

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES	
			R	1	37
2. AMENDMENT/MODIFICATION NO. 0004	3. EFFECTIVE DATE 02-Sep-2003	4. REQUISITION/PURCHASE REQ. NO. W22W9K-3090-8448		5. PROJECT NO.(If applicable)	
6. ISSUED BY CIVIL/OPS/ENVIRONMENTAL TEAM 600 DR. M. L. KING JR. PL., RM 821 ATTN: JAN LAMBERT LOUISVILLE KY 40202-2230	CODE DACW27	7. ADMINISTERED BY (If other than item 6)		CODE	
		See Item 6			
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)			X	9A. AMENDMENT OF SOLICITATION NO. DACW27-03-R-0003	
			X	9B. DATED (SEE ITEM 11) 05-May-2003	
				10A. MOD. OF CONTRACT/ORDER NO.	
				10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE				
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS					
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required)					
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Solicitation DACW27-03-R-0003, Construction of the Dam, Olmsted, Illinois is amended as follows: a. The hour and date specified for receipt of offer is NOT extended. Proposals are due on October 1, 2003 at 4:00 local time. b. General Decision IL030016, Modification 0, dated 06/13/2003 and Servie Wage Rates 94-2309, Revision 27 dated 05/30/2003 are applicable to this solicitation. c. Under Section 00010 an "NOTE" has been added that applies fixed priced subcontracts. d. Under Section 00115, 2.3 Technical Approach, paragraph H Schedule and Sequence of Work, part (a) a paragraph has been added. e. Under Section 00130, 3.3 Technical Approach, paragraph H, Schedule and Sequence of Work, part (a) the following sentence is deleted "Schedules offering durations less than the 2,200 Government estimated duration may receive a higher score if the schedule is shown to be realistic and achievable." f. Under Section 00130, 3.8 Cost Proposal the last sentence is changed "...FY04 anticipated amount of \$25 million..."					
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
_____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)		03-Sep-2003	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:

AMEND 0004

- g. The offer shall propose the award fee as part of the cost proposal. Under Section 00115, 2.8 Cost Proposal, and Section 00130, 3.8 Cost Proposal, language has been added to allowing the offeror to propose an award fee and the factors that will be used to evaluate the award fee.
- h. Under Section 00115, Cost Breakdown Schedule several quantities have been increased.
- i. The following specifications have been deleted and replaced:
 - Project Table of Contents
 - 00800 (attachments remain unchanged)
 - 00810 (attachments remain unchanged)
 - 01710
 - 02200
 - 02462
 - 02482
 - 03201
 - 03300
 - 03800
- j. The following specification has been added: 02821 Fencing

INDEX OF CLAUSES**OLMSTED DAM SOLICITATION**

<u>Clause No.</u>	<u>DESCRIPTION</u>
52.204-6	Data Universal Numbering System
52.211-1	Deleted
52.211-2	Deleted
52.211-6	Brand Name or Equal
52.215-1	Instructions to Offerors-Competitive Acquisition
52.216-1	Type of Contract
52.222-23	Notice of Requirements for Affirmative Action to Ensure Equal Opportunity....
52.233-2	Service of Protest
52.236-28	Preparation of Proposals
LCL 000-002	Request For Information
LCL 000-004	Submitting Bids
LCL 000-006	Modifications Prior to Date Set For Opening Bids Or Offers
LCL 0219-002	Subcontracting Plans For Small Business Concerns

LCL 0236-002 Restrictive Limitation

SECTION 00600 Representations & Certifications

- 52.203-11 Certification And Disclosure Regarding Payments To Influence.
- 52.204-3 Taxpayer Identification
- 52.204-5 Women-Owned Business
- 52.209-5 Certification Regarding Debarment, Suspension, Proposed Debarment...
- 52.219-1 Small Business Program Representations
- 52.219-4 Notice of Price Evaluation Preference for Hubzone Small Business Concerns
- 52.219-19 Small Business Concern Representation for the Small Business ...
- 52.222-22 Previous Contracts and Compliance Reports
- 52.222-25 Deleted
- 52.222-38 Compliance with Veterans' Employment Reporting Requirements
- 52.223-13 Certification of Toxic Chemical Release Reporting
- 52.230-1 Cost Accounting Standards Notices and Certifications
- 52.237-8 Deleted by Amdt #1
- 252.209-7001 Disclosure of Ownership or Control by...
- 252.225-7031 Secondary Arab Boycott of Israel

Section 00700 Contract Clauses

- 52.202-1 Definitions
- 52.203-3 Gratuities
- 52.203-5 Covenant Against Contingent Fees
- 52.203-6 Restrictions on subcontractors sales to the government
- 52.203-7 Anti-Kickback Procedures
- 52.203-8 Cancellation, Rescission, and Recovery of Funds....
- 52.203-10 Price or Fee Adjustment for Illegal or Improper Activity
- 52.203-11 Deleted
- 52.203-12 Limitation on Payments to Influence Certain Federal Transactions
- 52.204-4 Printed or Copied Double-Sided on Recycled Paper

52.209-6 Protecting the Government's Interest when
Subcontracting with Contractors Debarred...

52.211-15 Defense priority and allocation requirements

52.215-2 Alternate II Deleted

52.215-2 Audit and records--negotiation

52.215-11 Price Reduction for Defective Cost or Pricing
Data

52.215-13 Subcontracting Cost or Pricing Data

52.215-15 Pension adjustments and asset reversions

52.215-16 Facilities capital cost of money

52.215-17 Waiver of facilities capital cost of money

52.215-18 Reversion or Adjusting of Plans for
Postretirement Benefits Other Than Pensions

52.215-19 Notification of Ownership Changes

52.215-21 Requirements for cost or pricing data or
information other than cost or pricing data

52.215-7 Allowable cost and payment

52.219-8 Utilization of small business concerns

52.219-9 Small business subcontracting plan

52.219-16 Liquidated damages subcontracting plan

52.222-2 Payment for overtime premiums

52.222-3 Convict labor

52.222-4 Contract work hours and safety standards act

52.222-6 Davis-Bacon Act

52.222-7 Withholding of funds

52.222-8 Payrolls and basic records

52.222-9 Apprentices and trainees

52.222-10 Compliance with Copeland act

52.222-11 Subcontracts

52.222-12 Contract termination

52.222-13 Compliance with Davis-Bacon and related act
regulations

52.222-14 Disputes concerning labor standards

52.222-15 Certification of eligibility

52.22216 Approval of wage rates

52.222-21 Prohibition of segregated facilities

52.222-26 Equal opportunity

52.222-27 Affirmative action compliance.....

52.222-35 Equal opportunity for special disabled veterans.

52.222-36 Deleted

52.222-37 Employment reports on special disabled veterans...

52.223-3 Hazardous material identification and material safety data

52.223-5 Pollution prevention and right to know information

52.223-6 Drug free workplace

52.223-14 Toxic chemical release reporting

52.225-11 Buy American Act

52.225-12 Notice of buy American Act requirements

52.225-13 Restrictions on certain foreign purchases

52.227-1 Authorization and consent

52.227-4 Patent Indemnity

52.228-2 Deleted

52.228-11 Deleted

52.228-12 Deleted

52.228-14 Deleted

52.229-3 Deleted

52.230-2 Cost accounting standards

52.230-6 Administration of cost accounting standards

52.231.5000 Equipment ownership & operating expense schedule

52.232-12 Deleted

52.232-17 Interest

52.232-18 Deleted

52.232-20 Limitation of cost

52.232-22 Limitation of Funds

52.232-23 Assignment of claims

52.232-27 Prompt payment for construction contracts

52.232-23 Payment by electronic funds transfer

52.232-5000 Deleted

52.233-1 Disputes

52.233-3 Protest after award

52.236-5 Material and workmanship

52.236-7 Permits and responsibilities

52.236-13 Deleted

52.236-18 Work oversight in cost-reimbursement construction contracts

52.236-19 Organization and direction of the work

52.236-26 Preconstruction conference

52.242-1 Notice of intent to disallow costs

52.242-3 Penalties for unallowable costs

52.242-4 Certification of final indirect costs

52.242-13 Bankruptcy

52.243-2 Changes-Cost Reimbursement
52.244-2 Subcontracting
52.244-5 Competition in subcontracting
52.244-6 Subcontracts for commercial items and commercial components
52.245-1 Deleted
52.245-5 Deleted
52.245-17 Deleted
52.245-18 Deleted
52.246-21 Deleted
52.247-67 Submission of commercial transportation bills...

52.248-3 Value Engineering
52.249-6 Termination
52.249-14 Excusable delays
52.249-5000 Basis for settlement of proposals
52.251-1 Government supply sources
52.253-1 Computer generated forms
252.201-7000 Contracting officer representative
252.203-7001 Prohibition on persons convicted of fraud or other defense-contract related felonies
252.203-7002 Display of DOD hotline poster
252.204-7003 Control of government personnel work product

252.204-7004 Required central contracting registration
252.205-7000 Provision of information to cooperative agreement holders
252.209-7000 Acquisition from subcontractors subject to onsite inspection under the
252.209-7004 Subcontracting with firms that are owned or controlled by the government of a terrorist country
252.215-7000 Pricing adjustments
252.215-7002 Cost estimating system requirements
252.219-7003 Small, small disadvantaged and women owned small business subcontracting plan
252.223-7004 Drug-free work place
252.225-7012 Preference for certain domestic commodities

252.225-7014 Preference for domestic specialty metals
252.225-7031 Secondary Arab boycott of Israel
252.226-7001 Utilization of Indian organizations and Indian owned economic enterprises
252.227-7033 Rights in shop drawings
252.236-7000 Deleted
252.236-7002 Deleted
252.242-7000 Post award conference

252.243-7002 Request for equitable adjustment
252.245-7001 Reports of government property

SECTION 00010 - SOLICITATION CONTRACT FORM

The following have been modified:

SPECIAL INSTRUCTIONS

This is a Cost Reimbursable Award Fee Type Contract. The award fee pool is the total of the available award fee dollars for each evaluation period for the life on the contract. The base fee amount is not earned and will be fixed at 3% of the estimated cost of the contract exclusive of the fee. **The offeror shall propose the award fee as part of the cost proposal. The award fee amount is earned and will be evaluated in accordance with the Award Fee Plan (See Section 0810).** The award fee amount and the award fee determination and the methodology for determining the award fee are unilateral decisions made solely at the discretion of the Government and are not subject to the Disputes clause.

The selected Contractor will not be reimbursed for proposal preparation costs.

Stipends – The Government will offer a stipend in the amount of \$250,000 to each of the top four (4) satisfactory technical and reasonable cost proposals in accordance with Section 00115 – Procedures for Submittal of Offers and Section 00130 – Proposal evaluation Criteria. Proposals considered unsatisfactory will not receive a stipend. Proposals deemed to be non-responsive will be excluded from the stipend. The Government procures all ideas in the satisfactory proposal. Stipends are not to be paid to compensate contractors for proposal preparation costs. The contract awardee will not receive the stipend and no more than four (4) offers will receive stipends.

Accounting System - The contractor will be required to have an accounting system adequate for determining costs applicable to the contract in accordance with FAR 16.301. Government surveillance during performance will provide reasonable assurance that efficient methods and effective cost controls are used (See Section 00115). If the contractor proposes a cost reimbursable subcontract, the subcontractor will also be required to have an accounting system adequate for determining costs applicable to the contract.

Bonds – The requirement for Performance and Payment Bonds is waived for cost reimbursement contracts under DFAR 228.102. However, for cost type contracts with fixed price construction subcontracts, the prime contractor is required to obtain Performance and Payment Bonds. FAR Clauses 52.228-2, 52.228-11, 52.228-12 and 52.228-14 are applicable to fixed price subcontractors only. Payment Bonds are required as follows:

52.228-15 Payment Bonds- Construction (Modified)

As prescribed in 28.102-3(a), insert a clause substantially as follows:

Payment Bonds-Construction (July 2000)

(a) Definitions. As used in this clause-

"Original contract price" means the award price of the contract. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) Amount of required bonds. Unless the resulting contract price is \$100,000 or less, the successful offeror shall furnish payment bonds to the Contracting Officer as follows:

- (1) Payment Bonds (Standard Form 25-A). The penal amount of payment bonds at the time of contract award shall be two percent of the original contract price.
 - (2) Additional bond protection. (i) The Government may require payment bond protection if the contract price is increased. The increase in protection generally will equal two percent of the increase in contract price.
(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.
- (c) Furnishing executed bonds. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, before starting work.
- (d) Surety or other security for bonds. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the Federal Register or may be obtained from the:
- U.S. Department of Treasury
Financial Management Service
Surety Bond Branch
401 14th Street, NW, 2nd Floor, West Wing
Washington, DC 20227.
- (e) Notice of subcontractor waiver of protection (40 U.S.C. 270b(c)). Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

(End of clause)

*****NOTE***** All subcontracts for service and supply contracts shall be fixed price unless the subcontract is for river activities associated with constructing the dam. All fixed price subcontracts shall be in accordance with applicable fixed priced construction FAR clauses. Cost reimbursable subcontractors are required to have an accounting system adequate for determining costs applicable to the contract in accordance with FAR 16.301. The prime contractor will require performance and payment bonds on fixed price construction subcontracts. Fixed priced subcontracts in excess of \$1,000,000 will require to submit performance and payment bonds and the cost of the bonds will be passed through to the Government as part of the total contract price.

*****NOTE***** Some technical specification paragraphs include “payment” statements, i.e. “at contractor’s expense” or “at no additional cost to Government”, anticipating that this work will be performed by a fixed-price subcontractor and will not be paid at actual cost, but at contract price. If the work is performed using a cost reimbursable type contract, then the costs will be reimbursed at actual cost.

SECTION 00100 - BIDDING SCHEDULE/INSTRUCTIONS TO BIDDERS

The following have been modified:

SECTION 115

SECTION 00115

PROCEDURES FOR SUBMITTAL OF OFFERS

1. GENERAL REQUIREMENTS.

- 1.1. The intent of this solicitation is to select one contractor for the construction of the dam for the Olmsted Locks and Dam Project on the Ohio River near Olmsted, Illinois.
- 1.2. Offerors submitting proposals for this project should limit submissions to data essential for evaluation of proposals so that a minimum of time and monies will have been expended in preparing information required herein. However, in order to be effectively and equitably evaluated, the proposals must include information sufficiently detailed to clearly describe the offeror's experience, technical approach and management capabilities to successfully complete the project. Proposals should follow in the order of sequence set forth in the RFP. Information provided out of sequence may not be evaluated and may result in the offerors disqualification from award. Requirements stated in this RFP are minimums. The solicitation contains the design requirements for the completed Olmsted Dam. In general, the method of construction and equipment as defined in the "F" series drawings is conceptual in nature to demonstrate one way of constructing the designed Dam. Hydraulic and navigation modeling and environmental studies have been completed to support in-the-wet construction of the dam as designed in these documents in conjunction with work previously completed or planned for the Olmsted site. (Note: Phased cofferdam construction is not supported by these models and studies.) If the offeror chooses to propose alternate methods of construction, or equipment, they shall be clearly detailed in the proposal. Advantages/disadvantages and increased/decreased risk as compared to the construction methods outlined in the solicitation must be identified in Section III Technical Approach. If the offeror chooses to use the construction methods outlined in the solicitation, it should be clearly stated in the proposal. Any deviations from the construction requirements should be clearly noted and justified in the proposal. In addition any assumptions that the offeror makes shall be noted in the proposal.
- 1.3. Offerors shall submit their proposals to the US Army Corps of Engineers, 600 Dr. Martin Luther King, Jr. Place, Room 821, Louisville, KY 40202-2230 no later than the time and date specified in Block 13 of Standard Form 1442.
- 1.4. Offerors are required to submit a proposal made up of a Technical Proposal and a Price Proposal. All proposal materials shall be submitted in binders with a table of contents and tabbed section dividers. The sections should parallel the submission requirements identified below. Sections I, II, III, IV and V shall be submitted in original and 7 copies Sections VI, VII and VIII shall be submitted in original only and shall be placed in a separate envelope. There is a limit of 250 pages (excluding dividers) using a minimum font size of 11 and a minimum margin size of one half inch on all sides. If both sides of the pages are used, it will be counted as two (2) pages. A small type may be used on charts, graphs, figures, diagrams and schematics to accommodate a "make it fit" software capability, however, all text must be legible and easy to read. The schedule may be printed on a larger sheet (maximum size 36"x 48") and included in a pocket in the binder. Format restrictions will be adhered to and enforced. Information submitted which exceeds the specified limit may not be evaluated.

