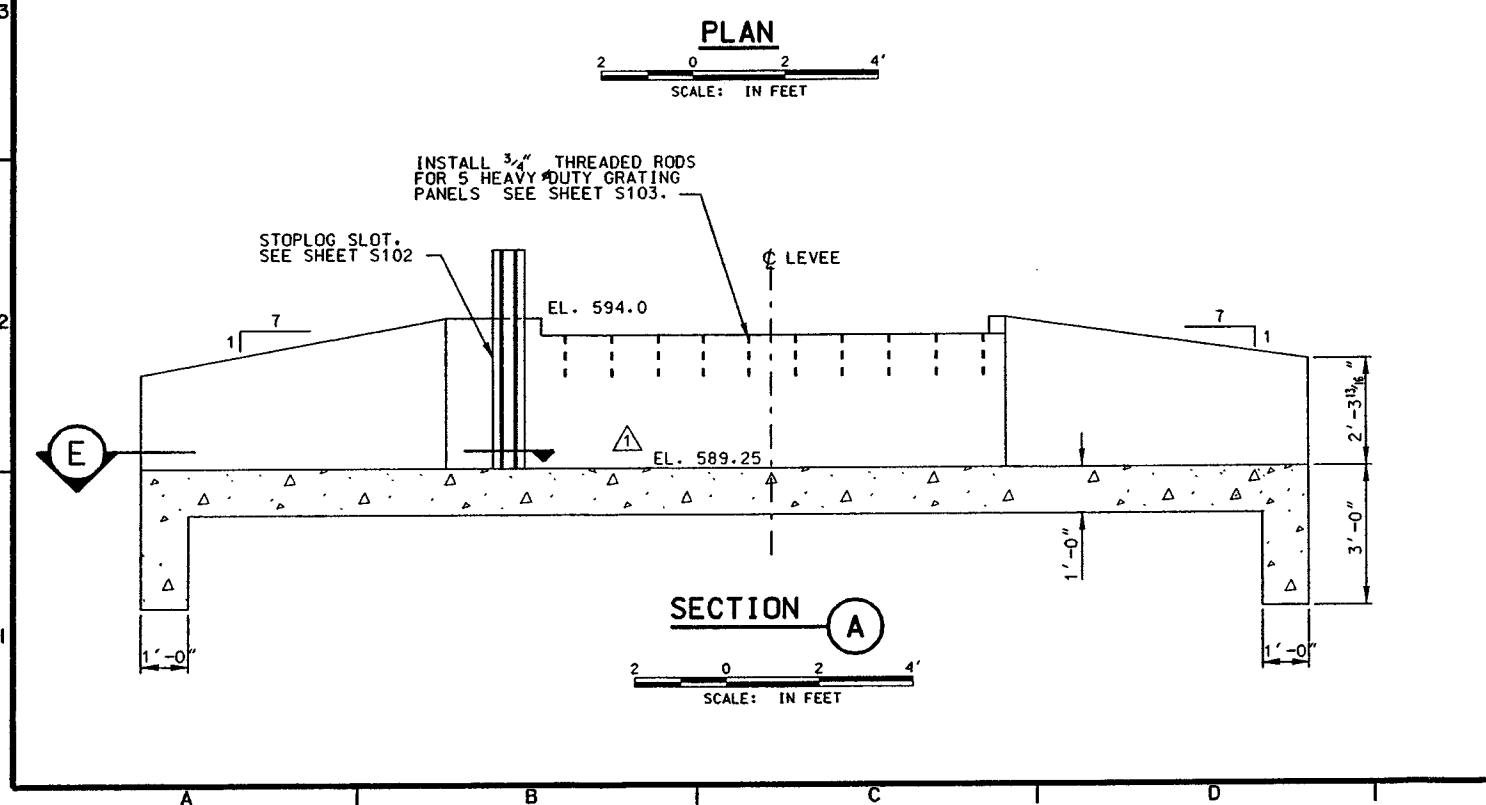
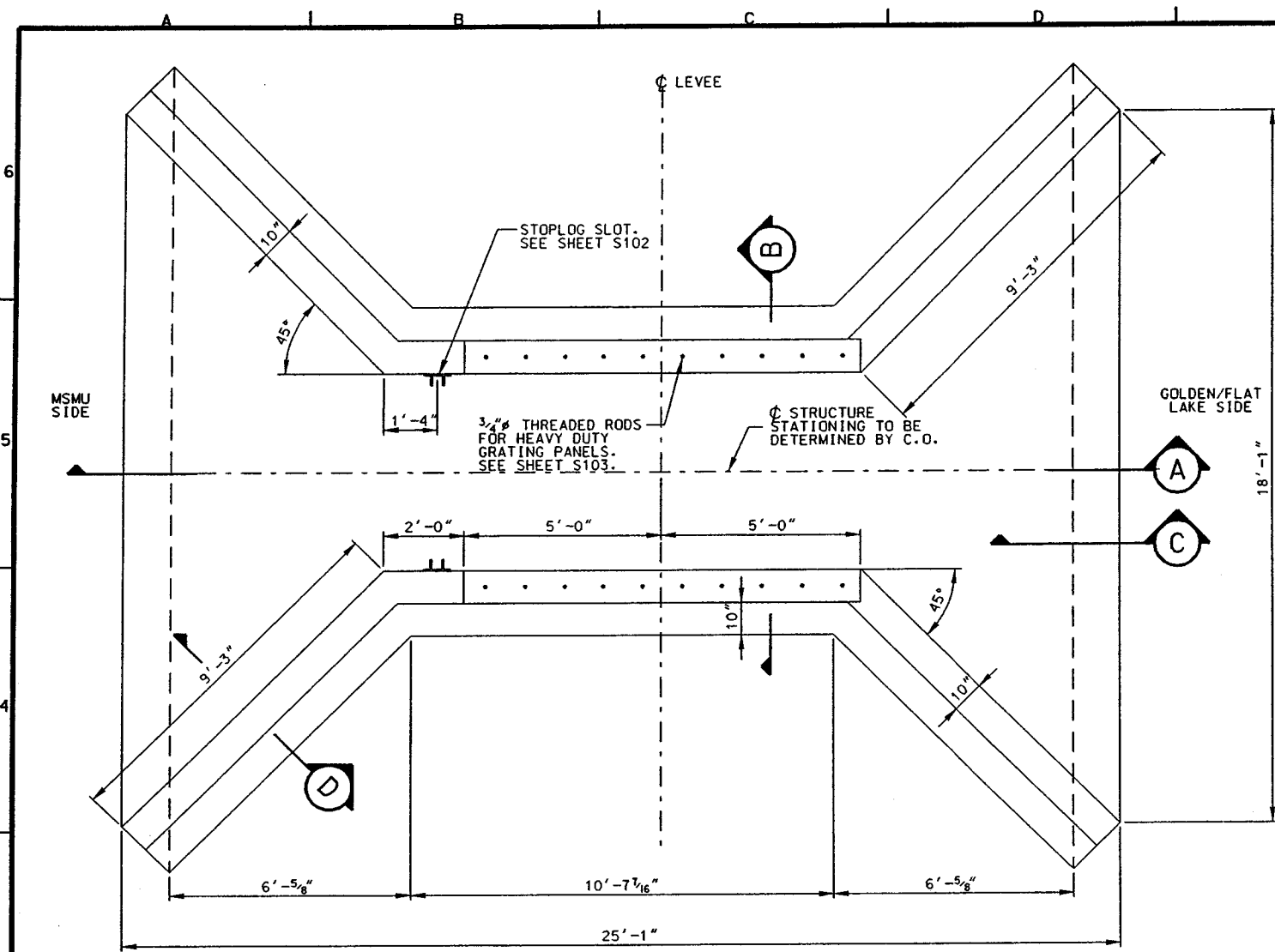


Symbol	Description	Date	Revisions
△	AS CONSTRUCTED	4/03/03	LEV/03
△	AMEND. # 2 - ADJUSTED H.I. OF WALL AND INVERT E.L.	6/22/01	LEV/01

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	Designed By: WMG Drawn By: DGP Checked By: JEE Reviewed By: MAA	Date: 22 MARCH 2001 Scale: AS SHOWN Project Code: ep62 Specification Number: DACKS-01-S-007
----------------------------------------------------------------------------	--------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**STOPLOG STRUCTURE  
MASONRY & REINFORCING**