2. PROPOSAL SECTIONS

This solicitation requires no submission of formal drawings. However, offerors may submit drawings or sketches to demonstrate any required information. (Drawings are excluded from the 250-page limit.)

2.1 Section I. Experience

A. Prime Contractor and Subcontractor Experience.

For the following items provide descriptions of projects which are similar to this project in size and scope and dollar value. If the work is not being self-performed, also provide the same information for the proposed subcontractor in the respective area. Indicate which, if any, subcontracts will be cost reimbursable and provide documentation that the subcontractor meets the cost accounting requirements. Formats for Prime Contractor and Subcontractor Experience are included for your use. Use as many forms as necessary to meet the criteria. If you elect not to use the formats, all information identified on the formats is still required for evaluation of this item. Extra consideration may be given for subcontractors who have prior experience with and can demonstrate team continuity with the prime contractor. Work must have been self-performed to qualify as experience.

1. Construction and overall management of major marine facilities
2. Placing Large Precast Concrete Elements In-the-Wet
3. Fabrication of Large Precast Elements
4. Underwater inspection and Quality Control
5. Underwater pile installation
6. Dredging, Screeding, and Underwater Placement of Scour Stone Protection
7. Underwater vibrocompaction/Ground Improvement
8. Fabrication of Large Structural Steel Assemblies (tainter/wicket gates)
9. Operation and Maintenance of large concrete batch plant facilities
10. Placing Tremie and Structural Concrete and Reinforcement

B. Individual Personnel Experience.

Provide resumes for key personnel including:

1. Project Manager
2. Project Engineer(s)
3. Project Superintendent
4. Diving Superintendent
5. All CQC Personnel including Quality Control Manager
6. Project Safety Specialist
7. Superintendents for all major subcontractors
8. On-site Purchase Agent/Procurement Manager
9. Project Controls
10. Cost Engineer

NOTE: The identified personnel must be used on the project. Any substitution of these persons will not be permitted without prior approval of the Contracting Officer. Indicate if the experience of the key personnel includes work on Cost Reimbursable Contracts and indicate the position(s) held. A format for Personnel Resume is included for your use. If you elect not to use the format, all information identified on it is still required for evaluation of this item. Identification of two individuals proposed for a single position will result in the evaluation of only the least qualified person.

2.2 Section II. Management

A. Operational Management Plan

Management Information System (MIS). MIS requirement are specified in Section 00800, paragraph 1.85, of this solicitation. Offeror shall submit the following;

1. Program Management/Project Management.
 - a. The offeror's experience in operating the Management Information System.

- b. Describe plans for providing the Corps with electronic access to MIS data.
- c. Describe how the estimate provided as a proposal, if accepted for award, will track actual cost to estimated cost. Describe MIS system lag times, success of managers to project estimates to complete.
- d. Include how long contractor has used these systems and any actual experience on previous cost reimbursable contracts.

2. Cost Control.

- a. Achievement of Cost. Explain how you achieve cost control and best value on purchases of materials, supplies, equipment and subcontracted work.
- b. Describe how cost control, including tracking subcontractor costs, is achieved.
- c. Name of software, type and hardware compatibility. Name of the company that produces the software.
- d. Measurement/Monitoring Productivity. Describe methods used for measuring and monitoring productivity and present your evaluation of the effectiveness of your methods and the supporting documentation
- e. Describe how forecasting will be done.

B.

Acquisition Management Plan

- 1. Procurement. Discuss your procurement system and procedures for acquisition and control of equipment, supplies, material, and labor resources. Assure that equipment; supplies material and personnel will be available when they are required. Describe your procurement system and procedures for acquisition of subcontractors. Discuss how competition and best value will be achieved. Discuss if your purchasing system is approved by the Government, if so, by which agency and contract.
- 2. Government Property Control – Describe your procedures for identification, tracking and control of Government property. Plan shall contain applicable parts of FAR Subpart 45.5 “Management of Government Property in the Possession of Contractors”. Do not submit the actual plan at this time. Only a general description and the tracking system are required at this time. Note after award this procedure will be negotiated and become a Contract Management Procedure (CMP).

C. Management Plan.

Provide a management and execution plan for the project that describes how your labor, resources, designers, and specialists, including subcontractors and material suppliers, will be coordinated and used to ensure successful completion of the project. Describe how you will manage, supervise and coordinate the subcontractor’s work. Plan shall include who in the organization will be responsible for this management and coordination. In addition, include how you will control and manage the test out of the equipment particularly, the mechanical, electrical, and controls systems. Discussion of the management of the MIS, cost and schedule control, reporting and change management shall be included. On-site personnel and equipment must be clearly distinguished from resources that are available but not present at the site.

Provide an organizational chart for this project showing home office support, on-site management and the responsible chain of command. Include names of assigned personnel and all subcontractors and their areas of responsibility. Joint venture offerers must show the respective areas of responsibility for each partner. Clearly delineate on-site from off-site personnel. Quality

Control and Safety should be included in the chart. Also include in the organization chart all anticipated field office positions necessary to complete the project.

D. Labor Plan

Present a narrative showing how the personnel will be committed to this job. Discuss the staffing plan to accommodate normal fluctuating workloads in order to maintain an experienced work force during periods of work buildup and decline. Include information that demonstrates the Contractor's knowledge in the local labor market. If the contractor is working multiple shifts the plan shall address how these shifts will be staffed. Included how many people will be relocated to the area and/or if you plan to hire locally.

2.3 Section III. Technical Approach

NOTE – As part of the discussion in each of the following sub-paragraphs, the offeror shall indicate their intent to use or not use the means outlined in the “F” Series Drawings.

A. Method of Transport, Positioning and Set-Down of Precast Elements

Provide a detailed plan describing the equipment and methodology for transport, lifting, controlled positioning and lowering of each of the types of precast concrete dam segments to ensure proper positioning on the foundation in variable river conditions.

B. Method of Maintaining Riverbed Stability

- a. Provide a detailed plan for methods and proposed equipment that will be used to prevent scour of the riverbed and damage to the dam foundation during construction.
- b. Provide a detailed plan (including proposed equipment) for sequence and methods that will be used to place the permanent scour protection.

C. Method of Fabrication and Installation of Dam Foundation Piles

- (a) Provide a plan for obtaining and fabricating the piling required for the dam foundation. This shall include:
 - 1) Tainter Gate Pipe Piles
 - 2) Navigable Pass Pipe Piles
 - 3) Boat Abutment Pipe Piles
 - 4) Isolation Joint Pipe Piles
 - 5) Cutoff wall Master and sheet piles
- (b) Provide a detailed plan for installation of the piles listed above in (a). Include templates, guides, pile hammers, methods for controlling the location and elevation of the piles, and methods for removal of misplaced piles.

D. Location and Method of Precast Element Construction.

(a). Provide the location of the facility that will be used to construct the precast concrete elements required for this project. Indicate if the precast elements will be fabricated by the prime contractor, a subcontractor, or a manufacturer. If an offsite facility will be used, indicate if this is an undeveloped site acquired for this project only or if this is a developed pre-existing facility. If it is a developed pre-existing facility, indicate what additional development is required for this project. Provide all applicable licenses, environmental permits, and proof of compliance with zoning requirements or the contractor's plan and schedule for obtaining these permits.

(b). Provide detailed plans and descriptions of the Casting Facility site, including site development requirements. Describe and show locations of equipment and facilities to support the dam segment fabrication.

- (c). Provide a detailed plan describing the construction methods that will be used for the precast elements.
- (d). Submit a detailed plan for load out of the precast segments.
- E. Method of River Bottom Grading and Screeding
- Provide a plan describing the proposed equipment and methods for accurately grading, monitoring and screeding the river bottom to the required tolerances.
- F. Method of Concrete Production, Delivery, and Placement
- Provide a detailed plan describing the proposed equipment and methods for production, delivery, and placement of all concrete for this project. This includes concrete for precast units, tremie infill, and cast in place. Describe how batch plants will be designed with (backup components) to accomplish uninterrupted placements, and methods to be used to maintain concrete temperature and slump.
- G. Method of Tainter Gates Installation

Provide a detailed plan for assembly and installation of the tainter gates required for this project. Include a plan stating how the dual tainter gate cylinders will be operated with the control system. This may include responsible players and their roles in coordinating this system to assure a timely working product.

H. Schedule and Sequence of Work

(a) Network Analysis

Submit a summary network analysis (utilizing software described in section 01320; For the proposal only the offeror may use P3 version 3.1 or later.) showing how the work will be performed and completed. The Government estimates that the work can be completed in 2,200 calendar days. The offeror will propose the contract duration for completing the work. The contract duration will be agreed to with the successful offeror and will be inserted into Special Clause 1.3. The analysis must acknowledge the conditions noted in Section 00800 Special Clauses 1.6, 1.11, 1.43 and 1.62. The schedule should be sufficiently detailed to show the Contractor has a complete understanding of the project's requirements. The schedule should contain between 250 and 400 activities.

The schedule (Section 1320, paragraph 3.4) shall allow 90 calendar days for the A/E to complete the design for the following critical items listed below, if applicable. This allowance shall include consideration of the kickoff meeting and design scope development between the Contractor, the A/E and the Government. The design time is based upon contractor means and methods generally following concepts depicted in the "F" drawings and starting upon receipt of applicable information from the contractor. In addition to the design duration identified, the schedule shall include 30 days for Government and Contractor review/comments of the preliminary designs and 14 days after resolution of the comments for the A/E to submit the final design. Guidance for the design time required, for some additional items not listed below, can be found in both the Government's Construction Schedule and the Submittal Register, but Actual durations will be mutually agreed upon after Notice to Proceed and after design scope development for the specific design services for each task. (Design times for the lifting frames are not listed below because they are not required until the beginning of Phase II.)

DWG

COMPONENTS

F-56	Sleds for SBS-1, SS-1, SBS-2 to 5, SS-2 to 5 and LP-1 to 6
F-57	Gripper Jacks
F-58	Skidway (does not include precast yard operation)
F-59	Field Demonstration Tremie Concrete Tests
F-61	Marine Skidway (does not include precast yard operation)
F-62	Cradle/s (for sleds listed above)
F-64/65	Lifting/Mating Details
F177/178	Mooring Anchors and Dolphins

(b) Sequence of Work

Submit a brief narrative description of how major milestones will be accomplished. Include the estimated manpower levels, number of shifts, and number of workdays per week to accomplish the work in the major milestone durations. The narrative shall be such detail that's its clear to the evaluator what will be accomplished in the river, each low water season.

(c) Connection to the MIS

Submit a narrative that states how the network analysis schedule will be tied to the MIS system proposed above. Include details of how the contractor would propose to adjust future activity budgets based on similar past experience to obtain the best possible forecast of future expenditures. This may include how budgeted costs in the schedule will be compared to and or linked with the actual costs from the cost accounting system.

I. Special Equipment Plan

Provide a description of all specialized major equipment required for this project. Include the design and fabrication requirements, current location, availability, and schedule for delivery.

2.4 Section IV. Past Performance/Quality:

Provide references for all of the experience identified in 2.1 A. Reference information should include project name, location, owner's name, point of contact and telephone number. Also include any ratings, letters, awards, etc which support past performance on these projects. The Government may also use other methods to obtain past performance information such as CCASS, contacting references, etc.

2.5 Section V. Safety.

A. Provide a detailed narrative describing the contractors plan for maintaining a safe work project. Identify all hazardous activities (including diving operations) and plans for mitigation. Describe the Managements commitment to safety and chain of authority on safety related items. Describe any safety incentive plans and special training that will be used.

B. Describe the safety performance and record of the prime contractor and subcontractor(s) listed in paragraph 2.1.A within the last five years. Provide the following information:

- a. Workman's Compensation Experience Modification Insurance Rating over the last five-year period. Submit the Prime Contractor's Experience Modification Rate (EMR), showing evidence that the EMR was calculated by a professional rate service organization such as the National Council of Compensation Insurance.
- b. Provide OSHA Inspections or statements of no inspection over the last five (5) year period. Any fatalities, foreign or domestic must be documented.

2.6 Section VI. Sub-Contracting Information (Go, No-Go)

- A. Past Performance on Utilization of Small, Small Disadvantaged, and Women-Owned Small Businesses. All firms must identify your efforts to comply with Clause 52.219-8, Utilization of Small, Small

Disadvantaged, and Women-Owned Small Business Concerns. If you are a large business, provide copies of subcontracting plans, both initial and final, that clearly represent your efforts to comply with FAR Clause 52.219-9, Small, Small Disadvantaged, and Women-Owned Small Business Subcontracting Plan. If you are a small business, provide details of efforts on previous projects that clearly represent your efforts to comply with FAR Clause 52.219-8 Information is to be limited to projects identified under Section II, Experience.

- B. Subcontracting Plan for Large Business. Large business offerors shall submit a subcontracting plan in accordance with the above numbered FAR Clauses. To be acceptable, plans must adequately address the six required statutory elements and provide sufficient information to enable the Contracting Officer to answer affirmatively questions A through H of Appendix CC, Part 2, AFARS 19.705. You may use the attached sample subcontracting plan as a starting point. Percentage goals apply to the total amount being subcontracted. The current goals for the Louisville District are 71.1% to Small Business, 10.2% to Small Disadvantaged Business, 10.6% to Women-Owned Small Business, 3.0% for Hubzone Businesses, and 3.0% to Veteran Owned Small Business.

2.7 Section VII. Pro Forma Requirements

The Offeror shall submit a completed original of Section 00600, Representations and Certifications.

The Offeror shall submit the following company policies, which will be used to help the Government and selected offeror to negotiate the Advance Agreements for the following:

1. Personnel and Company policies;
2. Compensation for personal services, including but not limited to allowances for off-site pay, incentive pay, hardship pay, cost of living differential and termination of defined benefits pension plans.
3. Travel and relocation cost;
4. Overtime policy (management staff);
5. Hourly rates, overtime & benefits for skilled trades (including escalation).

The above shall be submitted with the proposal in appendices. The firm selected for award should be prepared to negotiate these procedures immediately after award of the contract.

The following Advance Agreements are anticipated and will be negotiated with the firm selected for award. Do not submit them with your proposal in response to this RFP.

1. Management Information System
2. Government property management plan;
3. Training and education cost;
4. Cost of automatic data processing equipment;
5. Procurement plan and procedures;
6. Manpower utilization;
7. Work allocation document (WAD) procedures;
8. General and administrative cost (e.g., corporate, division, or branch allocation) attributable to the general management, supervision, and conduct of the contractor's business as a whole.
9. Security Plan.
10. Contract closeout
11. Claims
12. Change Management
13. Equipment Cost and procedures (ownership rates, standby by rates, rental rates and decision making process for equipment).

As Government and contractor identify procedures that require an agreement they will be negotiated and become a part of the process.

2.8 Section VIII. Cost Proposal.

The offeror shall submit their cost proposal in a separate envelope, Standard Form 1442 and Section 00010, Price Breakdown Schedule in original only. Both of these forms are included in Section 00010 of this solicitation. **The cost breakdown schedule provides a line for the 3% base fee and a line for the proposed award fee. The offeror is required to propose the award fee. The maximum allowable award fee is 11%. Include the basis for the award fee by addressing things such as technical, management, cost control, project duration and capital investment.** Include an expenditure curve by fiscal year based on your schedule.

The price evaluation team request the offeror submit their cost following the detailed break down schedule included at the end of this section.

The Cost Proposal will consist of:

- A. A signed Standard Form 1442
- B. Acknowledgement of all Amendments (if any) to the solicitation
- C. A completed Section 00010 (Pricing Schedule) & Estimated Cost Breakdown (see instructions for the breakdown schedule later in this Section)
- D. Data on Home and Field Office Indirect Cost Rates (Prime Contractor and all Team Subcontractors):

A recent (within the last 12 months) audit performed by the company's Federal cognizant audit agency showing ALL current indirect cost rates and their application to direct labor and other direct costs OR a current Forward Pricing Rate Agreement (FPRA) from the Federal cognizant audit agency giving the same information.

If no such audit or FPRA exists or if it is older than 12 months, provide a complete breakdown of all indirect costs rates to be applied during the life of this contract showing all expenses and the calculation (the base used to calculate the percentage), and the application of all indirect to both labor and all other direct costs.

All indirect cost rates means all multipliers on labor and other direct costs including but not limited to (depending on each offeror's accounting system) fringe benefits (labor burden), overhead, and general & administrative (G&A), mark-up to subcontractors' prices, etc. Provide the information for both home office and field office as applicable. The information is required from the prime and all team subcontractors. Other direct costs include but are not limited to (depending of each offeror's accounting system) such things as copies, faxes, telephone calls, computer usage, equipment, subcontractors' costs, travel, etc. Each offeror will provide a clear and concise description of how the indirects are applied and to what costs, showing the total multiplier formula on labor and all other direct costs.

If the prime or the team subcontractors, in preparing the Cost Proposal's Estimated Cost of the contract, used indirect costs rates above or below the rates supported by the current audit (or by the FPRA or supported by the breakdown of the (un-audited) indirect cost rates), the Cost Proposal will include a thorough discussion of the rates used and if the rates have been escalated from current rates, the prime and subcontractors will provide the justification (with support such as historical data, trends, etc.) for the indirect cost rates used.

PRIME CONTRACTOR EXPERIENCE

Your firm's name _____

Name of Project/Location _____

General Scope of Project _____

Your role (prime, joint venture, subcontractor) and work your company self-performed _____

Construction Cost:

At Award: \$ _____

Reason for the cost growth:

Final Cost \$ _____

Award Date: _____

Schedule Completion: _____

Reason for the time growth:

Actual Completion: _____

Extent and type of work you subcontracted out _____

Owner's Point of Contact (POC) for reference (name and company and telephone number)

SUBCONTRACTOR EXPERIENCE

Name of your firm _____

Project Name/Location _____

General Scope of Project _____

Your role (prime, joint venture, subcontractor) and the work your firm self-performed

Description of work subcontracted to others _____

Your subcontract amount:

At Award: \$ _____

Reason for the cost growth:

Final Cost \$ _____

Award Date: _____

Schedule Completion: _____

Reason for the time growth:

Actual Completion: _____

Your performance evaluation by Owner _____

Your performance evaluation by Prime _____

Owner's POC for reference (name and company and telephone number)

Prime contractor's POC for reference (name and company and telephone number)

Past Working History/Relationship with Prime (including joint ventures and partnering experience) _____

PERSONNEL RESUME

Name and Title _____

Name of your firm _____

No. of years: With this firm _____ With other firms _____

Education (Degree(s)/Year/Specialization):

Active Registration: No. _____ State _____ Year _____

Your Assignment on this project

Your specific experience and qualifications relevant to this project. Include a POC with phone number for the two most recent projects described:

Project Name and Location: _____

General Scope of Project: _____

Your Role in the Project and a Description of the Duties You Performed: _____

Owner's POC for reference (name and phone number): _____

Project Name and Location: _____

General Scope of Project: _____

Your Role in the Project and a Description of the Duties You Performed: _____

Owner's POC for reference (name and phone number): _____

SUPPLIER EXPERIENCE

Name of your firm _____

Project Name/Location _____

General Scope of Project _____

Your role (prime, subcontractor, supplier) and the work/products your firm self-performed

Description of work subcontracted to others _____

Your subcontract amount:

At Award: \$ _____

Reason for the cost growth:

Final Cost \$ _____

Award Date: _____

Schedule Completion: _____

Reason for the time growth:

Actual Completion: _____

Your performance evaluation by Owner _____

Your performance evaluation by Prime _____

Owner's POC for reference (name and company and telephone number)

Prime contractor's POC for reference (name and company and telephone number)

Past Working History/Relationship with Prime (including joint ventures and partnering experience) _____

COST BREAKDOWN SCHEDULE

The contractor shall complete the price breakdown schedule to the level of detail requested as part of the minimum Work Breakdown Structure (WBS) and submit it as a part of his proposal. See Section 00115. This schedule is not intended to be a means of making payment. The quantities are for proposal preparation purposes only and to insure consistency of offers. The price breakdown will be evaluated by the PEB as one means to evaluate cost and to insure the scope of work is understood. All costs should be included in these items and distributed as appropriate. In the event it is unclear where to put a certain cost the contractor should include it in the item that seems most applicable. The descriptions provided with the item is not intended to be complete but rather provide some general guidance to aid in submitting the cost proposal in the hope of getting consistency amongst perspective offers.

Offeror's are only required to provide to the level of detailed indicated by an asterisk in the WBS below. Further breakdown information of the cost may be provided pursuant to other levels of the WBS if the offeror chooses.

If a offeror's approach to the project changes an of the given quantities the offeror shall revise the quantities to best represent any increase or decrease to best reflect the most realistic cost of the project.

The quantities shown are the final in place estimates by the Government. They do not include miscellaneous supports, scrap, waste, etc. The offeror needs to adjust his price or revise the quantity to reflect these other cost.

Operational costs are intended to include equipment, labor and material/supply costs paid on each voucher to assure that the contractor maintains his operational capabilities. It is not intended to include additional personnel necessary to operate plant/equipment during actual production, but only the minimum personnel required on site at all times to assure that the plant/equipment remain full operational.

WBS - Feature/Subfeature Special Project Indicator	WBS -Element	Special Indicator #1	Special Indicator #2	Special Indicator #3	Quantity	Unit	Unit Price	Total	
0401	Main Dam								
0401	R 00	Reoccurring Costs							
*	0401	R 00	01	Field Overhead					
	0401	R 00	01	01	Labor				
	0401	R 00	01	01	01	Management	72	MO	_____
	0401	R 00	01	01	02	Engineering	72	MO	_____
	0401	R 00	01	01	03	Quality Control	72	MO	_____
	0401	R 00	01	01	04	Administration	72	MO	_____
	0401	R 00	01	01	05	Safety/Security	72	MO	_____
	0401	R 00	01	01	06	Shop	72	MO	_____
	0401	R 00	01	01	07	Other	72	MO	_____

0401 R 00 01 02	Plant/Equipment				
0401 R 00 01 02 01	Office	72	MO	_____	_____
0401 R 00 01 02 02	Storage	72	MO	_____	_____
0401 R 00 01 02 03	Vehicles	72	MO	_____	_____
0401 R 00 01 02 04	Equipment Shop				
0401 R 00 01 02 05	Other	72	MO	_____	_____
0401 R 00 01 03	Materials/Supplies				
0401 R 00 01 03 01	Communications	72	MO	_____	_____
0401 R 00 01 03 02	General Utilities	72	MO	_____	_____
0401 R 00 01 03 03	Office Supplies	72	MO	_____	_____
0401 R 00 01 03 04	Portable Toilet Facilities	72	MO	_____	_____
0401 R 00 01 03 05	Other	72	MO	_____	_____
0401 R 00 01 04	Miscellaneous Costs				
0401 R 00 01 04 01	Relocation Costs	72	MO	_____	_____
0401 R 00 01 04 02	Travel	72	MO	_____	_____
0401 R 00 01 04 03	Insurance	72	MO	_____	_____
0401 R 00 01 04 04	Winterize Operations	5	EA	_____	_____
0401 R 00 01 04 05	Subcontracts		LS	_____	_____
0401 R 00 01 04 06	Other	72	MO	_____	_____
* 0401 R 00 02	Operational Costs				
0401 R 00 02 01	Land Based				
0401 R 00 02 01 01	Concrete Batch Plant	72	MO	_____	_____
0401 R 00 02 01 02	Precast Concrete Manufacturing Facilities	72	MO	_____	_____
0401 R 00 02 01 03	Storage Facility	72	MO	_____	_____
0401 R 00 02 01 04	Other	72	MO	_____	_____
0401 R 00 02 02	River Based				
0401 R 00 02 02 01	Concrete Batch Plant	72	MO	_____	_____
0401 R 00 02 02 02	Shell Installation Barge	72	MO	_____	_____
0401 R 00 02 02 03	Screed Barge	72	MO	_____	_____
0401 R 00 02 02 04	Pile Installation Barge	72	MO	_____	_____
0401 R 00 02 02 05	Vibro-Compaction Barge	72	MO	_____	_____
0401 R 00 02 02 06	Workboats	72	MO	_____	_____
0401 R 00 02 02 07	Misc. Crane Barges	72	MO	_____	_____
0401 R 00 02 02 08	Other	72	MO	_____	_____
0401 M 00	Mobilization and Preparatory Work				
* 0401 M 00 01	Mobilization				
0401 M 00 01 01	On-site				
0401 M 00 01 01 01	Land Based Cranes & Equipment		LS	_____	_____
0401 M 00 01 01 02	Floating Cranes & Equipment		LS	_____	_____

0401 M 00 01 02	Off-site	LS	
0401 M 00 01 03	Subcontractors	LS	
0401 M 00 01 04	Other	LS	
0401 M 00 02	Temporary Buildings		
0401 M 00 02 01	On-site		
0401 M 00 02 01 01	Office	LS	
0401 M 00 02 01 02	Shops	LS	
0401 M 00 02 01 03	Storage	LS	
0401 M 00 02 01 04	Other	LS	
0401 M 00 02 02	Offsite		
0401 M 00 03	Mooring Points	LS	
0401 M 00 04	Approach Roads	LS	
0401 M 00 05	Precast Yard & Marine Skidway		
0401 M 00 05 00 01	Clearing & Grubbing	LS	
0401 M 00 05 00 02	Earthwork and Site Grading	LS	
0401 M 00 05 00 03	Riprap/Bank Protection	LS	
0401 M 00 05 00 04	Roadways	LS	
0401 M 00 05 00 05	Material Storage Facilities	LS	
0401 M 00 05 00 06	Fixed Batch Plant	LS	
0401 M 00 05 00 06	Material Conveyors	LS	
0401 M 00 05 00 08	Loaders	LS	
0401 M 00 05 00 09	Skidway & Launching Facilities	LS	
0401 M 00 05 00 10	Casting Beds	LS	
0401 M 00 06	Specialty Construction Equipment		
0401 M 00 06 00 01	Shell Installation Barge	LS	
0401 M 00 06 00 02	Screed Barge	LS	
0401 M 00 06 00 03	Pile Installation Barge	LS	
0401 M 00 06 00 04	Vibro-Compaction Barge	LS	
0401 M 00 06 00 05	Workboats	LS	
0401 M 00 06 00 06	Misc. Crane Barges	LS	
* 0401 D 00 07	Demobilization		
0401 D 00 07 01	General Demobilization	LS	
0401 D 00 07	Site Restoration		
0401 D 00 07 02 01	Existing Haul Road Removal	LS	
0401 D 00 07 02 02	Seeding	LS	
0401 D 00 07 02 03	Access Roads	LS	
0401 D 00 07 02 04	Parking Lots	LS	
0401 D 00 07 02 05	Fill Over Precast Yrd Foundation	LS	
0401 D 00 07 02 06	Cell"A" Removal	LS	

0401 D 00 07 02 07	Erosion Control			LS		
0401 E 10	Earthwork for Structures					
* 0401 E 10 01	Excavation					
0401 E 10 01 00 01	Excavation - Tainter Gate Section	175600	CY			
0401 E 10 01 00 02	Excavation - Navigable Pass Section	232400	CY			
* 0401 E 10 02	Deposite Suitable Material Back to the River					
0401 E 10 02 00 01	Place Material in River - Tainter Gate Section	43000	CY			
0401 E 10 02 00 02	Place Material in River - Navigable Pass Section	43000	CY			
* 0401 E 10 03	Disposal of Material to Shore					
0401 E 10 03 00 01	Shore Disposal - Tainter Gate Section	132600	CY			
0401 E 10 03 00 02	Shore Disposal - Navigable Pass Section	175500	CY			
* 0401 E 10 04	Matl. - Infill Zones of Dam					
0401 E 10 04 00 01	General Backfill #6 -Tainter Gate Section	109990	CY			
0401 E 10 04 00 02	General Backfill #6 -Navigable Pass Section	250240	CY			
* 0401 E 10 05	Maintenance Dredging Total Project					
0401 E 10 05 00 01	Maintenance Dredging - Total Project	300000	CY			
* 0401 E 10 06	Erosion Control					
0401 E 10 06 00 01	Purchase Articulated Mats	2000	SY			
0401 E 10 06 00 02	Install/Remove Articulated Mats	11000	SY			
* 0401 E 10 07	Vibro-Compaction					
0401 E 10 07 00 01	Tainter Gate Section	3500	LF			
0401 E 10 07 00 02	Navigable Pass	10000	LF			
Tainter Gate Section						
0401 T 07	Bridges, Superstructure and Deck					
* 0401 T 07 01	Tainter Gate Bridge					
0401 T 07 01 00 01	Concrete			LS		
0401 T 07 01 00 02	Reinforcing Steel			LS		
0401 T 07 01 00 03	Outfitting for Installation			LS		
0401 T 07 01 00 04	Load Out			LS		
0401 T 07 01 00 05	Transport to Position			LS		
0401 T 07 01 00 06	Lift, Position & Install Shells			LS		
* 0401 T 11	Foundation Work					
0401 T 11 02	Sitework					
0401 T 11 02 00 01	Purchase/fabrication of frames	387	TN			
0401 T 11 02 00 02	General Handling of Frames	96	HR			
0401 T 11 02 00 03	Pile Materials	46737	VLF			
0401 T 11 02 00 04	Pile Driving	46737	VLF			