Sheet  
Reference  
Number:  
**S101**  
Sheet 23 of 30

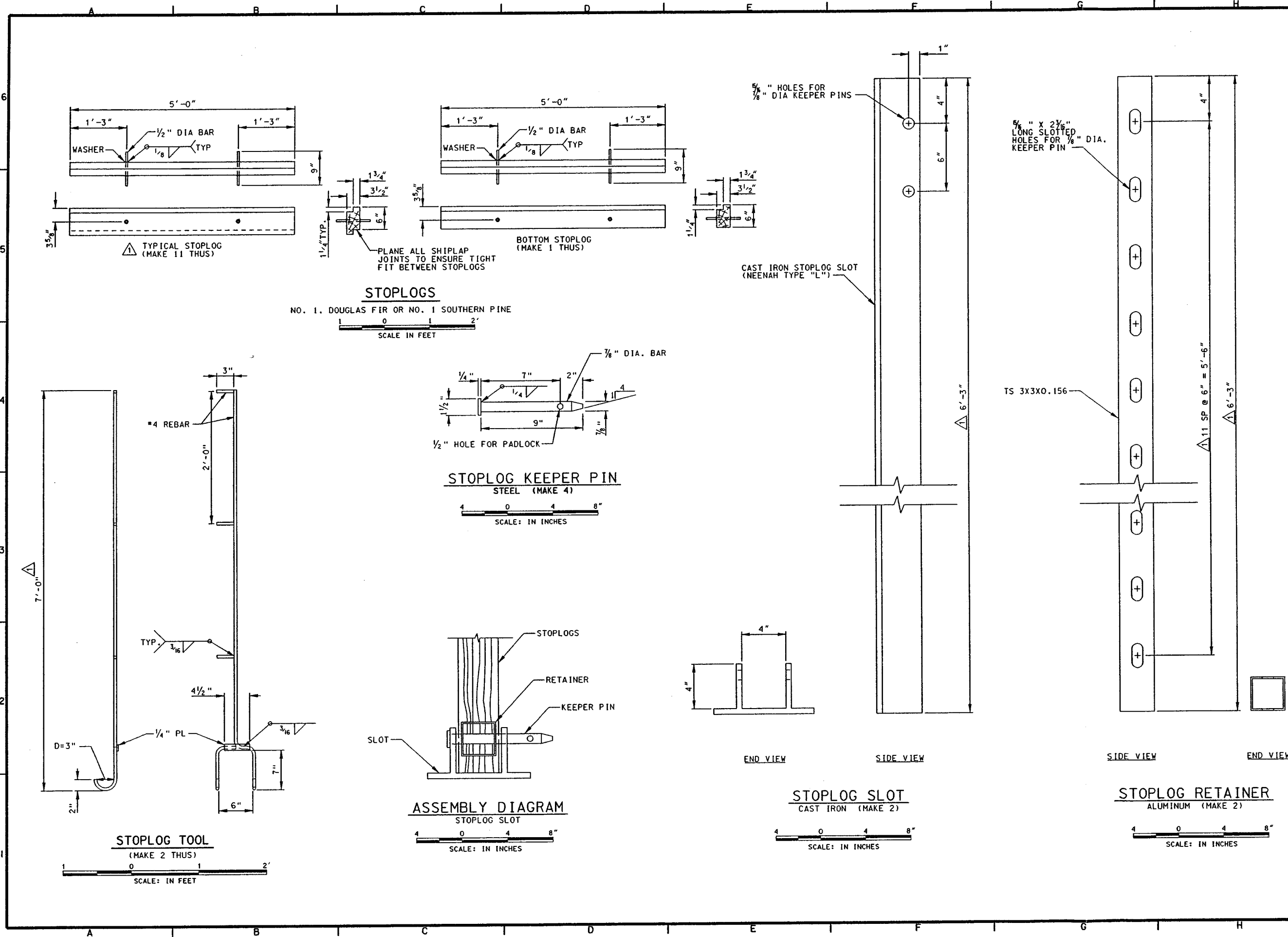


Revisions	Description	Date	By	Appr'd
1	AS CONSTRUCTED	4/03/03	LEV/BJ	
2	AND - REV - CORRECTED NO. OF STOP LOGS	6/22/01	LEV/MG	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	Designed By: WMD Drawn By: DGP Checked By: JEE Reviewed By: MMH	Date: 22 MARCH 2001 Scale: AS SHOWN Project Code: eb62 Specification Number: DACR25-01-8-0007
----------------------------------------------------------------------------	--------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 13, RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT

Sheet  
Reference  
Number:  
**S102**  
Sheet 24 of 30



Symbol	Description	Revisions
AS	AS CONSTRUCTED	
AND #2	SHEET NO. CHANGE ONLY	
DATE	DATE	DATE
1/20/03	1/20/03	1/20/03
1/20/03	1/20/03	1/20/03

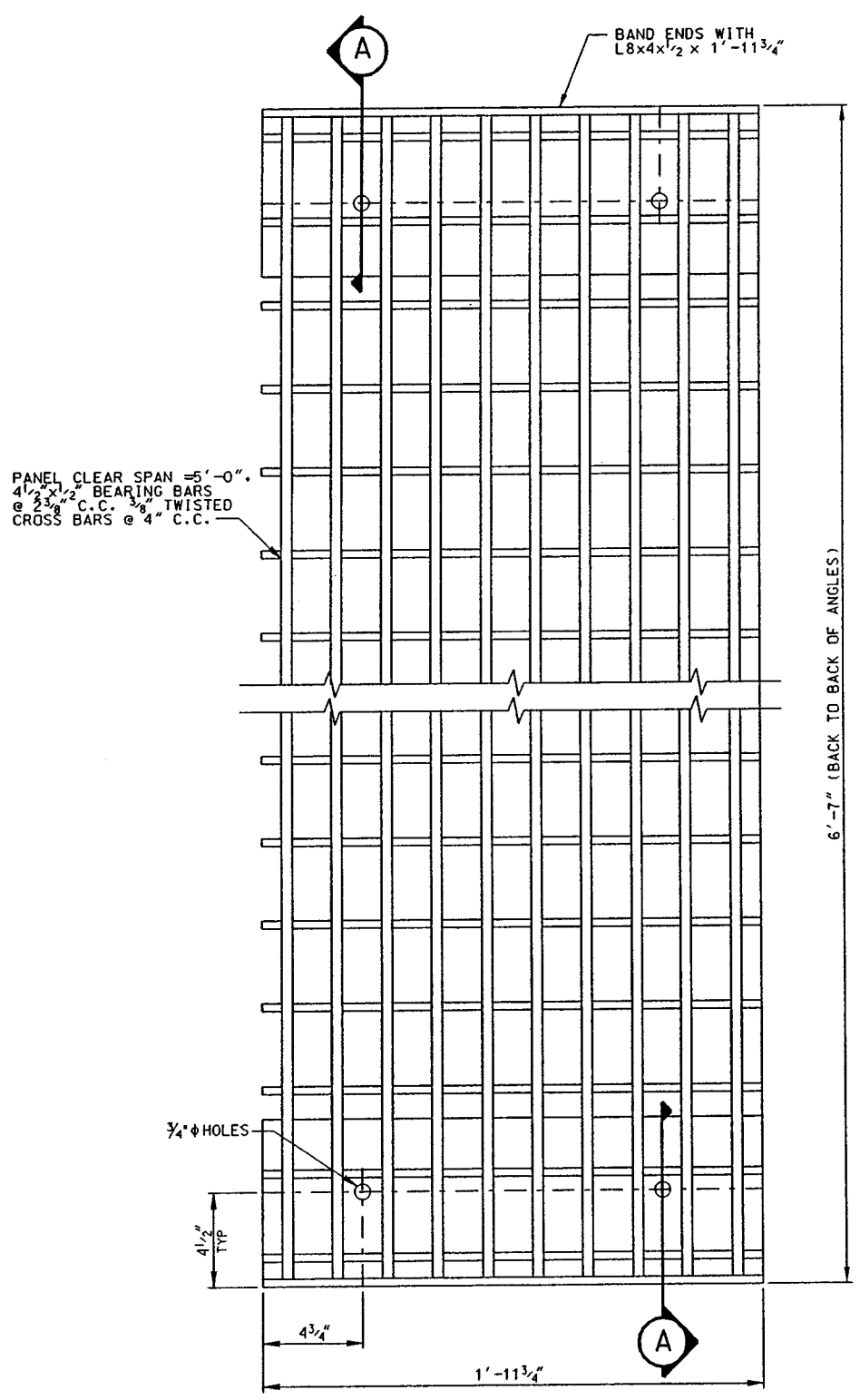
DESIGNED BY	WAG	DATE	22 MARCH 2003
DRAWN BY	DOP	SHEET	AS SHOWN
CHECKED BY	JEE	PROJECT CODE	0902
REVIEWED BY	MAM	SOLICITATION NUMBER	DACR05-01-B-0007
U.S. ARMY ENGINEER DISTRICT ROCK ISLAND, ILLINOIS			

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POULSBOY CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
**STOPILOG STRUCTURE  
MISCELLANEOUS DETAILS**

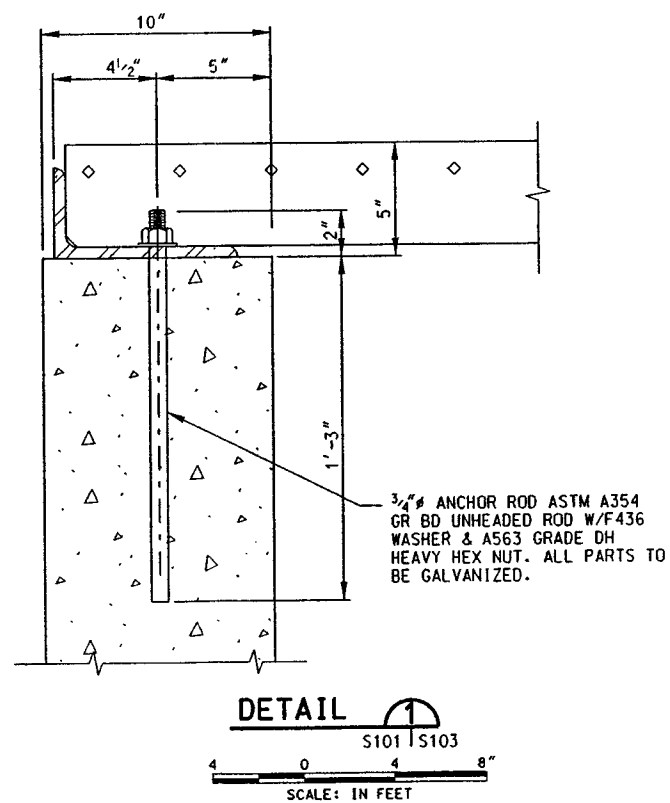
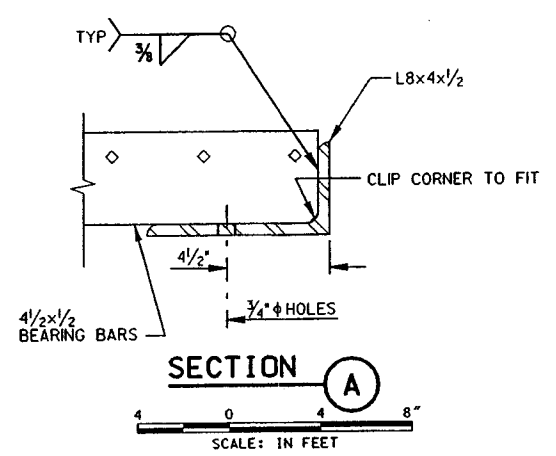
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Reference  
Number:  
**S103**