0401	T	11	02	00	05	Pile Testing		LS		
0401	T	11	02	00	06	Pile Anchorage at Shells	1	LS		
0401	T	11	02	00	07	Fab and Install Geotextile Fabri	143335	SF		
* 0401 T 12 Seepage Control										
0401	T	12	02			Sitework				
0401	T	12	02	00	01	Temporary Cutoff Wall	22936	SF		
0401	T	12	02	00	02	Handling of Reprocessed Sheets	2756	TN		
0401	T	12	02	00	03	Sheet Pile Frames for Walls	36.6	TON		
0401	T	12	02	00	04	Sheet Piling	42826	SF		
0401	T	12	02	00	05	Master Piles	577	TN		
0401	T	12	02	00	06	Pile Driving	24460	SF		
0401	T	12	02	00	07	Drainage System (Piping, etc.)	6	EA		
0401	T	12	02	00	08	Drainage Layer	32020	CY		
* 0401 T 25 Embedded Metal Work										
0401	T	25	05			Metals				
0401	T	25	05	00	01	Bulkhead Slot Beams	199500	LB		
0401	T	25	05	00	02	Bulkhead Slot Corner Protection	104750	LB		
0401	T	25	05	00	03	Tainter Gate Side Seals & Beams	201195	LB		
0401	T	25	05	00	04	Lifting Frame Embeds	57	TON		
* 0401 T 32 Apron Stilling Basins Deflectors										
0401	T	32	03			Concrete				
0401	T	32	03	00	01	Concrete	10562	CY		
0401	T	32	03	00	02	Reinforcing Steel	1570	TN		
0401	T	32	03	00	03	Skirts				
0401	T	32	03	00	04	Pintles				
0401	T	32	03	00	05	Flat Jacks				
0401	T	32	03	00	06	Outfitting Shells for Installation	6	EA		
0401	T	32	03	00	07	Load Out Shells	6	EA		
0401	T	32	03	00	08	Transport Shells to Position	6	EA		
0401	T	32	03	00	09	Lift, Position & Install Shells	6	EA		
0401	T	32	03	00	10	Stilling Basin Tremie Concrete	16735	CY		
* 0401 T 52 Concrete Dam Overflow Section										
0401	T	52	03			Concrete				
* 0401 T 52 03 01 Sill Shell										
0401	T	52	03	01	01	Concrete	9998	CY		
0401	T	52	03	01	02	Reinforcing Steel	1625	TN		

0401	T	52	03	01	03	Skirts	3233	SF		
0401	T	52	03	01	04	Pintles	68	TON		
0401	T	52	03	01	05	Flat Jacks	158	EA		
0401	T	52	03	01	06	Outfitting Shells for Installation	6	EA		
0401	T	52	03	01	07	Load Out Shells	6	EA		
0401	T	52	03	01	08	Transport Shells to Position	6	EA		
0401	T	52	03	01	09	Lift, Position & Install Shells	6	EA		
0401	T	52	03	01	10	Tremie Concrete - Sill	26045	CY		
*	0401	T	52	03	02	Lower Pier Shell				
0401	T	52	03	02	01	Concrete	6100	CY		
0401	T	52	03	02	02	Reinforcing Steel	1363	TN		
0401	T	52	03	02	03	Pintles	58	TON		
0401	T	52	03	02	04	Flat Jacks	96	EA		
0401	T	52	03	02	05	Outfitting Shells for Installation	6	EA		
0401	T	52	03	02	06	Load Out Shells	6	EA		
0401	T	52	03	02	07	Transport Shells to Position	6	EA		
0401	T	52	03	02	08	Lift, Position & Install Shells	6	EA		
0401	T	52	03	02	09	Tremie Concrete - Lower Pier	10785	CY		
*	0401	T	52	03	03	Upper Pier Shell				
0401	T	52	03	03	01	Concrete	1760	CY		
0401	T	52	03	03	02	Reinforcing Steel	275	TN		
0401	T	52	03	03	03	Flat Jacks	48	EA		
0401	T	52	03	03	04	Maintenance Platform	16.25	TON		
0401	T	52	03	03	05	Outfitting Shells for Installation	6	EA		
0401	T	52	03	03	06	Load Out Shells	6	EA		
0401	T	52	03	03	07	Transport Shells to Position	6	EA		
0401	T	52	03	03	08	Lift, Position & Install Shells	6	EA		
0401	T	52	03	03	09	Concrete - Upper Pier Closure	207	CY		
*	0401	T	52	05		Metals				
0401	T	52	05	01		Tainter Gates				
0401	T	52	05	01	01	Shop Fabrication	5	EA		
0401	T	52	05	01	02	Field Fabrication and Assembly	5	EA		
0401	T	52	05	01	03	Installation	5	EA		
0401	T	52	05	01	04	Install Gate Appurtenances	5	EA		
0401	T	52	05	01	05	Operating Machinery	5	EA		
0401	T	52	05	01	06	Hydraulic Cylinders	10	EA		
0401	T	52	05	01	07	Surface Prep and Painting	5	EA		
0401	T	52	05	01	08	Miscellaneous Metals -- Dam	15	TON		
*	0401	T	52	15		Mechanical				
0401	T	52	15	00	01	Compressed Air		LS		

0401	T	52	15	00	02	Non-Potable Water		LS		
0401	T	52	15	00	03	Hydraulic System		LS		
*	0401	T	52	16		Electrical				
0401	T	52	16	00	01	Electrical Distribution		LS		
0401	T	52	16	00	02	Power For Hydraulic Pumps		LS		
0401	T	52	16	00	03	Power for Machine House HVAC		LS		
0401	T	52	16	00	04	Branch Wiring and Devices		LS		
0401	T	52	16	00	05	Grounding / Lightning Protection		LS		
0401	T	52	16	00	06	Lighting Fixtures (Less Pier)		LS		
0401	T	52	16	00	07	Signal and Comm. Systems		LS		
0401	T	52	16	00	08	Control Panel Wiring		LS		
0401	T	52	16	00	09	PLC and Programming		LS		
0401	T	52	16	00	10	I/O, Field Devices and Wiring		LS		
0401	T	52	16	00	11	Cathodic Protection System		LS		
0401	T	52	16	00	12	Exterior (Pier) Lighting		LS		
*	0401	T	99			Associated General Items				
0401	T	99	01			Machine Houses and Misc. Const.		LS		
0401	T	99	02			Trunnion Girders				
0401	T	99	02	00	01	Concrete	387	CY		
0401	T	99	02	00	02	Trunnion Gdr Erection and Stress	10	EA		
0401	T	99	02	00	03	Prestressing Steel Support Fram	76022	LBS		
0401	T	99	03			Structure/Foundation Instrumentation		LS		
0401	T	99	04			Misc. Metals (Handrails, Stairs, Ladders..etc.)		LS		
Navigable Pass										
0401	N	11				Foundation Work				
*	0401	N	11	02		Sitework				
0401	N	11	02	00	01	Reconfigure TG Frames	372	TON		
0401	N	11	02	00	02	General handling of frames	96	HR		
0401	N	11	02	00	03	Piling Materials	90284	VLF		
0401	N	11	02	00	04	Pile Driving	90284	VLF		
0401	N	11	02	00	05	Pile Testing		LS		
0401	N	11	02	00	06	Pile Anchorage at Shells	972	TON		
0401	N	11	02	00	07	Fab and Install Geotextile Fabric	160250	SF		
*	0401	N	12			Seepage Control				
0401	N	12	02			Sitework				
0401	N	12	02	00	01	Sheet Piling	116418	SF		
0401	N	12	02	00	02	Master Piles	988	TN		

0401 N 12 02 00 03	Pile Driving	116418	SF		
0401 N 12 02 00 04	Drainage System (Piping, etc.)	12	EA		
0401 N 42	Fixed Weir (Weir and Abutm'ts)				
* 0401 N 42 01	Right Boat Abutment Shell				
0401 N 42 01 00 01	Concrete	1169	CY		
0401 N 42 01 00 02	Reinforcing Steel	158	TN		
0401 N 42 01 00 03	Outfitting Shells for Installation	1	EA		
0401 N 42 01 00 04	Load Out Shells	1	EA		
0401 N 42 01 00 05	Transport Shells to Position	1	EA		
0401 N 42 01 00 06	Lift, Position & Install Shells	1	EA		
0401 N 42 01 00 07	Tremie Concrete	1359	CY		
* 0401 N 42 02	Left Boat Abutment Shell				
0401 N 42 02 00 01	Concrete	1791	CY		
0401 N 42 02 00 02	Reinforcing Steel	174	TN		
0401 N 42 02 00 03	Outfitting Shells for Installation	1	EA		
0401 N 42 02 00 04	Load Out Shells	1	EA		
0401 N 42 02 00 05	Transport Shells to Position	1	EA		
0401 N 42 02 00 06	Lift, Position & Install Shells	1	EA		
0401 N 42 02 00 07	Tremie Concrete	1208	CY		
* 0401 N 42 03	Sheet Pile Cells/Fixed Wier Mods				
0401 N 42 03 00 01	Cut Off - Establish T.O.P. Elev.	759	LF		
0401 N 42 03 00 02	Excavate Interior of Cells	7200	CY		
0401 N 42 03 00 03	Unload barge, haul to fill area	8384	CY		
0401 N 42 03 00 04	Spread at fill area	8384	CY		
0401 N 42 03 00 05	Concrete Caps - mat'l & inst	2255	CY		
0401 N 52	Concrete Dam Overflow Section				
* 0401 N 52 01	Paving Blocks - Nav. Pass				
0401 N 52 01 00 01	Purchase/Fabrication of Frame	600	TON		
0401 N 52 01 00 02	Concrete	14473	CY		
0401 N 52 01 00 03	Reinforcing Steel	694	TN		
0401 N 52 01 00 04	Outfitting Shells for Installation	13	EA		
0401 N 52 01 00 05	Load Out Shells	13	EA		
0401 N 52 01 00 06	Transport Shells to Position	13	EA		
0401 N 52 01 00 07	Lift, Position & Install Shells	13	EA		
* 0401 N 52 02	Shells - Nav. Pass				

0401 N 52 02 00 01	Lifting and Tremie Frame		LS		
0401 N 52 02 00 02	Concrete	20075	CY		
0401 N 52 02 00 03	Reinforcing Steel	3508	TN		
0401 N 52 02 00 04	Outfitting Shells for Installation	12	EA		
0401 N 52 02 00 05	Load Out Shells	12	EA		
0401 N 52 02 00 06	Transport Shells to Position	12	EA		
0401 N 52 02 00 07	Lift, Position & Install Shells	12	EA		
0401 N 52 02 00 08	Tremie Concrete - Nav. Pass	32168	CY		
* 0401 N 52 03 Wicket Gates					
0401 N 52 03 00 01	Wicket	141	EA		
0401 N 52 03 00 02	Hurter	141	EA		
0401 N 52 03 00 03	Castings	141	EA		
0401 N 52 03 00 04	Bushings	141	EA		
0401 N 52 03 00 05	Pins & Retainers (Stainless)	141	EA		
0401 N 52 03 00 06	Installation at Dam Site	141	EA		
* 0401 N 99 Associated General Items					
0401 N 99 00 00 01	Wicket Pit Display Pit		LS		
0401 N 99 00 00 02	Maintenance Box	1	EA		
0401 N 99 00 00 03	Wicket Blanks	5	EA		
0401 N 99 00 00 04	Wicket Gate Needles	139	EA		
0401 N 99 00 00 05	Spare Wicket Gates	20	EA		
0401 N 99 00 00 06	TG Cylinder Pin Temp Platform	1	EA		
0401 N 99 00 00 07	Isolation Joint Lock and TG		LS		
0401 N 99 00 00 08	Isolation Joint TG and NP		LS		
0401 N 99 00 00 09	Isolation Joint LBA & Fixed weir		LS		
0401 N 99 00 00 10	Isolation Joint Mono. 12 and LBA		LS		
0401 N 99 03	Structure/Foundation Instrumentation		LS		
* 0401 G 99 Associated General Items					
0401 G 99 01	Tremie Concrete Test Pit		LS		
0401 G 99 02	Maint. and Ops. of the Resident Engr's Office	72	MOS		
0401 G 99 03	Mowing				
0401 G 99 03 01	Mow Access Road	36	EA		
0401 G 99 03 02	Mow Hillside	18	EA		
0401 G 99 03 03	Mow Entrance Road	126	EA		
* 0401 S 99 04 Stone Protection					
0401 S 99 04 01	15,720-pound Riprap	18720	TON		
0401 S 99 04 02	10,799-pound Riprap	58050	TON		

0401 S 99 04 03	5,529-pound Riprap	31400	TON	_____	_____
0401 S 99 04 04	3,200-pound Riprap	140000	TON	_____	_____
0401 S 99 04 05	2,333-pound Riprap	39000	TON	_____	_____
0401 S 99 04 06	1,638-pound Riprap	54000	TON	_____	_____
0401 S 99 04 07	691-pound Riprap	116000	TON	_____	_____
0401 S 99 04 08	Selected Fill Aggregate #6	200000	TON	_____	_____
0401 S 99 04 09	Drainage Stone Aggregate #1	150000	TON	_____	_____
0401 S 99 04 10	Leveling Aggregate #7	260000	TON	_____	_____
* 0401 G 99 05	Hydrographic Surveys				_____
0401 G 99 05 01	Mobilization for Scour Monitoring Surveys	20	EA	_____	_____
0401 G 99 05 02	Scour Monitoring Surveys	40	EA	_____	_____
* 0401 G 99 06	Miscellaneous Lock Work		LS	_____	_____

Sub-Total _____

Home Office Overhead _____

Sub-Total _____

3% Base Fee _____

Award Fee _____

Total Cost _____

SECTION 130**SECTION 00130**
PROPOSAL EVALUATION CRITERIA

1. **GENERAL.** A Source Selection Evaluation Board (SSEB), comprised of representatives of the Corps of Engineers, will evaluate the proposals. The Board will consist of two parts – a Technical Evaluation Board (TEB) and a Price Evaluation Board (PEB). The number and identities of offerors are not revealed to anyone who is not involved in the evaluation and award process or to other offerors. Proposals will be evaluated based on the factors described herein, and the basis of award is the Tradeoff Analysis Process.
2. **EVALUATION PROCESS.** The evaluation process essentially consists of four parts: proposal compliance review and responsibility determination, technical/quality evaluation, cost evaluation and cost/technical trade-off analysis.
 - 2.1. Proposal Compliance Review: This is an initial review to ensure that all required forms and certifications are complete and that both a technical and cost proposal was received and are in separate binders.
 - 2.2. Technical/Quality Evaluation: The TEB will evaluate and rate those proposals passing the first review, above. Proposals will be evaluated against the RFP requirements. Some factors will be rated using an adjectival -based system. Others will be rated on a “go, no-go” basis.
 - 2.3. Cost Evaluation: The PEB will evaluate cost proposals independent of technical/quality evaluation. The cost proposal will be evaluated using a cost realism and reasonableness determination (FAR15.305 and 15.404.1). The TEB will not have access to cost information until completion of the technical/quality evaluation.
 - 2.4. Cost/Technical Trade-off Analysis: After all above evaluations are complete, the SSA will compare the relative advantages and disadvantages of technical proposals and cost proposals. The Source Selection Authority (SSA) will then consider all factors using the tradeoff analysis procedure to determine the proposal offering the most advantage to the Government.
3. **EVALUATION FACTORS.** Proposals will be evaluated in accordance with the evaluation factors and sub-factors below, listed in descending order of importance. All evaluation factors, other than cost, when combined, are approximately equal to cost.
 - 3.1. Experience

A. Prime Contractor, and Subcontractor, Experience.

The TEB will evaluate both the extent and quality of recent experience in the ten areas identified in Section 00115, paragraph 2.1.A, Prime Contractor and Subcontractor Experience. Experience within the last 5 years will be rated more favorably. Experience prior to ten years will not be given consideration unless key personnel proposed for this project played a significant role and the project can be shown to be similar to this project considering changes in technology, materials, equipment, codes, etc. Documentation of successful completion of projects similar in nature and scope to this project will be favorably considered in the evaluation. Conversely, proposals that do not include substantial evidence that the offeror has experience, qualifications and production capability to successfully prosecute the proposed project will be unfavorably considered. (Similar to this project or in nature is defined as marine projects involving piles, precast elements, excavation, heavy lifts, tremie concrete placements, tainter gates, and wicket gates.) The TEB may give additional credit for previous successful working relationships with any proposed subcontractors.

B. Individual Personnel Experience.

The TEB will evaluate the adequacy and strength of key personnel listed in Section 00115, paragraph 2.1.B, Individual Personnel Experience. The TEB will also evaluate for compliance with specified

minimum requirements, degree of qualification and experience, familiarity with local conditions, etc. At a minimum the Project Manager shall have a minimum of five years experience as a project manager on heavy marine construction projects and have a degree in engineering or construction management. Project Engineer(s) at a minimum will have a degree in engineering, and a minimum five years heavy construction experience. If the Project Manager or Project Engineer has a professional registration the individual may be evaluated more favorably. The Project Superintendent shall have a minimum ten years of heavy and marine construction experience. The CQC System Manager and the other CQC Personnel will be evaluated using the qualification listed in Section 01451 paragraph 3.4. The Diving superintendent will be evaluated using the qualifications listed in Section 01353 paragraph 1.5. The Safety Specialist will be evaluated using the qualifications listed in Section 01525, paragraph 1.6.1. The Superintendents for all major subcontractors shall have a minimum of five years experience in the area work they are over seeing. The TEB may give additional credit for more experience, licenses, degrees beyond the minimum specified.

The Procurement Manager shall have a minimum four years experience in the areas of federal procurement/contracting. Experience with cost reimbursable contracts may be evaluated more favorably.

The Project Controls individual will possess at a minimum five years experience in the area of project management and controls, utilizing a CPM methodology. A working knowledge in the areas of scope, time, cost, resource, procurement, quality and risk management as outlined by PMI Body of Knowledge will be considered. An individual that demonstrates an understanding of the utilization of project management metrics such as earned value analysis and risk analysis assessment may be evaluated more favorably. A project Management Professional certification is a plus, but is not required.

The Cost Engineer shall have a minimum of five years of experience as a cost engineer in heavy marine construction projects. If, the individual is recognized as a Certified Cost Engineer (CCE) by the Association for Advancement of Cost Engineering International or other nationally recognized cost engineering society they may be evaluated more favorably.

3.2. Management

A. Operational Management Plan

The TEB will evaluate the offeror's MIS and cost control, based on firms experience and ability to demonstrate sound management practices with the systems identified in Section 00800, paragraph 1.85 Management Information System. Firms with more than three years experience with the system will be considered more favorably than those with less than three years or someone with no experience. Offeror's with a DCAA approved accounting system may be considered more favorably than those that are not approved.

B. Acquisition Management Plan

The TEB will evaluate the offeror's procurement plan & property control plans. Plans will be evaluated based on the Contractor's level of understanding of the procedures required to order materials, contract with subcontractor and suppliers, take delivery, manage inventory and avoid waste.

C. Management Plan.

The TEB will evaluate the offeror's ability to demonstrate sound management practices, both at the home office as well as at the project site. Comprehensive plans that demonstrate a clear understanding of the work and an ability to coordinate resources to ensure successful pursuit of the work will be evaluated favorably. Plans that do not demonstrate a clear understanding of the work, that do not demonstrate a capability to coordinate resources, or that do not demonstrate appropriate excess capacity will be evaluated less favorably. Plans will be evaluated based on the level of involvement the contractor will have in the management, oversight, control, and coordination of the work performed by subcontractors. Plans with more involvement may be rated more favorably. The TEB will evaluate the clarity, adequacy, capabilities and strengths of the offeror's organizational chart for managing a successful project. An organizational chart that clearly depicts a highly qualified on-site team supported by appropriate resources off-site and that clearly defines responsibilities will be evaluated favorably. Charts that are confusing, cluttered

with duplicative entries, or that do not clearly define responsibilities will be evaluated less favorably.

D. Labor Plan.

The TEB will evaluate the plan to assure that the contractor has adequate capacity to perform the work necessary to complete the project. If the contractor is working multiple shifts the plan shall address how these shifts will be staffed. Consideration will be given to those offerors who have knowledge of the local labor market.

3.3. Technical Approach

J. Method of Transport, Positioning and Set-Down of Precast Elements

Plans will be evaluated based on the Contractor's level of understanding of the procedures required to safely and efficiently transport, lift, position, and set-down the precast shells required for the dam. Procedures will be evaluated for impacts on the precast elements, the existing structures, and the river bottom. Plans that minimize these impacts will be evaluated more favorably.

K. Method of Maintaining Riverbed Stability

- a. Plans will be evaluated based on the Contractor's level of understanding of the equipment and procedures required to prevent scour of the riverbed and damage to the dam foundation during construction. Plans that identify conditions where the riverbed may be susceptible to scouring and the countermeasures that will be used in each situation will be evaluated more favorably. Plans that show a clear sequence of work that will minimize scour and loss of scour protection will also be rated more favorably. Plans that contain a quick response capability to scour problems will be evaluated more favorably.
- b. The TEB will evaluate the Contractors plan for placing the permanent scour protection. Plans that show that the contractor has a clear understanding of the procedure and equipment required to place the scour protection and how the work will be preformed in the varying river conditions will be evaluated favorably.

L. Method of Fabrication and Installation of Dam Foundation Piles

Plans will be evaluated on Contractor's level of understanding of the procedures required to fabricate and install the tainter gate, navigable pass, boat abutment, isolation joint foundation piles and cutoff wall master and sheet piles. Plans that identify the suppliers, fabricators, their general fabrication methods, and method of delivery to the site will be evaluated favorably. Plans that identify the methods and equipment required to install the foundation piles to the required tolerances will also be evaluated favorably.

M. Location and Method of Precast Element Construction

(a) The location of the facility will be evaluated, the TEB may evaluate a site more favorably the closer it is to the Olmsted site. However the level of preparation of the proposed site, site equipment, documentation of required licenses, and permits for an existing or new off site facility will be considered. More favorable scoring may be awarded to a site which is currently zoned for the type of work to be performed under this contract and which has environmental permits from all jurisdictions versus a site which is otherwise equal but has not yet been permitted.

(b) The casting facility will be evaluated based on the proposed equipment, flow of work, capacity of the facility (the ability to produce the required segments for each season) and the proposed load out plan/facilities.

(c) The evaluation of the plan describing precast element construction methods will be based upon the offeror's understanding of the potential difficulties entailed at each step of the particular construction processes, and the offeror's proposed methods of successfully completing each of these key portions of the project.

(d) The construction method and load out will be evaluated against the criteria established in Section 01710 paragraph 3.2.

E. Method of River Bottom Grading and Screeding

Plans will be evaluated based on the Contractor's level of understanding of the procedures required to grade and screed the river bottom. Plans that identify the methods and equipment required to provide a stable bottom with the required tolerances will be evaluated favorably. The screeding barge depicted in the F series of drawings will be the TEB base line for evaluating the offerors equipment.

F. Method of Concrete Production, Delivery, and Placement

Plans will be evaluated based on the Contractor's level of understanding of the procedures required to produce, deliver, and place concrete. Plans that provide excess capacity, backup systems to allow uninterrupted placements, quick delivery, and high quality concrete will be evaluated favorably.

G. Method of Tainter Gates Installation

Plans will be evaluated based on the Contractor's level of understanding of the assembly, installation and painting of the tainter gates. The TEB will evaluate how the tainter gates are handled, lifted and secured during erection. The setting of the maintenance bulkheads, unwatering, installation of hydraulic cylinders, testing and rewatering of the tainter gate bays will also be evaluated. Plans will also be evaluated based on the contractor's level of understanding of the operation and controls for the tainter gates.

H. Schedule and Sequence of Work

- a. **Network Analysis - The TEB will evaluate the schedule to assess the strength of understanding of events associated with coordinating design submittals and incorporating design comments, fast-tracking and completion requirements. The TEB will also evaluate the offeror's capability to complete the schedule within his proposed contract duration and the realism of the schedule. The Government reserves the right to negotiate with the offeror the contract duration prior to the contract award. The agreed to contract completion will be stated in Section 00800 paragraph 1.3.**
- b. Sequence of Work - The TEB will evaluate the offeror's ability to meet major milestones. Included in this examination will be a review of the estimated manpower levels, number of shifts, and number of workdays per week to accomplish the work for a particular milestone. How the contractor proposes to deal the river conditions and his ability to perform the in river work will be evaluated. A major milestone is defined as the work scheduled to be performed in each of the four in the river seasons as well as the initial season to mobilize and fabricate shells for the first in the river season.
- c. Connection to the MIS – The TEB will evaluate the offeror's proposed plan to see how effective it would appear to be in capturing the data necessary for the Government to monitor expenditures during future time periods. Documented historical experience and use of Earned Value type reports will also be evaluated. The types, frequency and accuracy of reports the contractor would propose to supply to the government will also be evaluated with higher ratings being applied to plans that effectively report future expenditures.

I. Special Equipment Plan

The contractor is responsible for all equipment necessary to construct the project. The bid documents show conceptual plans for some of the specialized equipment for constructing the project. The SSEB will evaluate the offerors specialized equipment proposed for this project, including the design and fabrication requirements, availability and location of existing equipment, and the delivery schedule for all the specialized equipment.

3.4. Past Performance/Quality:

The TEB will evaluate the degree of successful completion of all experience identified. Documentation of successful completion of projects similar in size, scope, complexity and dollars will be favorably considered. Conversely, offers which do not include substantial evidence of successful completion will not be favorably considered. The Government reserves the right to check any or all cited references to verify supplied information and to assess owner satisfaction. The Government may also use other tools such as CCASS, ACASS, Dun & Bradstreet, etc. to gather information regarding an offeror's qualifications and past performance.

3.5. Safety.

- A. The TEB will evaluate the offeror's plan for maintaining a safe project. His identified hazardous activities, proposed safety training and safety incentive plan based on the extent of coverage of the required safety information, the level of importance defined by management commitment, the proposed response to safety issues that arise, and proposed training and incentive methods.
- B. The TEB will rate the past safety performance of the Contractor based on the following:
 - (a) The Workman's Compensation Experience Modification Insurance Rating number will be compared with the normal industry frequency rate of 1.0. If Workman's Compensation Experience Modification Insurance Rating number submitted with the proposal is equal to or lower than 1.0, the proposal may be scored more favorably than a proposal with a Workman's Compensation Experience Modification Insurance Rating number rating exceeding 1.0.
 - (b) Results of OSHA inspections in the previous five years identifying any willful or severe violations or citations, or fatalities, either foreign or domestic, may be scored less favorably than previous inspection results without willful or severe violations/citations or fatalities.

3.6. Subcontracting Information. This factor will be rated on a "go, no-go" basis.

- A. Past Performance on Utilization of Small, Small Disadvantaged and Women-Owned Small Business. The TEB will evaluate the clarity, adequacy, capabilities and strengths of the offeror's past efforts to comply with FAR Clause 52.219-8, Utilization of Small, Small Disadvantaged, and Women-Owned Small Business Concerns. If a large business firm, the SSEB will evaluate the successes of meeting and/or exceeding the goals on previous projects containing subcontracting plans. If a small business firm, the SSEB will evaluate the efforts made on past projects to comply with FAR Clause 52.219-8, the submitted information will be rated Go.
- B. Subcontracting Plan for Large Business. The plan will be evaluated for acceptability in accordance with AFARS 19.705. To be acceptable, subcontracting plans must:
 - (a) Adequately address the required statutory elements.
 - (b) Provide sufficient information to enable the Contracting Officer to answer affirmatively questions A through H of Appendix DD (AFARS 19.705).
 - (c) To be acceptable, subcontracting plans must be rated 71 percent or higher under the AFARS evaluation system. Any subcontracting plan that is rated 70 percent or less will be carefully considered for acceptability. If discussions with offerors are necessary, those areas where the plan is deficient will be reviewed with the offeror with the goal of correcting deficiencies.

3.7. Pro Forma Requirements

The TEB will review the company policies that will lead to the Advance Agreements and will rate them on a “go, no-go basis. If discussions with offerors are necessary, those areas where the plan is deficient will be reviewed with the offeror with the goal of correcting deficiencies. The Government will negotiate the final advance agreements with the successful offeror.

3.8. Cost Proposal:

The total cost including the base fee and the proposed award fee will be evaluated by the PEB for reasonableness and realism through the use of cost analysis. Cost analysis will also be used to determine price reasonableness; whether the offeror’s proposal reflects a thorough understanding of the project requirements and whether the labor rates and material rates build ups are consistent with the methods described in the offeror’s proposal. The PEB will consider innovative construction methods, construction efficiencies and realistic cost assessments more favorably.

The PEB’s will review the proposed award fee in light of the offeror’s level of professional and managerial skills proposed whose skills, facilities and technical assets can be expected to lead to efficient and economical contract performance.

- A. The technical factor will look at how the offeror has developed or is applying advance technologies and his effort to overcome difficult technical obstacles.**
- B. The management factor will measure the offeror’s general management, material acquisition, direct labor and indirect cost. How intense the management effort is and its added value to overcome the difficulties, coordination and integration of the project will be evaluated.**
- C. The cost control factor takes into account an offeror’s previously demonstrated ability to perform similar task efficiently and economically or measures that are proposed that would result in productivity improvements and other cost reduction accomplishments that will benefit the Government.**
- D. The duration factor takes into account how the scheduled activities and the importance of hitting the windows of opportunity effects the timeliness, cost effectiveness and efficient performance of the contract.**
- E. The capital investment factor takes into account the contribution of the contractor investments to efficient and economical contract performance.**

Offerors are cautioned to distribute costs appropriately. The funding of this contract is based on Congress making appropriations for future fiscal years. The expenditure curve will be evaluated on the offerors ability to meet the FY04 anticipated amount of \$25 million and his ability to maintain a relative even earnings over the years, with the exception of the initial and final fiscal year.

SECTION 00600 - REPRESENTATIONS & CERTIFICATIONS

The following have been deleted:

52.219-1 Alt I

Small Business Program Representations (Apr 2002)

APR 2002

Alternate I

SECTION 00700 - CONTRACT CLAUSES

The following have been modified:

52.231-5000 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE
MAR 1995)--EFARS

(a) This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions **of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region II**. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

(End of clause)

(End of Summary of Changes)

Amdt #0004

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Amendment #0004
SECTION 00800

SPECIAL CLAUSES
11/01

PART 1 GENERAL

1.1 REFERENCES - NOT USED

1.2 SUBMITTALS

Government approval/acceptance is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Pollution Prevention Plan; G

Safety Specialist Qualifications; G

***1**

Accident Prevention Plan-including Activity Hazard Analysis (AHA)
Alt. I ***1**

Drug Free Work Place - See Section 0700 Clause 52.223.6; G

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SD-11 Closeout Submittals

As-Built Drawings; G

*1

1.3 COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK

The Contractor shall be required to commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, prosecute said work diligently, and complete the entire work ready for use not later than **[blank to be filled in at award]** calendar days after date of receipt of notice to proceed. The time stated for completion shall include as-built drawings, O&M manuals, operational tests/reports/training/instructions, equipment lists, and final cleanup of the premises. The work associated with the Locks **shall be scheduled to be** completed and ready for use no later than 550 calendar days after date of receipt of notice to proceed. *1

1.4 NOT USED

1.5 NOT USED

1.6 SCHEDULE FOR RIVER WORK

No work in the river will be required during the period between 01 December through 15 June inclusive. The Contractor may, however, perform work in the river during all or any part of this period upon giving prior written notice to and receiving approval from the Contracting Officer.

1.7 CONTRACT DRAWINGS AND SPECIFICATIONS

a. At award, the Government will furnish the Contractor a compact disk containing all technical contract documents. This disk will include a complete set of drawing files and technical specification files which have all amendments incorporated. The disk will contain drawing files in CALS Type 4 format and technical specifications in PDF format.

The CALS files and the PDF files are being provided for the Contractor's use in printing hard copies of contract documents.