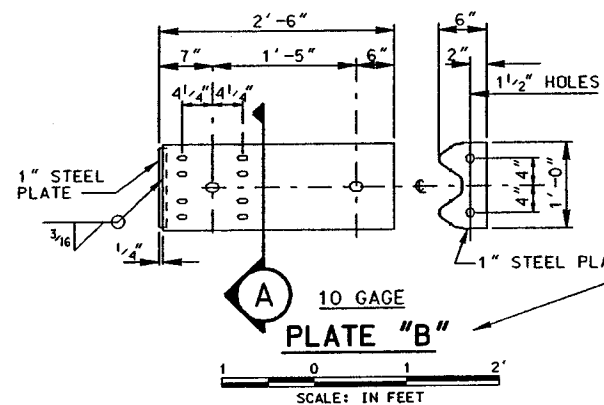
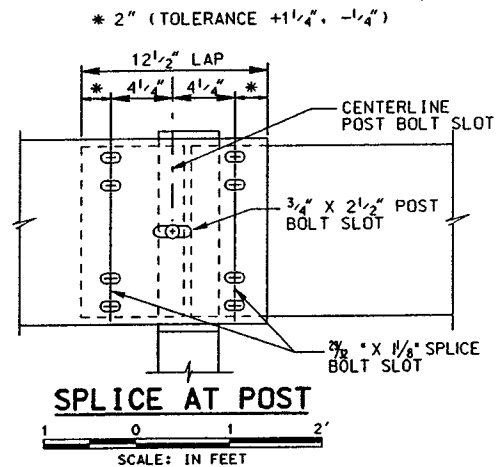
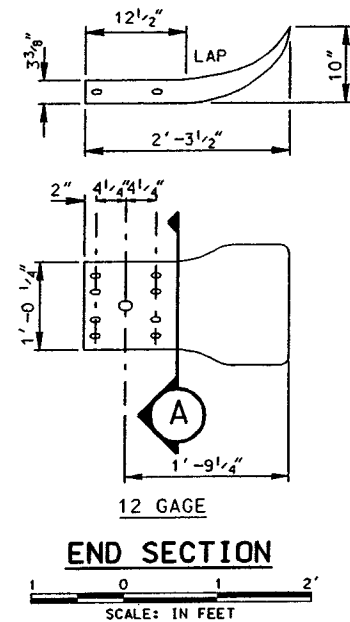
Sheet 25 of 30

PLATE 27

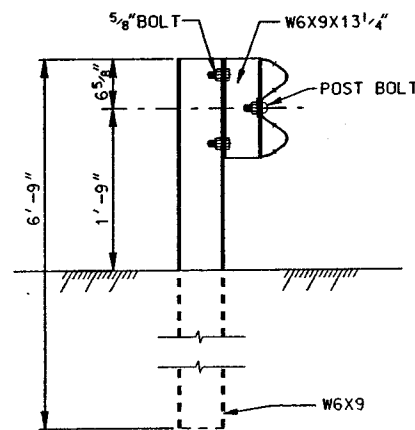


**HEAVY DUTY GRATING PANELS**  
(ASTM A36 STEEL, GALVANIZED - MAKE 5)

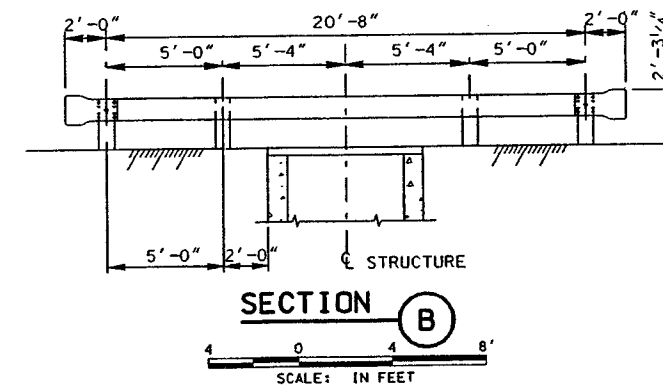
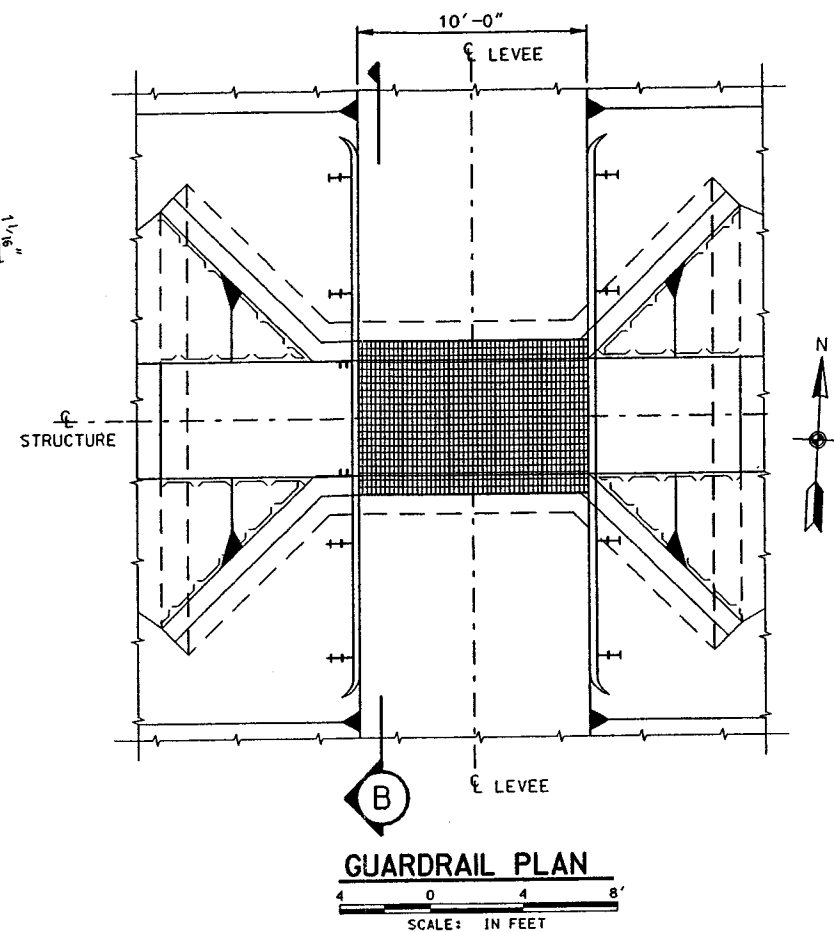
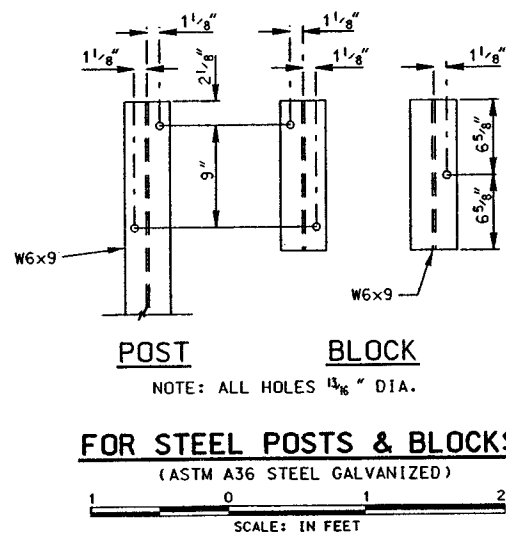
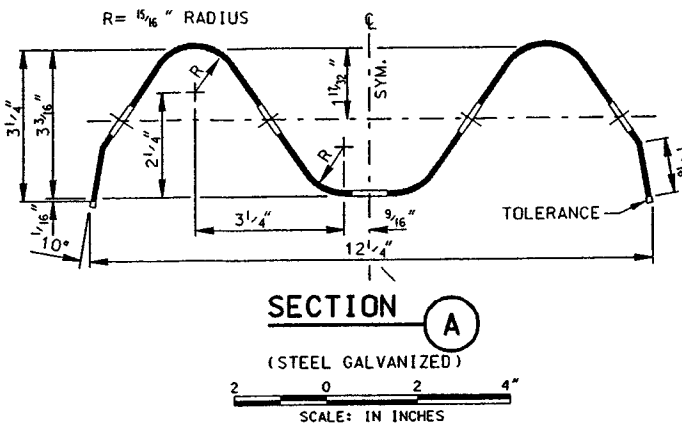




SEE MOD A00006. DELETE FABRICATION AND INSTALLATION OF PLATE B.



**5/8" SPLICE OR POST BOLT**  
(GALVANIZED)  
NO SCALE



#### GUARDRAIL NOTES:

1. STEEL POSTS SHALL BE FABRICATED FROM MATERIAL MEETING THE REQUIREMENTS OF ASTM A36. THE SECTIONS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO M111.
2. WASHERS SHALL BE USED AT ALL POST BOLTS (BETWEEN BOLT HEAD AND BEAM). THEY SHALL BE RECTANGULAR IN SHAPE (3" X 1 3/4" X 3/16") MIN. AND FLAT. OR IF NECESSARY OF SUCH DESIGN TO FIT THE CONTOUR OF THE BEAM. WASHERS SHALL HAVE 1/16" X 1" HOLE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE SHOWN.

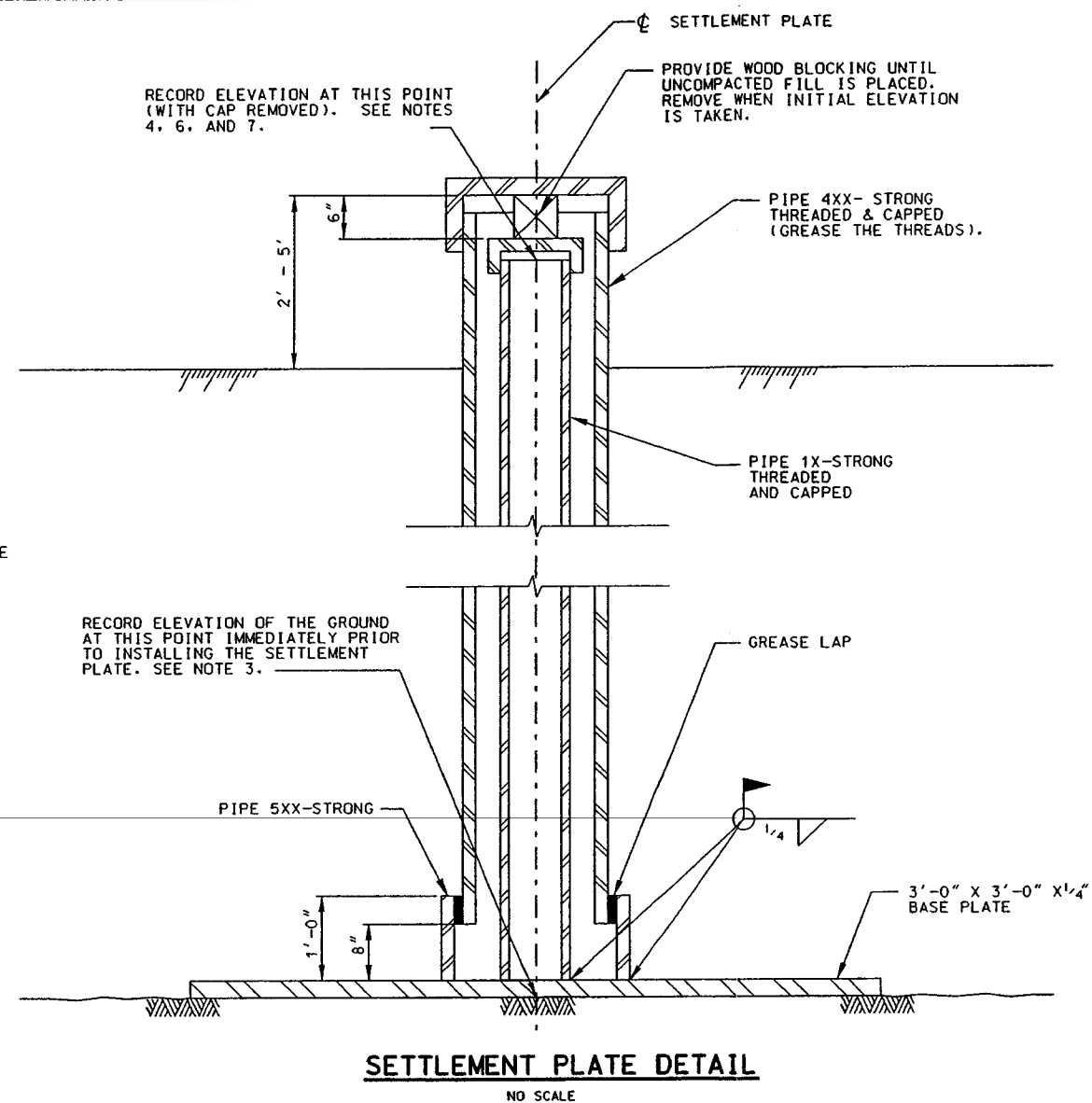
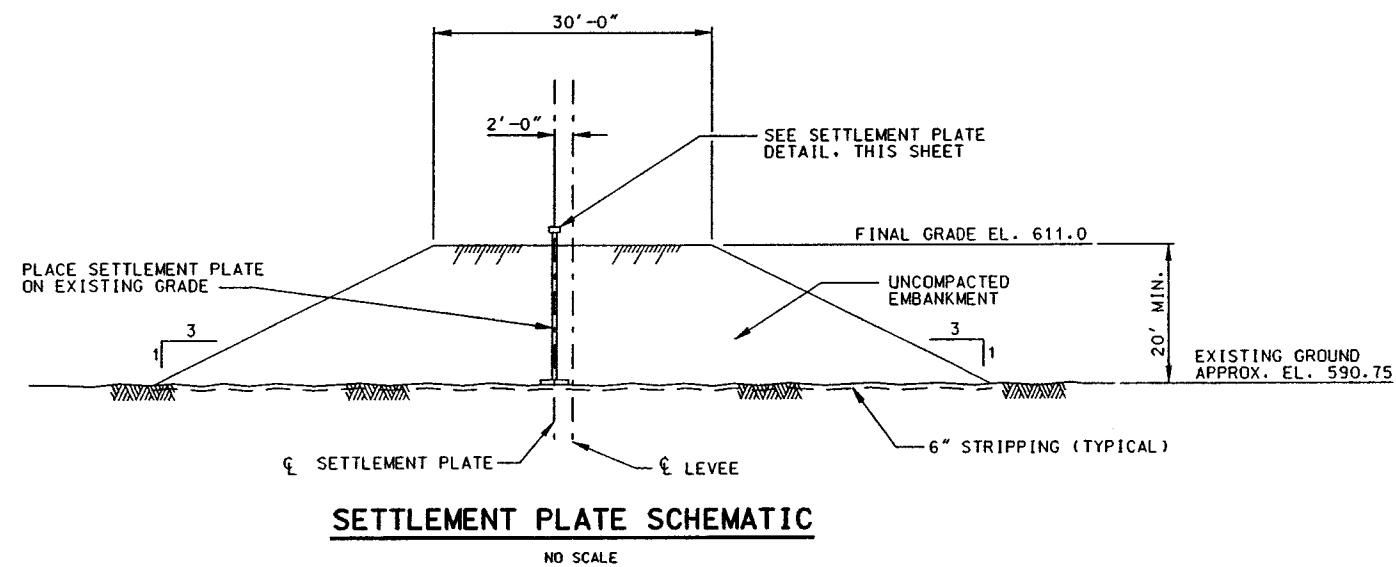
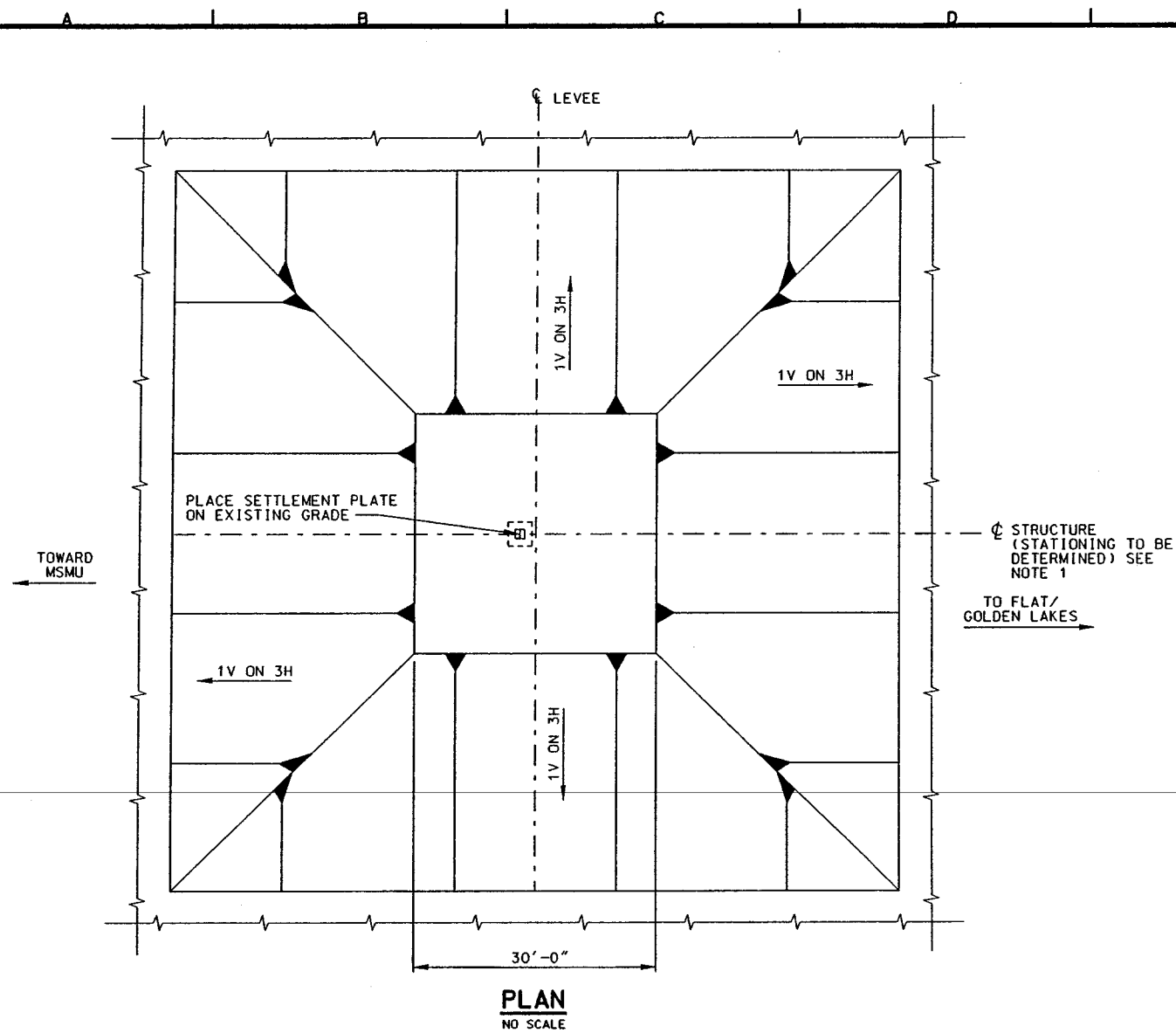


Symbol	Description	Revisions
1	REVISE AS CONSTRUCTED	
2	AMEND #2 SHEET NO. CHANGE ONLY	

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	Designed By: WAG Drawn By: DGP Checked By: JEE Reviewed By: MMH	Date: 22 MARCH 2001 Scale: AS SHOWN Project Code: 0562 Solicitation Number: DACP5-01-B-0007
----------------------------------------------------------------------------	--------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT  
PROJECT  
POUL LEASAN CREEK TRIBUTARY  
REHABILITATION AND ENHANCEMENT  
**STOPLOG STRUCTURE  
GUARDRAIL DETAILS**

Sheet  
Reference  
Number:  
**S104**



#### NOTES:

THE FOUNDATION FOR THE STOPLOG STRUCTURE REQUIRES SETTLEMENT PRIOR TO CONSTRUCTION. THE CONSTRUCTION SEQUENCE FOR THE STOPLOG STRUCTURE SHALL BE AS FOLLOWS:

1. THE CONTRACTING OFFICER WILL SELECT THE LOCATION FOR THE STOPLOG STRUCTURE BEFORE THE CONTRACTOR BEGINS ANY LEVEE OR STOPLOG STRUCTURE CONSTRUCTION WORK.
2. CONTRACTOR SHALL STRIP THE TOPSOIL BACK TO PREPARE THE FOUNDATION FOR THE SETTLEMENT PLATE AND STOPLOG STRUCTURE.
3. CONTRACTOR SHALL RECORD THE ELEVATION OF THE GROUND AT POINT IMMEDIATELY BELOW THE CENTERLINE OF THE SETTLEMENT PLATE.
4. CONTRACTOR SHALL INSTALL THE SETTLEMENT PLATE.
5. PLACE THE UNCOMPACTED EMBANKMENT ENSURING THAT THE PLACEMENT OPERATION DOES NOT DISTURB THE SETTLEMENT PLATE OR PIPE.
6. EXTEND PIPE TO NO MORE THAN 5' ABOVE THE UNCOMPACTED FILL AT ANY TIME. THE FINAL ELEVATION OF THE PIPE BETWEEN 2' TO 5' ABOVE THE TOP OF THE FILL.
7. CONTINUE TO RECORD THE ELEVATION ONCE EVERY SEVEN DAYS UNTIL EITHER THE CONTRACTING OFFICER DETERMINES SETTLEMENT TO BE COMPLETE OR THREE MONTHS HAVE ELAPSED, WHICHEVER COMES FIRST.
8. THE CONTRACTOR SHALL REMOVE THE UNCOMPACTED FILL AND SETTLEMENT PLATE PRIOR TO CONSTRUCTING OF THE STOPLOG STRUCTURE.