In addition, native CADD files and Specsintact files are provided in accordance with "AS-BUILTS DOCUMENTS" paragraph for the Contractor's use in developing as-built plans and specifications.

b. The Contractor shall--

(1) Check all drawings furnished on the CD-ROM immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer in writing that the drawings have been checked and describe any of the discrepancies;

(4) Reproduce and print contract drawings and specifications as needed.

c. Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

d. The work shall conform to the specifications and the contract drawings identified on index of drawings **at the beginning of each volume of drawings (Sheet X-1, X-2, X-3, X-4 and X-4A).**

1.8 AS-BUILT DOCUMENTS

1.8.1 General.

This section covers the completion of as-built drawings and as-built specifications, as a requirement of the contract.

1.8.1.1 As-Built Drawings

An as-built drawing is a construction drawing revised to reflect the final as-built conditions of the project because of modifications, changes, corrections to the project design required during construction, submittals and extensions of design. The term "red line mark-ups" are field changes used to revise contract drawings to be used for the "RECORD DRAWING AS-BUILTS".

1.8.1.2 As-Built Specifications:

As-built specifications are the construction specifications as modified by changes (contract mods, and approved variations from the construction specifications which did not result in contract mods).

1.8.2 Maintenance of Working As-Built Drawings

*1

The Contractor shall revise 2 sets of paper prints by red-line process to show the as-built conditions during the prosecution of the project. These as-built marked prints shall be kept current on a weekly basis and available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. Changes must be reflected on all sheets affected by the change. The working as-built marked prints will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor before submission of each monthly **voucher**. The working as-built mark-ups shall show the following information, but not be limited thereto: *1

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be

determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.

b. The location and dimensions of any changes within the building structure.

c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

d. Additional as-built information that exceeds the detail shown on the Contract Drawings. These as-built conditions include those that reflect structural details, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations and layouts, equipment, sizes, mechanical room layouts and other extensions of design, that were not shown in the original contract documents because the exact details were not known until after the time of approved shop drawings. It is recognized that these shop drawing submittals (revised showing as-built conditions) will serve as the as-built record without actual incorporation into the contract drawings. All such shop drawing submittals must include, along with the hard copy of the drawings, CADD files of the shop drawings in a commercially available digital format, compatible with the Using Agency System (see paragraph "Computer Aided Design and Drafting (CADD) Drawings"). All shop drawings which require submittal of CADD files are indicated in the submittal register located at the end of this section.

e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

f. Changes or modifications which result from the final inspection.

g. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the red line mark-ups.

h. Since borrow material for this project is from sources on Government property, or since Government property is used as a spoil area, the Contractor shall furnish an aerial bathymetric map of the entire site to include the disposal area at the start of construction and at the completion.

i. If fire protection and fire detection related systems are included in this project, the as-built shop drawings will include detailed information for all aspects of the systems including wiring, piping, and equipment drawings.

The Contractor will be provided files at the beginning of construction for use during the construction phase which are to be maintained during construction and for the preparation of as-builts. The Contractor shall enter changes and corrections on blue line prints on a weekly basis in accordance with Paragraph "Maintenance of Working As-Built Drawings" and

provide to the contracting officer to use in updating the CADD as-built drawings on a monthly basis. The paper documents shall be available at all times and shall be provided promptly to the Contracting Officer when requested.

*1

1.8.3 Scheduling and Cost of Preparing As-Built Drawings

The Contractor shall include in his schedule of values, the cost of as-built document preparation. This value shall include all requirements of this clause:

- maintenance of working as-built drawings (red-line mark-ups)
- maintenance of working as-built specifications
- conversion of submittals and other miscellaneous documents into electronic files
- creation of "Record As-Built Specifications" (MicroSoft Word specifications or by manually prepared documents as specified herein.)
- creation of a CD containing all required files.
- submittal of as-built documents in the required media forms and numbers of copies

*1

1.8.4 Not used.

1.8.5 Preparation of Final As-Built Drawings.

In the event the Contractor accomplishes additional work which changes the as-built conditions of the facility, after final submission of the working as-built drawings, he shall be responsible for the addition of these changes to the working as-built red line mark-ups and also to the final as-built documents.

1.8.6 Markings and Indicators

Changes shall be annotated with a triangle and sequential number at the following locations:

- a. bottom of the revised detail
- b. right hand and bottom border aligned with the revised detail
- c. the revision block of the title block.

Separate markings shall be made for each modification negotiated into the contract.

1.8.7 Preparation of Final As-Built Specifications

Final as-built specifications shall be prepared in Specsintact and the electronic files shall be placed on the same CD-ROM that contains the as-built CADD files, if applicable. The front sheet of the specifications shall contain an identification which clearly labels the specifications as representing as-built conditions and shall be dated with the date of the submittal.

1.8.8 Preparation of Other As-Built Documents

All other non-electronic documents which may include design analysis,

catalog cuts, certification documents that are not available in native electronic format shall be scanned and provided in an organized manner in Adobe .pdf format.

1.8.9 Submittal of Final As-Built Documents

At the time of Beneficial Occupancy of the project, Final As-Built documents shall be provided to the Contracting Officer in the formats described in paragraph "Computer Aided Design and Drafting (CADD)".

1.8.10 Not used

1.8.11 Not used

1.9 NOT USED.

1.10 EQUIPMENT DATA

***1**

Real Property Equipment.

Contractor shall be required to make an Equipment-in-Place list of all installed equipment furnished under this contract **in accordance with Clause 52.295-5**. This list shall include all information usually listed on manufacturer's name plate. The list shall also include the cost of each piece of installed property F.O.B. construction site. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, the following information shall be given: The name, serial and model number address of equipment supplier, or manufacturer originating the guaranteed item. Furnish the list as one (1) reproducible and three (3) copies to the Contracting Officer thirty (30) calendar days before completion of any segment of the contract work which has an incremental completion date. ***1**

Maintenance and Parts Data.

The Contractor will be required to furnish a brochure, catalog cut, parts list, manufacturer's data sheet or other publication which will show detailed parts data on all other equipment subject to repair and maintenance procedures not otherwise required in Operations and Maintenance Manuals specified elsewhere in this contract. Distribution of directives shall follow the same requirements as listed in paragraph above.

1.11 PHYSICAL DATA (APR 1984) FAR 52.236-4.

***1**

Data and information furnished or referred to below is furnished for the Contractor's information. ***1**

Physical Conditions indicated on the drawings and in the specifications are the result of site investigations by surveys, borings, test pits and probings. Driving records for cofferdam sheet piling and H-piling for the Locks, cores and soil samples from results of site investigations are available for inspection at various locations in the Louisville area, subject to prior arrangement at the Office of the District Engineer, Engineering Division, Jeff Schaefer, 600 Dr. Martin Luther King, Jr. Place,

Louisville, Kentucky 40201, (502) 315-6452.

Weather Conditions. The Contractor shall make his own investigations as to weather conditions at the site. Data may be obtained from various National Weather Service offices located generally at airports of principal cities, the nearest to this project being:

NWS Office NOAA
Airport Terminal Building
Paducah, KY 42001

Historical data for all areas may be obtained from:

U. S. Department of Commerce
National Climatic Center
Federal Building
Asheville, N. C. 28801

*1

Transportation Facilities. Roads and railroads in the general area are shown on the drawings. Access ways shall be investigated by the Contractor to satisfy himself as to their existence and allowable use. The Contractor will be held responsible for any and all damages attributable to the actions of the Contractor, his subcontractors, and his suppliers outside the limits of construction shown on the drawings or designated by the Contracting Officer. This shall include damage to existing roads, drainage structures, electric or telephone facilities, pavement and other structures and facilities. All such damage shall be repaired to the satisfaction of the proper municipal or state authorities by the Contractor.

All hauling over roads to and from the project will be subject to the approval of the proper municipal or state authorities, and the Contractor shall make the necessary arrangements, with such authorities for the use of such roads and shall comply with their requirements in connection with such use. *1

The Contractor will not be allowed to bring any construction equipment and/or materials through the Village of Olmsted. The vehicle size limitation allowed to travel through Olmsted is a pickup truck or smaller. No truck traffic is allowed through the Village of Olmsted.

Current River Mapping. The existing hydrographic mapping shown on the drawings is 1997 river contours. Plan development utilized available hydrographic mapping at the time of plan preparation, and does not fully reflect all channel changes at the time of construction. Data from the most recent comprehensive hydrographic survey, conducted May 2002, is included in digital format with this package for the bidder's information. See Attachment 4 on the CD. Data from previous comprehensive surveys is available upon request. The contractor will be required to map the river prior to any excavation. See specification section 01351 for specific details.

Hydraulic studies. The effect of Olmsted Dam construction activities on river conditions and channel bed stability by monthly period (June to November) has been analyzed and the results are available from the Corps of

Engineer at the Office of the District Engineer, Engineering Division,
Attn: Hydrology and Hydraulic Design Section, 600 Dr. Martin Luther King,
Jr. Place, Louisville, Kentucky 40201, (502)315-6458

River Conditions. Computed flow, velocity, and water surface slope data for the Ohio river in the vicinity of Olmsted is available for the period of record (October 1966 to Present) from the Corps of Engineers at the Office of the District Engineer, Engineering Division, Attn: Hydrology and Hydraulic Design Section, 600 Dr. Martin Luther King, Jr. Place, Louisville, Kentucky, 40201, (502)315-6458

Hydrographs are provided in the drawings, and a table is included for your information showing river elevation exceedence percentages by month based upon the computed elevations. The elevation is computed by interpolating between the L&D 53 gage reading and the Cairo gage reading. The elevation of water surface at Olmsted is used to compute the cross-sectional area and cross-sectional averaged velocity of the water. Available slope data are the water surface slopes from L&D 53 to Cairo in feet per mile units. Available velocity data is the computed cross-sectional averaged velocity at the centerline of the future dam. The area/elevation tables used to calculate these velocities take into account the approximate condition of the cofferdam and locks on the date of the gage input. It was assumed that the lock miter gates were closed for these computations. The velocities are computed by dividing the flow by the cross-sectional area of the water.

It should be noted that local velocities in deeper portions of the river and near structures will be higher than the cross-sectional averaged velocities.

In addition to the above river characteristics, the Contractor must be fully aware of the visibility characteristics of the river. The Contractor shall ensure that river visibility is taken into full account in planning and developing safe procedures and in carrying out all underwater construction activities and in monitoring and reporting of such.

The Contractor is responsible for taking all necessary preventative measures to protect completed in-the-river work. Construction activities will affect the river flow which may in turn cause some localized scouring or siltation. The Contractor shall be required to place articulated mats in such areas in order to prevent damage to permanent works and to protect work in progress.

In the reaches downstream of Smithland Lock & Dam, silt, sand and gravel movement is regularly experienced, especially during periods of high flows. Sediment dunes (also termed sand waves) have been observed downstream of Smithland Lock & Dam and have also been found at the Olmsted site. The dunes have been measured at approximately 10 - 20 feet high and move downstream over periods of several months.

Physical model experiments were performed at the US Army Engineer Research and Development Center to analyze localized river conditions and trends at the dam site. The experiments included testing of some general deflector arrangements prior to placement of tainter gate shells, and also analysis of localized flow conditions during tainter gate shell placement. The experimental data and reports on findings from these experiments are

included on the CD of this bid package for the Bidder's information. See Attachments 1, 2, and 3 for Reports.

ELEVATION-FREQUENCY TABLE ATTACHED AT THE END OF SECTION 00800

LOCKS AND APPROACH WALLS CONSTRUCTION PROGRESS PHOTOGRAPHS. Monthly Construction Progress Photographs of the Locks and Approach Walls contracts are available by reviewing the Olmsted website at the following specific web address. All available photos can be found by starting at this web page. <http://www.lrl.usace.army.mil/olmsted/ceorlcdo.htm>.

*1

DESIGN MEMORANDUM: The complete index for, "Lower Ohio River Navigation System, Locks and Dam #52 & #53 Replacement Project, DM No. 8" is attached at the end of this section. These volumes serve as the design analysis and calculations to support this solicitation. Copies are available for viewing at the Louisville District Office. *1

AVAILABILITY OF LOCKS. The Contractor shall be permitted to utilize the lock chambers once Massman Construction Company has completed the Maintenance and Operating Bulkheads contract in the summer of 2004 and the upstream (river) side of Cells 1 through 5 for fleeting of his floating plant while at the Olmsted site except when the lock is being used for navigation purposes. The opening to the Mooring Area shall not be blocked by the Contractor's plant if he elects to utilize the upstream side of cells 1 thru 5. Locking will only occur when construction of the dam requires locking. Access to the lock chambers is subject to river conditions (see Hydrographs). Top of lock walls is at El. 310. Anytime the river elevation reaches El. 304 the contractor will be required to remove his floating plant from the lock unless otherwise directed by the Contracting Officer or unless the 3-day forecast indicates the river will not rise above El. 306. The floating approach walls will not be allowed to be used for mooring of the contractor's fleet. All loading and off loading of supplies shall be done on Cells 1 through 5 and Cells 47 through 50. Loading and off loading will not be allowed from the landwall of the lock or from any of the floating approach walls or within the fleet mooring area.

The Contractor will be responsible for repairing all damage to the locks resulting from his use of these areas for construction activities in a manner approved by the Contracting Officer prior to commencement of the repairs. The Contractor will also be responsible for cleaning the lock chamber floors of all material that may have fallen off of barges during his material loading and unloading construction activities. The Contractor is alerted to review the requirements and limitations indicated in Specification Section 1130, ENVIRONMENT PROTECTION, regarding fleeting, mooring and work in the area of the Chestnut Hills Nature Preserve, and in the areas of mussel beds located downstream of the project. Mooring of contractor's equipment will be allowed at the four new mooring cells located downstream of the locks.

During construction of the dam the existing lock structure and elevators are not needed for access to work areas for the dam will be off limits to construction personnel. This also includes the control center area.

1.12 UTILITIES (APR 1984) FAR 52.236-14 (PARA. 1.12.A.(1) & 1.12.A.(2))

ONLY).

a. Availability and Use of Utility Services

*1

(1) The Contractor will have access to a 69 KV line built by AmerenCIPS for his electrical power service requirements for the Dam Construction. Power from the Locks will not be available to the Contractor. Any existing aerial lock lighting utilized by the contractor will be inspected by the Contracting Officer at the end of construction and replaced to the satisfaction of the Contracting Officer if needed. Currently adequate power (over 5,000 KW) exists at the site for most construction operations. Any additional power requirements needed by the Contractor will be his responsibility. This can be with generators or contacting AmerenCIPS. For service contract: AmerenCIPS, 334 North Illinois Avenue, Carbondale, Illinois 62901, Telephone 618-351-5501, POC Harry McLeod. The Contractor is responsible for his own water requirements for the Dam Construction. The Contractor will be allowed to connect on to the Corps of Engineers 4" waterline. Contact Village of Olmsted for water rates and connection fees; telephone 618-742-6487. *1

(2) The Contractor, in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

b. Alterations to Utilities

Where changes and relocations of utility lines are noted to be performed by others, the Contractor shall give the Contracting Officer at least thirty (30) days written notice in advance of the time that the change or relocation is required. In the event that, after the expiration of thirty (30) days after the receipt of such notice by the Contracting Officer, such utility lines have not been changed or relocated and delay is occasioned to the completion of the work under contract, the Contractor will be entitled to a time extension equal to the period of time lost by the Contractor after the expiration of said thirty (30) day period.

c. Interruptions of Utilities at Olmsted Site

(1) No utility services shall be interrupted by the Contractor to make connections, to relocate, or for any purpose without approval of the Contracting Officer.

(2) Request for Permission to shut down services shall be submitted in writing to the Contracting Officer not less than seventeen (17) days before date of proposed interruption. The request shall give the following information:

- (a) Nature of Utility (Gas, L.P. or H.P., Water, etc.)
- (b) Size of line and location of shutoff;

- (c) Buildings and services affected.
- (d) Hours and date of shutoff.
- (e) Estimated length of time services will be interrupted.