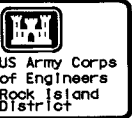
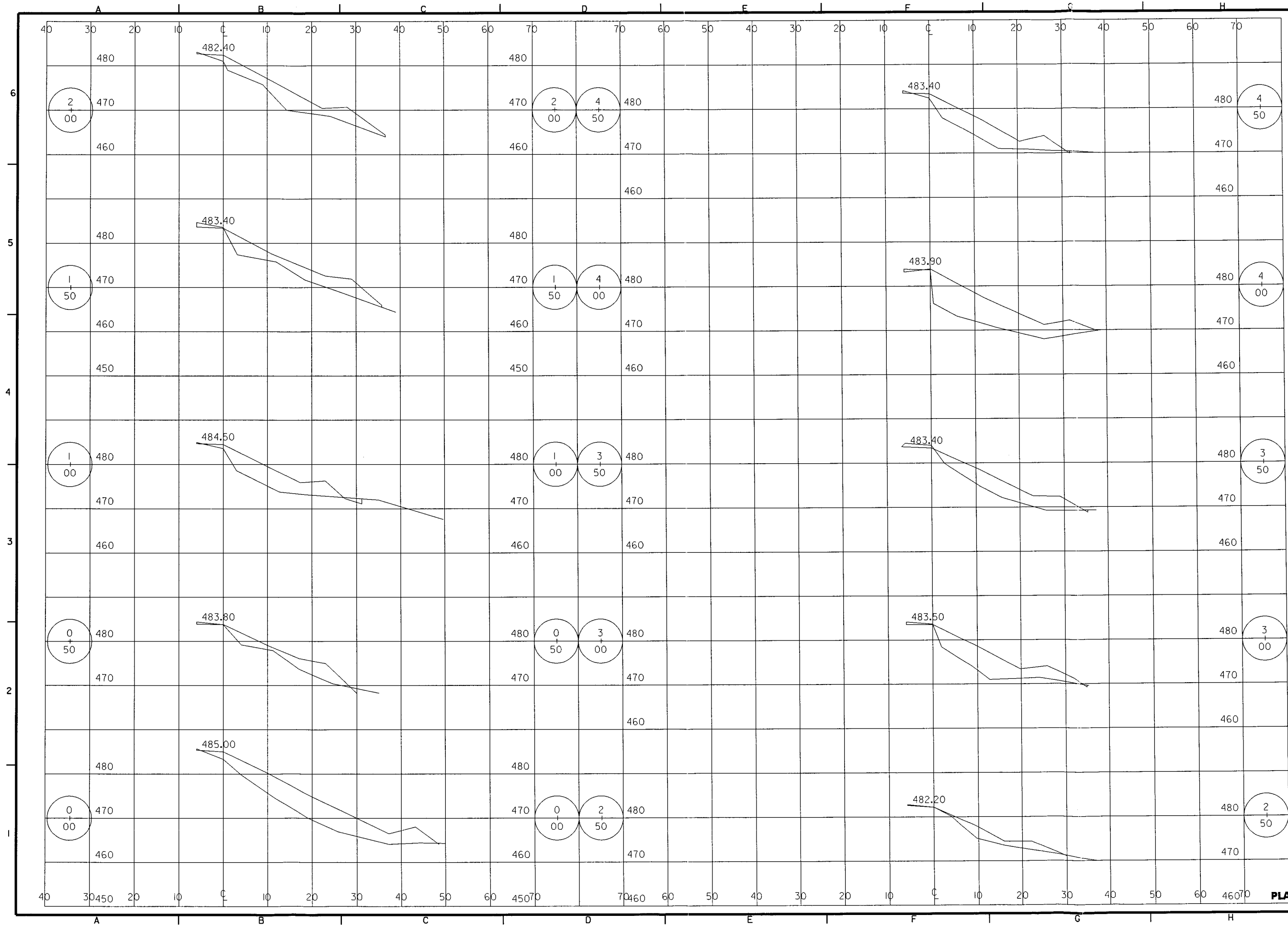


Revisions	Revised By	Revised Date	Revised Description
1	SAZ	4/13/03	AS CONSTRUCTED
2	SAZ	6/22/01	AND, #2 - MINOR REVISIONS

Designed By:	SAZ	22 MARCH 2001
Drawn By:	DOP	AS SHOWN
Checked By:	CJM	0062
Reviewed By:	MAH	0062
Project Code:	0062	
Stationing Number:	0062	
Sheet Number:	0062	

UPPER MISSISSIPPI RIVER  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 131 RM 548.7 THRU 552.8  
PLEASANT CREEK HABITAT  
REHABILITATION AND ENHANCEMENT  
STOPLOG STRUCTURE  
SETTLEMENT PLATE  
DETAIL

Sheet  
Reference  
Number:  
**S105**  
Sheet 27 of 30

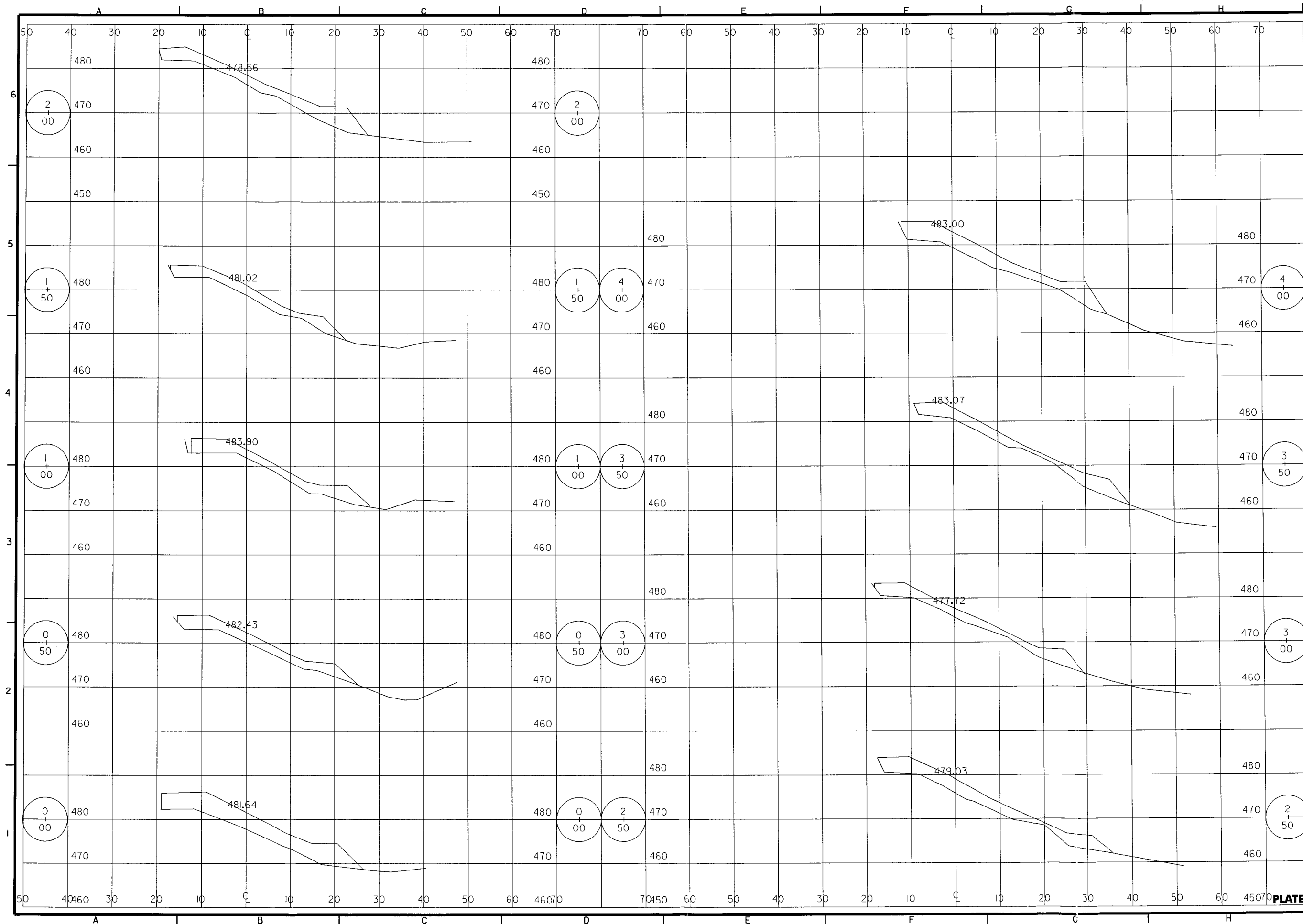


Symbol	Description	Revisions
AS CONSTRUCTED		

Designed By: KIM	Date: 28 JUNE 2001
Drawn By: SDB/TPD	Scale: AS SHOWN
Checked By: RTN	Project Code: epd1
Reviewed By: DJH	Soil Erosion Number: DUCR25-01-8-002

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21- RM 332 - 340.2  
GARDNER DIVISION D&M  
**ISLAND C**  
**AS BUILTS I**

Sheet  
Reference  
Number:  
**REF7**  
Sheet of 32



Symbol	Description	Revisions
AS CONSTRUCTED		

Designed By: KMM	Date: 28 JUNE 2001
Drawn By: SDB/TFD	Scale: AS SHOWN
Checked By: RTN	Project Code: ep61
Reviewed By: DJH	Revision Number: DAC25-01-B-002

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21- RM 332 - 340.2  
GARONER DIVISION O&M

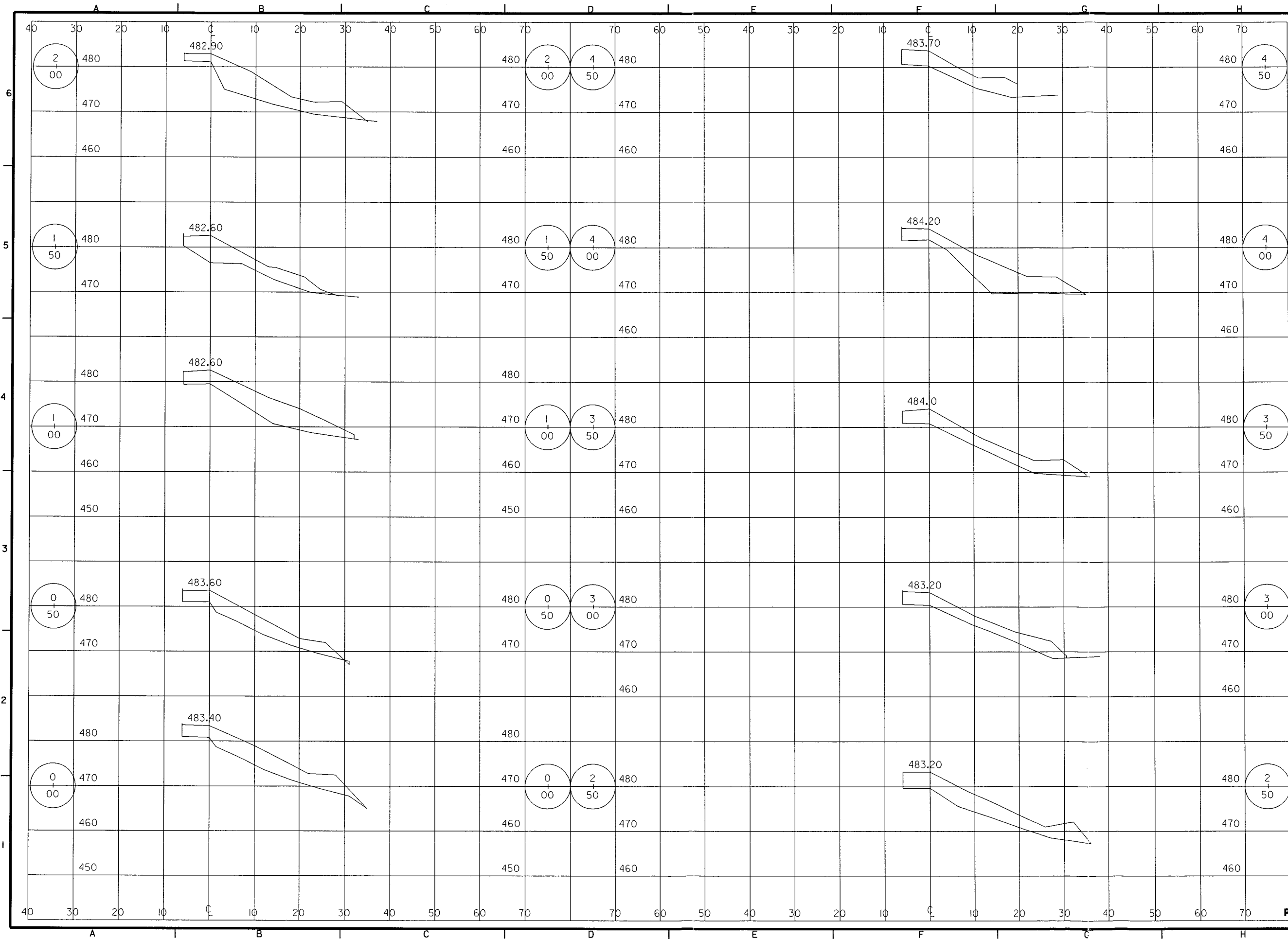
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AS BUILTS**

Sheet  
Reference  
Number:  
**REF11**

Sheet of 32

PLATE 33

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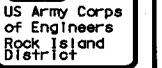
Symbol	Description	Revisions
AS CONSTRUCTED		

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS	Designed By: KNM Drawn By: SDB/TPD Checked By: RTN Reviewed By: DJH	Date: 28 JUNE 2001 Scale: AS SHOWN Project Code: 9061 Solligation Number: DAK025-01-B-002
----------------------------------------------------------------------------	------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21- RM 332 - 340.2  
GARDNER DIVISION G&M  
**SHANDREW ISLAND  
AS BUILT 1**

Sheet  
Reference  
Number:  
**REF12**  
Sheet of 32

PLATE 34

[illegible]

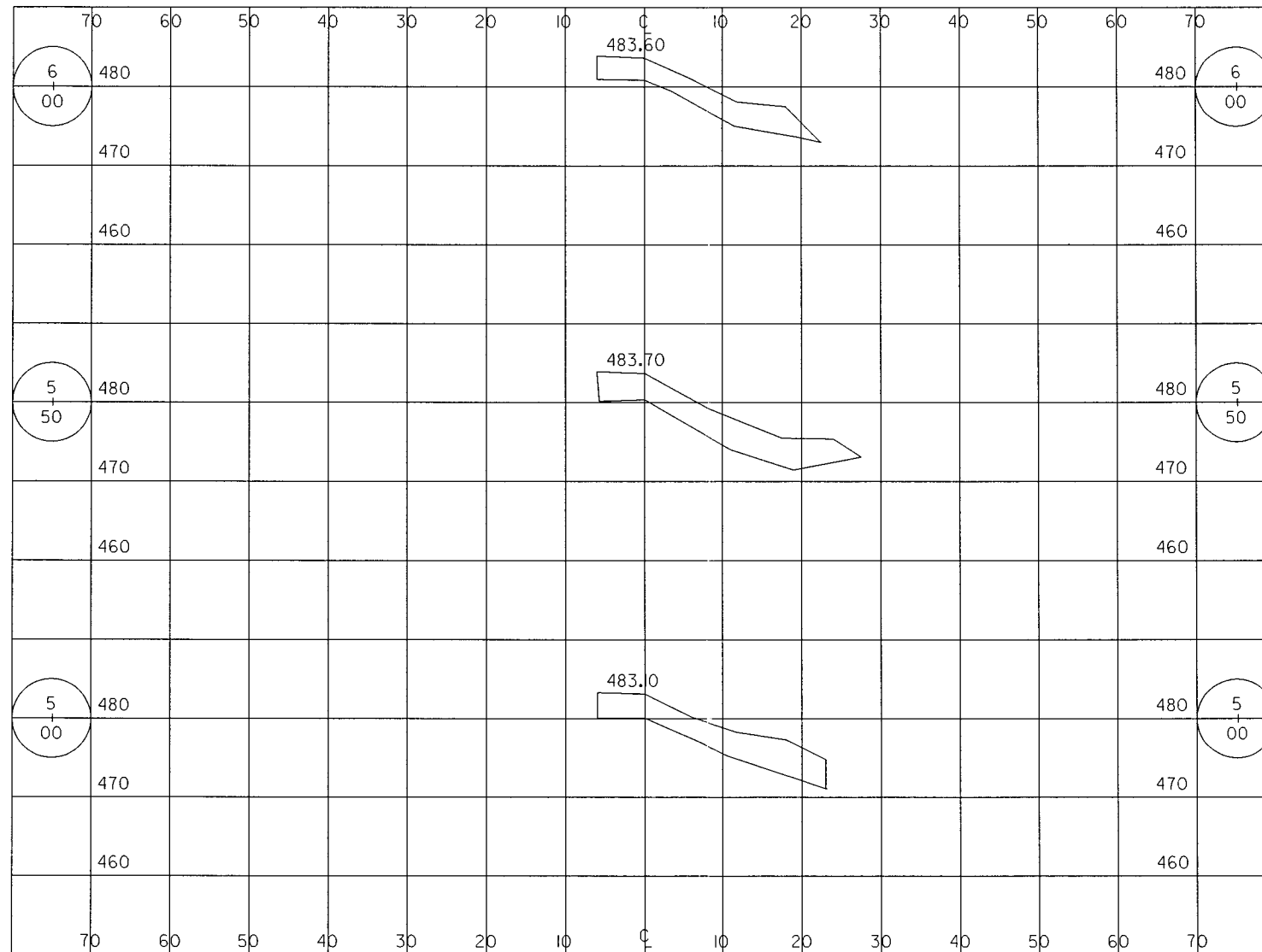
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	Drawn By: SDB/TPD	Scale: AS SHOWN
	Checked By: RTN	Project Code: ep61
	Reviewed By: DJH	Specification Number: DAGE21-01-0002

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21- RM 332 - 340.2  
GARDNER DIVISION O&M