(3) Services shall not be shutoff until receipt of approval of the proposed hours and date from the Contracting Officer.

*1

(4) Shutoffs which will cause interruption of Government work operations as determined by the Contracting Officer shall be accomplished during regular non-work hours or on non-work days of the Using Agency. *1

(5) Operation of valves on water mains will be by Government personnel. Where shutoff of water lines interrupts service to fire hydrants or fire sprinkler systems, the Contractor shall arrange his operations and have sufficient material and personnel available to complete the work without undue delay or to restore service without delay in event of emergency.

1.13 NOT USED

*1

1.14 LAYOUT OF WORK

The Contractor shall lay out its work from Government-established coordinates and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them.

*1

1.15 NOT USED

1.16 PERFORMANCE OF WORK BY THE CONTRACTOR

The Contractor shall perform on the site, and with its own organization, work equivalent to at least 40 percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

a. For purposes of this paragraph "WORK BY THE CONTRACTOR" is defined as prime Contractor direct contract labor (including testing and layout personnel), exclusive of other general condition or field overhead personnel, material, equipment, or subcontractors. The "TOTAL AMOUNT OF WORK" is defined as total direct contract labor (including testing and layout personnel), exclusive of other general condition or field overhead personnel, material, or equipment.

b. Within 7 days after the award of any subcontract, either by

himself or a subcontractor, the Contractor shall deliver to the Contracting Officer a completed SF 1413, "Statement and Acknowledgment." The form shall include the subcontractor's acknowledgement of the inclusion in his subcontract of the clauses of this contract entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act-Overtime Compensation," "Apprentices and Trainees," "Compliance with Copeland Regulations," "Withholding of Funds," "Subcontracts," "Contract Termination-Debarment," and "Payrolls and Basic Records." Nothing contained in this contract shall create any contractual relation between the subcontractor and the Government.

1.17 SUPERINTENDENCE OF SUBCONTRACTORS

*1

- a. The Contractor shall be required to furnish the following: *1

If more than 50 percent and less than 60 percent of the value of the contract work is subcontracted, one superintendent shall be provided at the site and on the Contractor's payroll to be responsible for coordinating, directing, inspecting and expediting the subcontract work.

b. If the Contracting Officer, at any time after 50 percent of the subcontracted work has been completed, finds that satisfactory progress is being made, he may waive all or part of the above requirements for additional superintendence subject to the right of the Contracting Officer to reinstate such requirement if at any time during the progress of the remaining work he finds that satisfactory progress is not being made.

1.18 ADDITIONAL SECURITY AND IDENTIFICATION OF EMPLOYEES.

A minimum of one guard will be required twenty-four (24) hours a day seven (7) days a week for the life of the project, to provide site security. The Contractor may be required at times to increase his security at the site to include the control of all personnel and deliveries to the site by the use of guards and check points, including the inspection of vehicles. Additional security may be required at various times based on terrorist threats.

The Contractor may be responsible for furnishing an identification badge/card to each employee prior to the employees work on-site, and for requiring each employee engaged on the work to display identification as may be approved and directed by the Contracting Officer. All prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of the employee. When required by the Contracting Officer, the Contractor shall obtain and submit fingerprints of all persons employed or to be employed on the project.

1.19 NOT USED

1.20 WARRANTY OF CONSTRUCTION

- a. General Requirements

*1

(1) In addition to any other warranties in this contract, the Contractor warrants, that work performed under this contract conforms to the contract

requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(2) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(a) Obtain all warranties that would be given in normal commercial practice;

(b) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(c) Provide names, addresses, and telephone numbers of all subcontractors, equipment suppliers, or manufacturers with specific designation of their area of responsibilities if they are to be contacted directly on warranty corrections; and

(d) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(3) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(4) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(5) Defects in design or manufacture of equipment specified by the Government on a "brand name and model" basis, shall not be included in this warranty. In this event, the Contractor shall require any subcontractors, manufacturers, or suppliers thereof to execute their warranties, in writing, directly to the Government.

b. Equipment Warranty Identification Tags

(1) The Contractor shall provide warranty identification tags on all Contractor and Government furnished equipment which he has installed.

(a) The tags shall be similar in format and size to the exhibits provided by this specification, they shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Contractor furnished equipment that has differing warranties on its components will have each component tagged.

(b) Sample tags shall be submitted for Government review and approval. These tags shall be filled out representative of how the

First Priority Code 1 Perform on site inspection to evaluate situation, determine course of action, initiate work within 24 hours and work continuously to completion or relief.

Second Priority Code 2 Perform on site inspection to evaluate situation, determine course of action, initiate work within 48 hours and work continuously to completion or relief.

Third Priority Code 3 All other work to be initiated within 5 work days and work continuously to completion or relief.

The "Warranty Service Priority List" is as follows:

Code 1 Electrical

- a. Power failure to any one of the dam piers
- b. Closed Circuit Television
- c. Public Address System

Code 2 Electrical

- a. Receptacle and lights
- b. Fire alarm systems
- c. Telephone

Code 1 Heat

Code 1 Dam Operating, Control and Sensing Equipment (Electrical & Hydraulic)

Code 2 Plumbing

- a. Water valves, drains, supply line or water pipe leaking

Code 1 Roof Leaks

Temporary repairs will be made where major damage to property is occurring

Code 2 Roof Leaks

Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis

Code 2 Air Exhaust System

Code 3 Dam Instrumentation System

Code 3 Cathodic Protection

(1) Should parts be required to complete the work and the parts are not immediately available, the Contractor shall have a maximum of 12 hours after arrival at the job site to provide the Contracting Officer or an authorized representative of the installation designated in writing by the

Contracting Officer, with firm written proposals for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractors proposals shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair. The Contracting Officer or an authorized representative designated in writing by the Contracting Officer, will evaluate the proposed alternatives and negotiate the alternative considered to be in the best interest of the Government to reduce the impact of the emergency condition. Alternatives considered by the Contracting Officer or an authorized representative designated in writing by the Contracting Officer will include the alternative for the Contractor to "Do Nothing" while waiting until the required parts are available to perform permanent warranty repair. Negotiating a proposal which will require Government participation and the expenditure of Government funds shall constitute a separate procurement action by the using service.

1.21 Not used

*1

1.22 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION

a. The Government will pay all costs for the mobilization and demobilization of all of the fixed price sub-contractor's plant and equipment at the contract lump sum price for this item.

(1) Eighty percent of the lump sum price upon completion of the Contractor's mobilization at the work site.

(2) The remaining percent upon completion of demobilization.

b. The Contracting Officer may require the sub-contractor to furnish cost data to justify this portion of the bid if the Contracting Officer believes that the percentages in paragraph 1.22a(1) and (2) of this clause do not bear a reasonable relation to the cost of the work in this contract.

(1) Failure to justify such price to the satisfaction of the Contracting Officer will result in payment, as determined by the Contracting Officer, of --

(i) Actual mobilization costs at completion of mobilization;

(ii) Actual demobilization costs at completion of demobilization; and

(iii) The remainder of this item in the final payment under this contract.

(2) The Contracting Officer's determination of the actual costs in paragraph (1) above of this clause is not subject to appeal. *1

*3

1.23 *3 SALVAGE MATERIALS AND EQUIPMENT *3

The Contractor shall maintain adequate property control records of all materials or equipment as specified in FAR Subpart 45.5 "Management of Government Property in Possession of the Contractor." An Advance Agreement is required for Government Property Management per Section 00115 paragraph 2.7.

See Section 02220 for the items to be salvaged. The Contractor shall be responsible for the adequate storage and protection of all salvaged materials and equipment. The Government will seek an equitable cost adjustment for all salvaged materials and equipment damaged during salvage operations or while in the contractor's care as a result of negligence.

All other Government property/equipment shall be removed/salvaged/scrapped as specified in FAR 45.6 "Reporting, Redistribution and Disposal of Contractor Inventory". FAR 45.610 "Sale of Surplus Contractor Inventory" will be followed with the proceeds from any sale being credited to the cost of the work.

The details of this entire process will be developed in an Advance Agreement.

*3

1.24 IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY

*1

a. The Government will furnish to the Contractor the property identified in the Schedule to be incorporated or installed into the work or used in performing the contract. The listed property will be furnished at the place specified below. When the property is delivered, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of delivery any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work, unless otherwise indicated in this contract.

*1

*4

Approximately 1,700 pieces of PS27.5, 100'-109' in length and 100 wyes are available in the Storage Yard on Kentucky Bank. See Sheet X-22 A Reference Drawings.

Twenty cofferdam steel deflector frames **are** available for use by the contractor during the construction of the dam as a flow deflector. It is located in the Storage yard on the Kentucky Bank. **Also there are 62 pipe piles and 170 PZ-22 sheets available as shown on reference sheet X-22A.**

Once the construction of the dam is complete the steel deflector frame shall be removed from the project site by the contractor.

*4

The contractor will take possession from Massman Construction Company the maintenance bulkheads (2-38 ft (weight 243 tons each), 1-18 ft (weight 176 tons), 1-11 ft (weight 114 tons)) steel maintenance bulkheads, 110 feet long. These bulkheads are to be used for construction of the tainter gates. Once construction of the tainter gates is complete the contractor shall recondition (required structural repairs) and total repainting of these bulkheads which would entail removing/blasting off all existing paint and reapplying the entire paint system (5-E-Z) per Spec Section 09965

Painting: Hydraulic Structures, and store bulkheads at the Smithland Lock and Dam Gate Storage Facility. Lifting of the bulkheads off barges at Smithland will be required. The Contractor shall also supply proper dunnage material to place under and between the stored bulkheads as well as tie down cables and clamps.

1.25 AGGREGATE SOURCES

Aggregates may be furnished from any source designated by the Contractor and approved by the Contracting Officer, subject to the conditions hereinafter stated. Additionally, a list of aggregate sources from the region surrounding the Olmsted site was published in the Concrete Materials Design Memorandum No. 4 (DM No. 4), dated October 1990. DM No. 4 is available for review in the Louisville District Office; please contact Mr. David Kiefer at 502-315-6445. At the time when DM No. 4 was being prepared, these sources were capable of furnishing aggregate of the quality required for construction of the Olmsted Locks concrete, when suitably processed. No guarantee is given or implied that any of the sources listed in DM No. 4 are currently capable of producing aggregates that meet the required quality stated in the technical specifications. If the Contractor proposes to construct portions of the Dam at a site remote from the Olmsted site, no aggregate source information is available from the Government.

Source. Within 60 days after award of the contract, the Contractor shall designate in writing only one source or one combination of sources from which he proposes to furnish aggregates. If the Contractor proposes to furnish aggregates from a source or from sources not listed above, he may designate only a single source or single combination of sources for aggregates. Samples for acceptance testing shall be provided as required by the technical portions of these specifications.

Listing of a concrete aggregate source in DM No. 4 is not to be construed as approval of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable for concrete aggregate as determined by the Contracting Officer. Materials produced from listed sources shall meet all requirements of the technical portions of these specifications.

1.26 PROJECT SIGN

The Contractor shall furnish and erect at the location directed one project sign.

Exact placement location will be designated by the Contracting Officer. The panel sizes and graphic formats have been standardized for visual consistency throughout all Corps operations.

Panels are fabricated using HDO plywood with dimensional lumber uprights and bracing.

All legends are to be painted in the sizes and styles as specified by the graphic formats shown at the end of this section. The signs (including back and edges), posts and braces shall be given two coats of Benjamin Moore No. 120-60 poly-silicone enamel or approved equal before lettering.

The 4' x 4' right section of the project sign shall be white with black lettering. The 2' x 4' left section shall be Communication Red (CR) with white lettering. Paint colors shall be as follow:

Black - Federal Standard 595a Color Number 27038
White - Federal Standard 595a Color Number 27875
Red - PANTONE 032

An example of the sign including mounting and fabrication details are also provided at the end of this section.

Name of the project shall be as follows:

OHIO RIVER LOCKS AND DAM 52 AND 53
REPLACEMENT PROJECT
(OLMSTED LOCKS AND DAM)
DAM CONSTRUCTION

Name of the designer shall be as follows:

JACOBS/GERWICK JOINT VENTURE
ST. LOUIS, MISSOURI

Erection and Maintenance.

*1

a. The sign shall be erected at the designated location. The sign shall be plumb and backfill of post holes shall be well tamped to properly support the sign in position throughout the life of the contract. The sign shall be maintained in good condition until completion of the contract, and shall be removed from the site upon completion of work under the contract.

*1

b. The Corps of Engineers logo and the Jacobs/Gerwick logo will be provided by the Contracting Officer.

1.27 NOT USED

1.28 WAGE RATES

*1

A Project Wage Decision has been **provided by** the Department of Labor for this contract. The classifications and wage rates to be incorporated in the Project Wage Decision are applicable to this contract only, and reflect the minimum wages to be paid for work performed in Pulaski County, Illinois, Ballard County, Kentucky, and in the Ohio River between the extreme boundaries of the above listed counties.

Wage Decisions attached at the end of Section 00800 are: General Wage Decision IL030016 and Service Wage Determination 94-2309 Rev (26). *1

1.29 PURCHASE ORDERS

*1

In addition to the advance notification/consent requirements on

subcontracts discussed in FAR 52.244-4, Section 00700, the Contractor will also be required to provide five copies of all purchase orders, for items requiring shop inspection, showing firm names and addresses, shall be submitted to the Contracting Officer when orders for materials are placed. Orders shall be so worded or marked that each item, piece or member can be definitely identified on the drawings. *1

1.30 INTERFERENCE WITH TRAFFIC AND PUBLIC AND PRIVATE PROPERTY.

a. The Contractor at all times shall dispose his plant and conduct the work in such manner as to cause as little interference as possible with private and public travel. Damage (other than that resulting from normal wear and tear) to roads, shall be repaired to as good a condition as they were prior to the beginning of work and to the satisfaction of the Contracting Officer.

b. The Contractor shall provide and maintain as may be required by the State of Illinois, Department of Transportation, proper barricades, fences, danger signals and lights, provide a sufficient number of watchmen, and take such other precautions as may be necessary to protect life, property and structures, and shall be liable for and hold the Government free and harmless from all damages occasioned in any way by his act or neglect, or that of his agents, employees, or workmen.

1.31 SEQUENCE OF WORK.

As many as three separate construction contracts will be concurrent with, or overlap the Dam Construction contract; the ongoing Approach Walls Contract, ongoing Operating and Maintenance Bulkhead Contract, and the future Buildings and Grounds contract. The Service Mound Area El. 345 will not be available for use by Dam contractor; this is the flat area that currently only has the ROSS Building on it. The contractor will be allowed to construct the wicket gate test section in this area but not to use the area for storage or parking. Therefore coordination and cooperation between contractors shall be required.

The Contractor is alerted to review the requirements and limitations indicated in the Specification Section 1130, ENVIRONMENTAL PROTECTION, regarding fleeting, mooring and work in the area of the Chestnut Hills Nature Preserve, and in the areas of mussel beds located downstream of the project.

The Contractor is alerted to review the requirements indicated in the Specification Section 01710 Execution Requirements For Construction. The Contractor shall pay particular attention to paragraph 1.12 Sequencing & Scheduling.

1.32 GOVERNMENT FIELD OFFICE FACILITIES AND SERVICES.

General. The Government Field Office Facilities are located as shown on the drawings. Beginning on the Notice To Proceed Date the Dam Construction Project Contractor will become responsible for maintenance of the Government Field Office Facilities. Maintenance shall include any normal repairs needed to keep the office functioning properly, including

but not limited to cleaning and greasing equipment and replacing filters as needed on a regular basis. The Contractor shall set up a 24 hour repair service phone number which can be called by Government personnel in order to have maintenance problems repaired by the next day, this includes the public restrooms and overlook area. The Floor Plan, Building Elevations, Laboratory Plan, and Site Plan, are in the Reference Drawings.