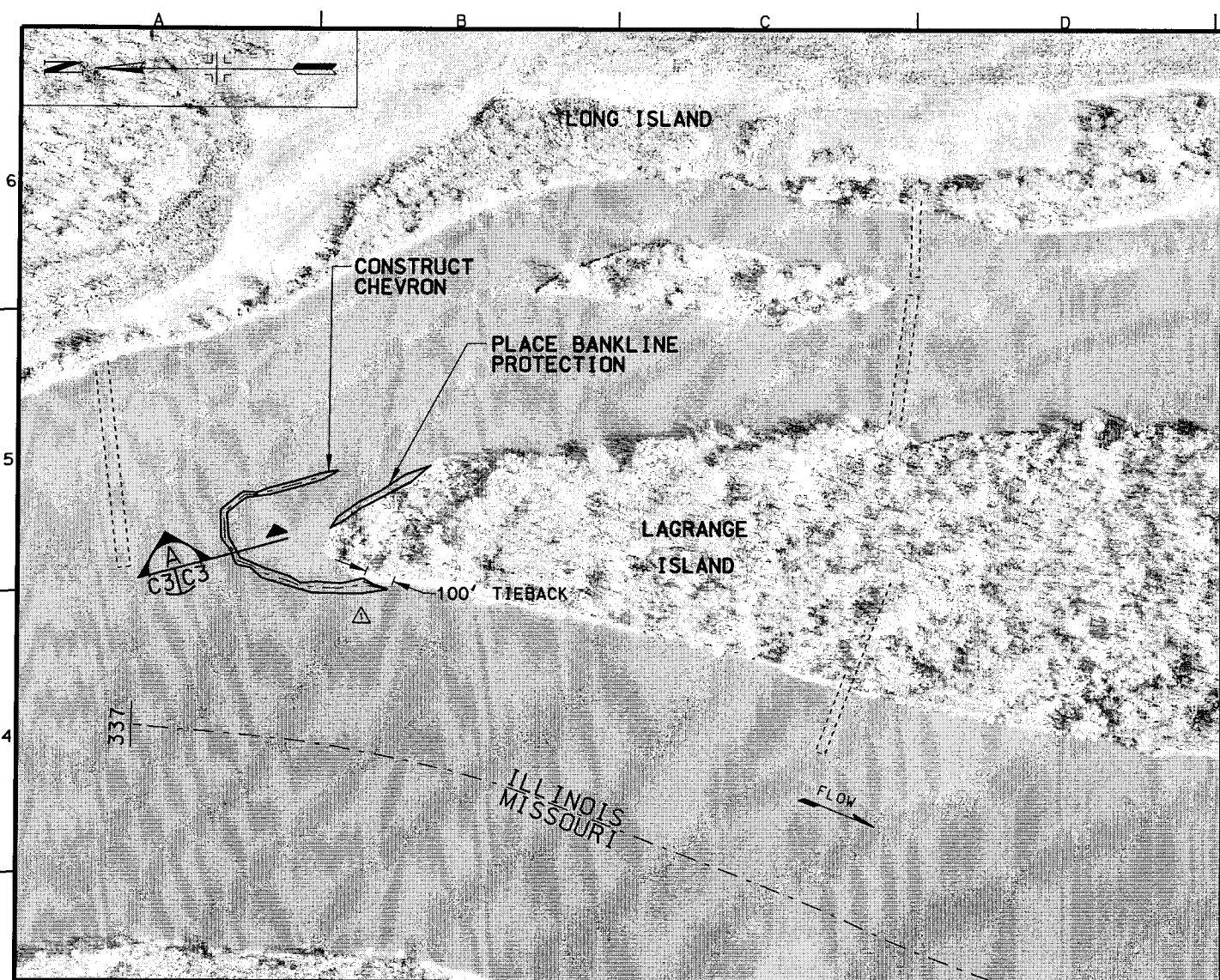
**SHANDREW ISLAND  
AS BUILTS II**

Sheet  
Reference  
Number:  
**REF13**  
Sheet of 32

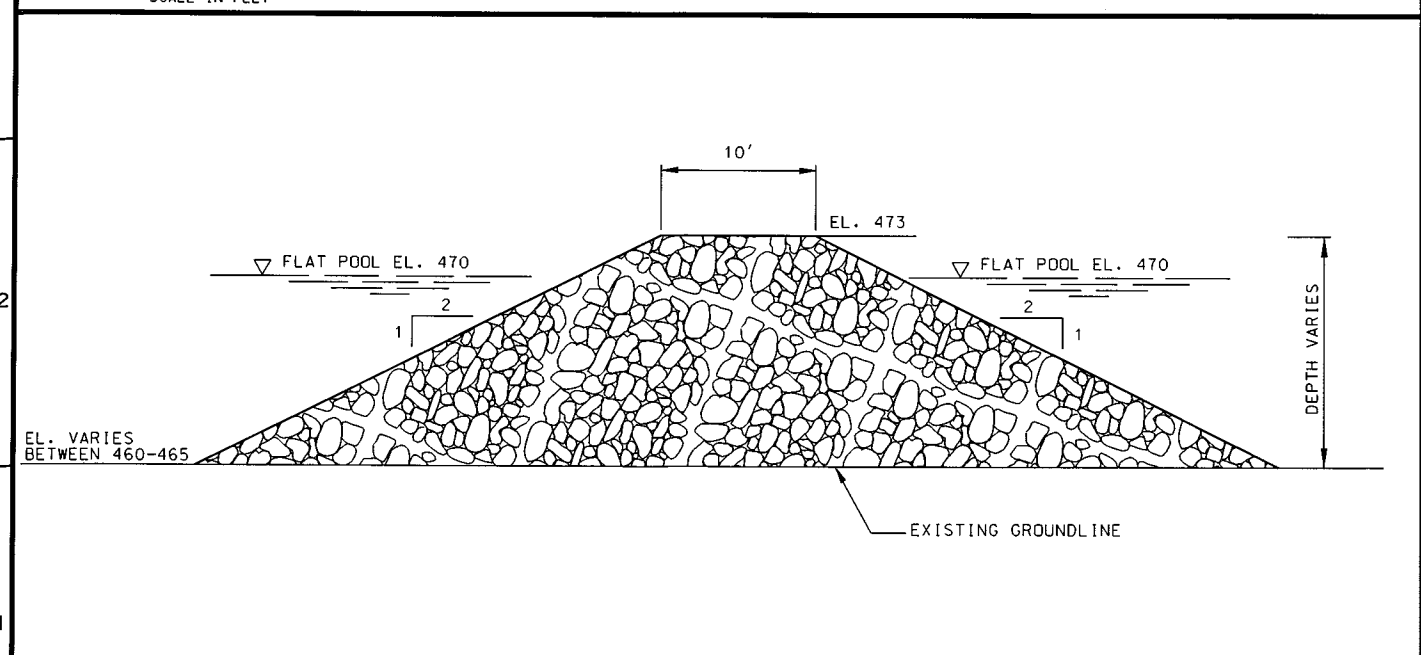
**PLATE 35**



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PLAN VIEW




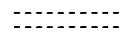
CHEVRON TYPICAL SECTION

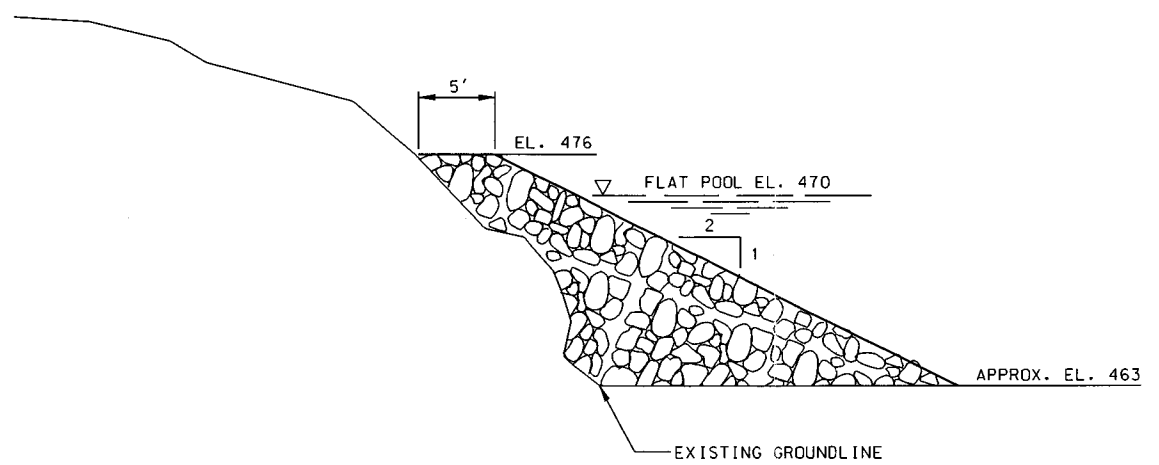
NO SCALE

NOTES:

1. THE AERIAL PHOTO WAS TAKEN IN 1995. SEE SHEET C2 FOR THE JUNE 4, 2003 SOUNDINGS SURVEY AND MAY 18, 2005 LAND SURVEY OF THE HEAD OF LAGRANGE ISLAND.
2. SINCE THEN THE UPSTREAM END OF LAGRANGE ISLAND HAS ERODED. THE PROJECT FEATURES ARE PLACED ACCORDING TO THE MOST RECENT SOUNDING AND LAND SURVEY.
3. ALL SLOPES FROM THE TOP OF THE CHEVRON, TIEBACK AND BANKLINE PROTECTION TO NATURAL GROUND SHALL BE 2H:1V UNLESS NOTED.

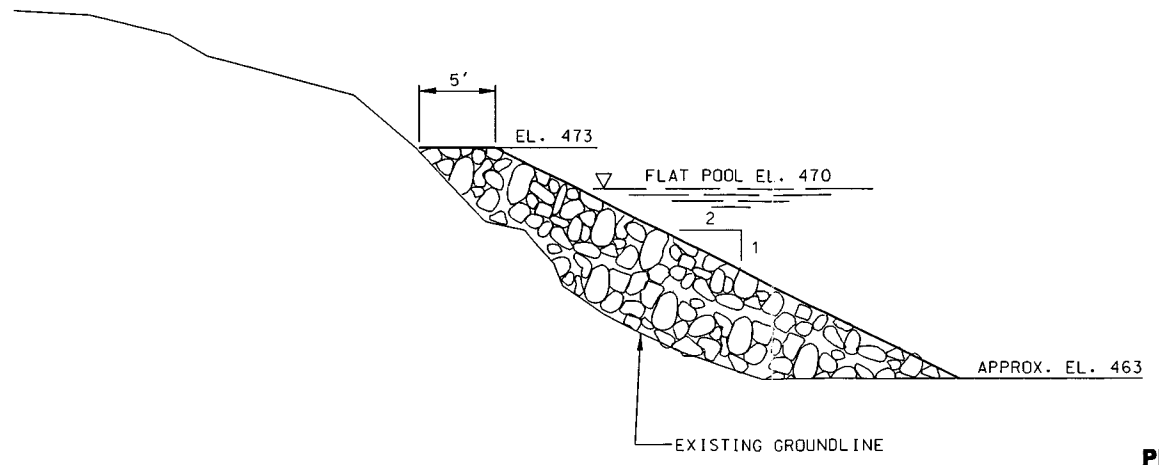
LEGEND:

-  CHEVRON
-  EXISTING WINGDAMS/  
SUBMERGED FEATURE



BANKLINE PROTECTION TYPICAL SECTION

NO SCALE



TIEBACK TYPICAL SECTION

NO SCALE



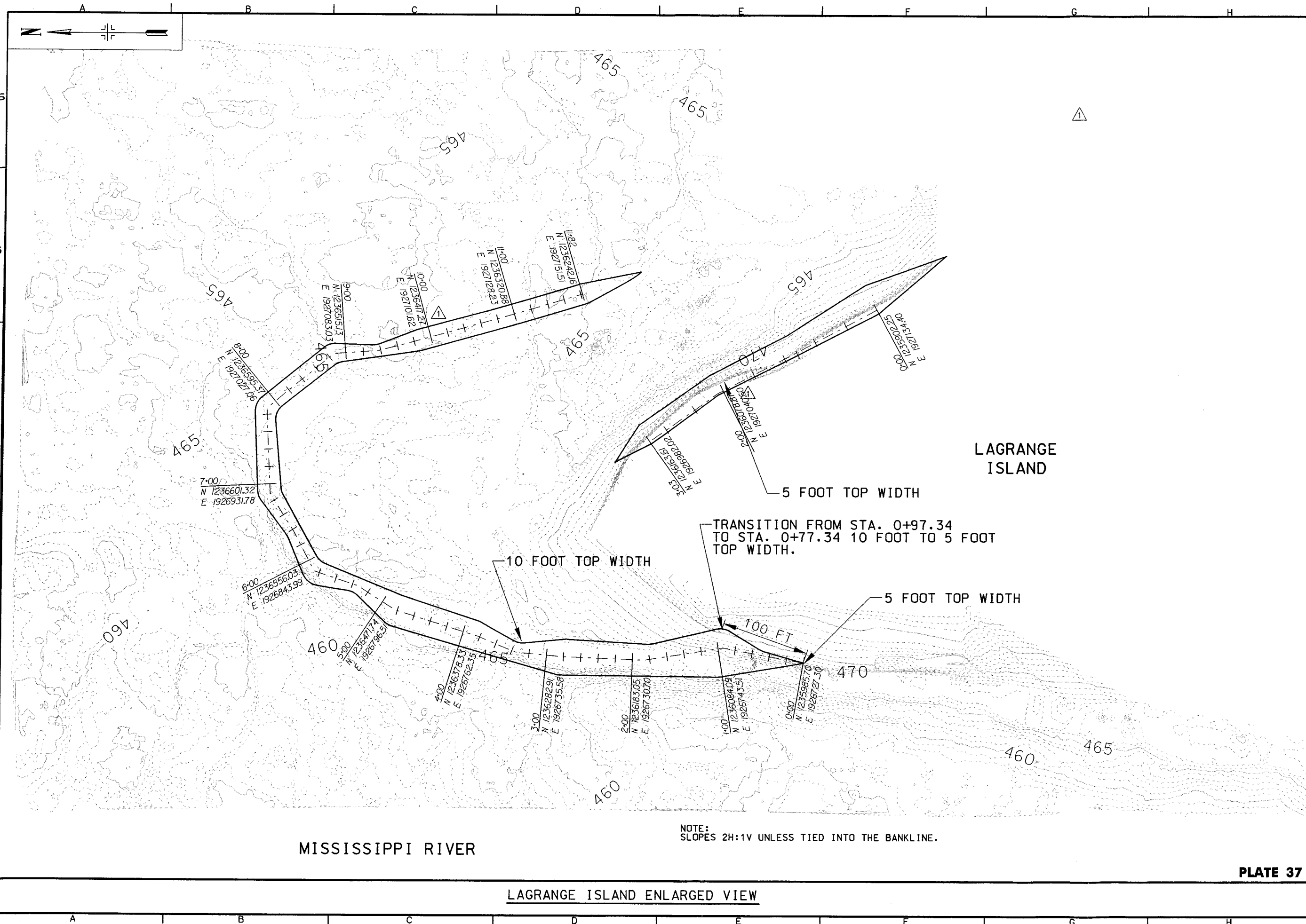
Symbol	REVISION AS CONSTRUCTED	Description	Revisions
Δ	9-2-05	KRM/RTN	DATE

Designed By:	JLF	Date:	27 JAN 04
Drawn By:	SDB	Scale:	AS SHOWN
Checked By:	HLA	Project Code:	EP82
Reviewed By:	DJJ	Soil Condition Number:	DAWG25-04-R-XXXX

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21 - RM 336 TO RM 337  
LONG ISLAND REFUGE  
LAGRANGE ISLAND CHEVRON  
**LAGRANGE ISLAND  
CHEVRON**

Sheet  
Reference  
Number:  
**C1**  
Sheet 1 of XX

05-DEC-2005 09:13:11  
\*\*mvd fs#codchp of act sm#105 m# 105p17.dgn



MISSISSIPPI RIVER

LAGRANGE ISLAND ENLARGED VIEW

PLATE 37

US Army Corps of Engineers  
Rock Island District

Revisions	Date	Approved
1	9-2-05	KM/RTN

REVISOR: AS CONSTRUCTED

Symbol

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

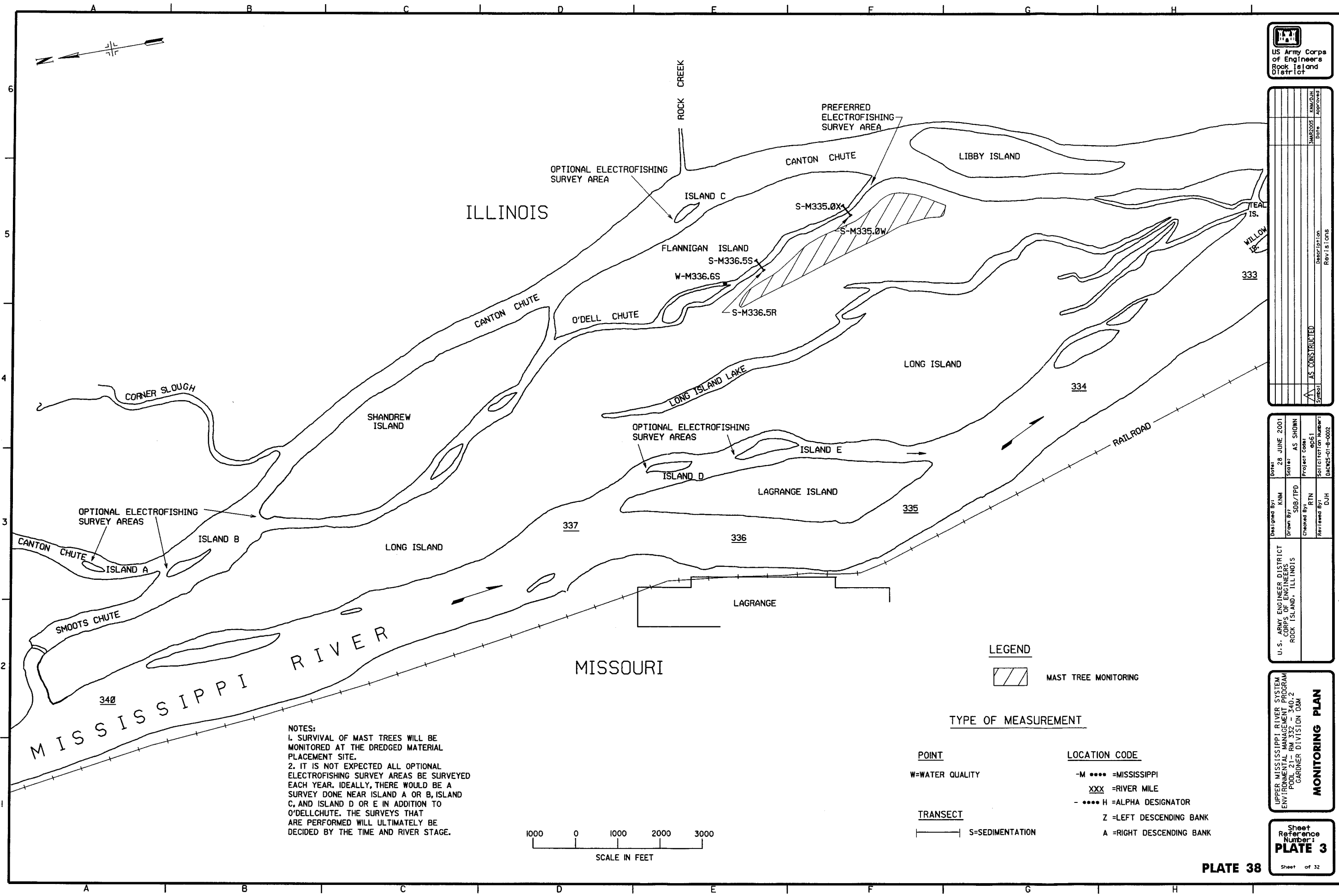
Designed By: JLF  
Drawn By: SDB  
Checked By: HLA  
Reviewed By: DJJ

Date: 27 JAN 04  
Scale: AS SHOWN  
Project Code: EP82  
Solicitation Number: DACW55-04-R-XXXX

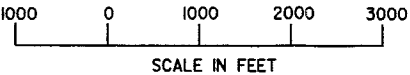
UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21 - RM 336 TO RM 337  
LONG ISLAND REFUGE  
LAGRANGE ISLAND CHEVRON

**LAGRANGE ISLAND  
ENLARGED VIEW**

Sheet  
Reference  
Number:  
**C2**  
Sheet X of XX



NOTES:  
1. SURVIVAL OF MAST TREES WILL BE MONITORED AT THE DREDGED MATERIAL PLACEMENT SITE.  
2. IT IS NOT EXPECTED ALL OPTIONAL ELECTROFISHING SURVEY AREAS BE SURVEYED EACH YEAR. IDEALLY, THERE WOULD BE A SURVEY DONE NEAR ISLAND A OR B, ISLAND C, AND ISLAND D OR E IN ADDITION TO O'DELLCHUTE. THE SURVEYS THAT ARE PERFORMED WILL ULTIMATELY BE DECIDED BY THE TIME AND RIVER STAGE.



LEGEND

MAST TREE MONITORING

TYPE OF MEASUREMENT

POINT

W= WATER QUALITY

TRANSECT

S= SEDIMENTATION

LOCATION CODE

-M .... =MISSISSIPPI  
XXX = RIVER MILE  
- .... H =ALPHA DESIGNATOR  
Z =LEFT DESCENDING BANK  
A =RIGHT DESCENDING BANK



Symbol	Description	Revisions
AS CONSTRUCTED		
DATE	APPROVED	
3/28/2005		
DATE	APPROVED	
3/28/2005		

DESIGNED BY	DATE	28 JUNE 2001
DRAWN BY	SCALE	AS SHOWN
CHECKED BY	PROJECT CODE	ep61
REVIEWED BY	SUBMITTAL NUMBER	DA2005-01-8-0002
U.S. ARMY ENGINEER DISTRICT		
CORPS OF ENGINEERS		
ROCK ISLAND, ILLINOIS		

UPPER MISSISSIPPI RIVER SYSTEM  
ENVIRONMENTAL MANAGEMENT PROGRAM  
POOL 21 - RM 332 - 340.2  
GARDNER DIVISION O&M

MONITORING PLAN

Sheet  
Reference  
Number:  
**PLATE 3**  
Sheet of 32