1.32.1 Janitor Service

The Contractor shall furnish daily janitorial services for the Government office, Laboratory, and overlook restrooms and perform normal maintenance of these facilities and grounds and weekly janitorial services for the control room including restrooms and lunch room located in the lock structure as deemed necessary by the Contracting Officer starting at Notice to Proceed and continuing for the life of the contract. The supply of all cleaning equipment and materials shall be the responsibility of the Contractor. Services need only be performed four hours a day, five days a week, which is sufficient to maintain a clean office. Toilet facilities shall be kept clean and sanitary at all times. Toilet paper, hand soap, paper towels, and other materials the Contracting Officer determines necessary to provide sanitary facilities shall be in such a manner to least interfere with the operations, but will be accomplished during normal working hours. Services shall be accomplished to the satisfaction of the Contracting Officer. The Contractor will include items such as furnace filters, paper towels, soap, toilet paper, cleaning supplies and light bulbs. (The Government estimates these items to cost approximately \$3,200 per year.)

The Contractor shall also provide daily trash collection and clean-up of the Government buildings and adjacent outside areas, snow and ice removal from office and parking areas, and the access road from the county road. The Contractor shall dispose of all discarded debris, aggregate samples and concrete test samples, all in a manner approved by the Contracting Officer.

1.32.2 Maintenance of Established Turf Area

The Contractor shall provide personnel and equipment for mowing and trimming grass as scheduled below (drawing shown in "Remarks" are provided in Plans as Reference Drawings in Volume 7 of 7 unless noted otherwise):

LOCATION	TIME FRAME	REMARKS
Each side of access road from STA 10+00 to 30+00 to tree line; also the area designated as Storage Area for Government Salvage including lateral field along Access Road	4 times per season as directed by the Contracting Officer	See Drawing C-5, "PLAN DAM ACCESS ROAD" in VOL 7 of 7; See Drawing X-5, "LOCATION PLAN AND VICINITY MAP" in VOL 7 of 7
Slope and hill side between Resident Engineer's Office and Lock Structure, EL 420	2 times per season as directed by the Contracting Officer	See Drawing X-10, "CONCRETE TEST AREA" in VOL 7 of 7; areas

and below including mound
area.

to be mowed are
roughly delineated
by areas C2, C3, and
C4 on drawing

Along entrance road and
around Resident Engineers
Office and Overlook

Twice a month between
March & November

See Drawing C-2A,
"SITE PLAN" in VOL
7 of 7

Mowing shall include the clean up of the grass from the hard surfaces and killing of weeds that grow in graveled areas under the fence and along the riprap ditch lines. Trimming around the office, sidewalks, signs, concrete security blocks, guardrails and roses will be required with each mowing. The roses will also be trimmed each fall. All debris will be discarded in a manner approved by the Contracting Officer.

1.32.3 Locks

Maintenance of the Olmsted Locks will be accomplished by Government forces with the exception of the control room as mentioned above in para. 1.32.2.

1.32.4 Overlook Area

In addition to the requirements mentioned above, the Contractor shall provide daily clean-up and trash collection of the overlook area.

1.32.5 Trash Pickup

The Contractor will be responsible for trash pick-up.

1.32.6 Field Office Located at Pre-Cast Yard (If Located Off Site)

The Contractor shall furnish a field office located at the Pre-Cast Yard (if the yard is located off site) with a minimum of 300 sq. ft. free office space for the exclusive use of the Government inspectors. It shall be watertight, lockable, with open/close windows, properly heated, with electrical hookup, adequately lighted, with wall receptacles, ventilated, air conditioned, and furnished with 2 lockable desks (30" x 60"), with swivel chairs, two filing cabinets, (with 4 drawers each), 2 (30" x 60") table, plan table with stool, 8 straight back chairs, small refrigerator, microwave oven, two connected telephones, an additional telephone line for a fax machine, one additional telephone line for data transmission, and one port-o-let.

The contractor shall provide a phone and desk space for the government inspector for inspection of the tainter gates at an off-site location.

The Contractor shall budget \$5,000.00 to be used for computers, a fax machine, printers and other electronic devices to be used by the Government. The specifications for this equipment will be provided when the equipment is needed.

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1.33 NOT USED

1.34 EQUIPMENT AND OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)
EFAR 52.231-5000.

a. This does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.

b. Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region II. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the Contracting Officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time of negotiations shall apply.

c. Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

d. When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the Contracting Officer shall request the Contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Cover Sheet.

***3**

e. The contractor's cost proposals for equipment ownership and operating expenses shall be determined in accordance with the requirements of SPECIAL CONTRACT REQUIREMENT: EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE. A copy of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule" is available for review at the office of the District Engineer, Room 821, 600 Dr. Martin Luther King, Jr. Place, Louisville, Kentucky, or a copy may be ordered from the Government Printing Office at a cost of \$11.00 by calling telephone no. (301) 953-7974. ***3**

Address to Order: U.S. Government Printing Office
Document Warehouse
8160 Cherry Lane
Laurel, MD 20707

Vol No.	Stock No.
1	008-022-00254-5
2	008-022-00255-3
3	008-022-00256-1
4	008-022-00257-0
5	008-022-00258-8
6	008-022-00259-6
7	008-022-00260-0
8	008-022-00261-8
9	008-022-00262-6
10	008-022-00263-4
11	008-022-00264-2
12	008-022-00265-1

1.35 NOT USED

1.36 ILLINOIS RETAILER'S OCCUPATIONAL TAX AND USE TAX.

a. The contract to be awarded will be a construction contract between the construction Contractor and the United States Government. As contemplated by 86 Illinois Administrative Code, Section 130.2075, sales of materials to construction Contractors for incorporation into real estate owned by exclusively charitable, religious or educational institutions or organizations, or for incorporation into real estate owned by governmental bodies, are exempt from Retailers' Occupational Tax and Use Tax. However, sales, of tools, fuel, lumber for forms and other end use or consumption items to construction Contractors who do not incorporate these items into real estate are taxable sales. A supplier claiming exemption hereunder shall have among his records a certification from the purchasing Contractor stating that his purchases are for conversion into real estate under a contract with a church, charity, school, or governmental body, identifying the church, charity, school or governmental body that is involved by name and address and stating on what date his contract was entered into.

b. The person claiming the exemption has the burden of proving that the Contractor's customer qualifies as an exclusively charitable, religious or educational organization or institution, or as a governmental body. In case of doubt on this point, the Contractor's customer shall obtain a ruling from the Illinois Department of Revenue.

***1**

c. Prior to award of a contract, the successful **Offeror** shall furnish a break-out to be incorporated into the contract separately pricing (1) materials to be incorporated into the structure or improvement to real estate, (2) services and other obligations of the construction contract, and (3) total **estimated cost**. ***1**

1.37 **STATE TAXES**

***4**

The Contractor is responsible for compliance with all applicable laws governing state taxes. As set forth in Para. 1.36, above, materials incorporated into the Olmsted project may be exempt from Illinois taxation

provided those materials are permanently placed in that portion of the project within the state boundaries of Illinois. An Illinois tax exemption number may be obtained from the Contracting Officer for this purpose. However, most of the project is located in the Commonwealth of Kentucky and the Illinois exemption does not apply outside the Illinois State boundary. Note approximate state line shown on drawing X-6. Similarly, equipment purchases by the Contractor, in the State of Illinois, for and titled in the name of the United State Government, is exempt from Illinois taxes. Purchases so made must be accompanied by a letter from the United States Government authorizing its purchase for title in the U.S. Government's name and containing the Illinois State exemption number. Exemption from other states laws relating to taxation may be available on a state-by-state basis but must first be confirmed with the individual state's Department of Revenue.

*4

1.38 NOT USED

1.39 PROGRESS PHOTOGRAPHS

PROGRESS PHOTOGRAPHS. The Contractor shall, during the progress of the work, furnish the Contracting Officer Kodak Compatible Photo CD master disc, photographs, slides and negatives depicting construction progress. The photographic work furnished shall be commercial quality as determined by the Contracting Officer. The photography shall be performed between the first and fifth of each month and the photographs, slides and negatives delivered to the Contracting Officer no later than the 15th of each month taken. A maximum of twenty views from different positions shall be taken as directed to show, inasmuch as possible, work accomplished during the previous month. Where appropriate take pictures from the same locations as the previous month. If the work is occurring at multiple work sites, there shall be a minimum of six photos from each major site. At least, on (1) set of photographs, slides and negatives will be made at completion of the contract, after final inspection by the Contracting Officer. Additionally, aerial photographs shall be furnished quarterly (IE Mar., June., Sept. & Dec.) and shall cover both on site work and remote work sites. The photographs shall be 8"x10" color prints and the slides 35 mm color. Each photograph and slide shall be identified on the face of the picture or the border of the slide giving date made, contract title and number, location of work, as well as a brief description of work depicted. Each negative will be identified with the same information on a sheet of paper by cross-referencing to the number on the negative. The photo CD images shall be in *.PCD format and along with the CD, an electronic file shall be submitted containing the information below on each photo taken. One CD and two copies of photographs and slides, along with the original negatives of each view taken, shall be furnished to the Contracting Officer by the time stipulated above.

Electronic Photo CD Label File named for the month and year it applies shall contain the following for each photo.

Contract N. and description
Photo file name
Negative cross reference number
Photo date and time to the nearest hour minimum

Photographer
Description of the photo
Site Location
Location on site of the photo to include the direction of the view
Schedule activity ID of work being depicted

*3 *1

1.40 PAYMENT FOR MATERIALS DELIVERED AND PROGRESS PAYMENTS OFFSITE

Materials delivered to the Contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions are fulfilled. Payment for items delivered to locations other than the worksite will be limited to:

(1) Materials required by the technical provisions.

(2) Materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

Progress payments and payments for materials delivered offsite will be made subject to FAR 52.216-7. *1

*3

1.41 INSURANCE--WORK ON A GOVERNMENT INSTALLATION (SEP 1989) FAR 52.228-5.

*1

The Contractor shall provide and maintain during the entire performance of this contract at least the kinds and minimum amounts of insurance required in the Schedule or elsewhere in the contract. *1

(1) Coverage complying with State laws governing insurance requirements, such as those requirements pertaining to Workman's Compensation and Occupational Disease Insurance. Employer's Liability Insurance shall be furnished in limits of not less than \$100,000.00 except in states with exclusive or monopolistic funds.

(2) Comprehensive General Liability Insurance for bodily injury coverage shall be furnished in limits of not less than \$500,000 per occurrence.

(3) Comprehensive Automobile Liability Insurance for both bodily injury and property damage, shall be furnished in limits of not less than \$200,000.00 per person, \$500,000.00 per accident for bodily injury, and \$20,000.00 per accident for property damage. When the Financial Responsibility or Compulsory Insurance Law of the State, requires higher limits, the policy shall provide for coverage of at least those higher limits.

(4) Marine Liability Insurance furnished in a limit of not less than \$1,000,000.00 per accident for property damage.

(5) Pollution Insurance (oil spills, etc.) furnished in a limit of not less than \$1,000,000.00 per accident.

Before commencing work under this contract, the Contractor shall submit to

the Contracting Officer in writing that the required insurance certification has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective (1) for such period as the laws of the State in which this contract is to be performed prescribe, or (2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

The Contractor shall insert the substance of this clause, including this paragraph, in subcontracts under this contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

1.42 NOT USED

1.43 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER. ER 415-1-15

*1

This provision specifies the procedure for the determination of time extensions for unusually severe weather. In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied: *1

The weather experienced at the project sites during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the Olmsted project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER CONDITION DELAY WORK DAYS BASED ON (7)
DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11	10	9	8	7	6	6	5	5	5	8	11

MONTHLY ANTICIPATED ADVERSE WEATHER CONDITION DELAY WORK DAYS BASED ON (6)
DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
9	9	8	7	6	5	5	4	4	4	7	9

MONTHLY ANTICIPATED ADVERSE WEATHER CONDITION DELAY WORK DAYS BASED ON (5)
 DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
8	7	6	6	5	4	4	4	4	4	6	8

If the Contractor proposes to construct the Navigable Pass or Tainter Gate sections at a Prefabrication Yard at a location other than the Olmsted site he shall provide the proposed location of the remote Prefabrication Yard site to the Government in his proposal. An additional set of monthly anticipated weather condition delay work days, appropriate for the proposed site, will be provided by the Government after contract award.

*1

Adverse river conditions can also affect the various construction activities in the river. The conditions will be evaluated against the following table which shows limiting river conditions for major in river construction activities. If the limiting criteria are exceeded during the period between 16 June and 30 November inclusive, and cumulative delays to the project occur exceeding 5% of the construction period, and the delay effects 50% of the work on critical activities, then a time extension may be granted. This criteria provides no guarantee that construction can be accomplished in these conditions and additional protective measures may be needed. The Contractor will be required to compute the average velocity of the river in accordance with Section 01351, Underwater Survey, River Monitoring, And Scour Repair Section 3.5. *1

Conditions for Work In-the River	Limiting Criteria
Maximum Average River Velocity for Placing Shells	6 ft per sec (Approx. 4 MPH)
Maximum River Stage for Placing Shells (Other than Nav Pass Shells #3 through #11)	El 312
Maximum River Stage for Placing Nav Pass Shells #3 through #11 (due to closure of locks) for Unrestricted Navigation	El 306
Minimum River Stage for Placing Shells (Other than the Left Boat Abutment)	El 283
Minimum River Stage for Placing the Left Boat Abutment	El 285
Maximum River Stage for Installing Tainter Gate	El 301
Contractor is responsible for providing a 4'tall splash board at the top of the downstream maintenance bulkhead.	
Maximum River Stage for Installing Upper Pier Wall Shells	El 306
Maximum Average River Velocity for Installing Tainter Gates	5 ft per sec (Approx. 3 MPH)

Maximum Average River Velocity for Pile Driving (Approx. 4 MPH)	6 ft per sec
Maximum Average River Elevation for Pile Driving	El 315
Maximum Average River Velocity for Backfill Placement (Approx. 4 MPH)	6 ft per sec
Maximum Average River Elevation for Backfill Placement	El 316
Maximum Average River Velocity for Dredging (Approx. 4 MPH)	6 ft per sec
Maximum River Stage for Dredging	El 316

Adverse river slope and stage can also affect the contractors operations in the river. If this occurs the conditions will be evaluated against the following table which shows abnormal high river elevations and slope gradients for each month; the data provided represents an approximation of the statistical second standard deviation above the mean. The data in the table therefore represent conditions which would be considered abnormal. If either condition is met and a delay to the project occurs, then a time extension will be granted. The slope gradient is expressed in feet/mile where the slope is defined by the readings at Lock 53 lower gage and Cairo gage.

Month	Elev	Slope
Jan	323	0.36
Feb	325	0.36
Mar	325	0.33
Apr	325	0.25
May	325	0.22
Jun	320	0.20
Jul	310	0.19
Aug	305	0.22
Sep	305	0.22
Oct	305	0.28
Nov	310	0.27
Dec	320	0.34

***1**

Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more on the Contractor's scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days, If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph b. above, the Contracting Officer will convert any qualifying delays to work days, giving full consideration for equivalent fair weather work days, and issue a **time extension.**

***1**

The anticipated adverse weather work days listed above are based on days with

precipitation greater than 0.1 inch and/or maximum temperature below 32 degrees F. The numbers shown represent the number of work days normally expected to have these particular weather conditions based on historical data obtained from the "Climatology of the United States No. 20". The actual number of days will vary. This information is furnished for computation of possible time extensions due to weather delays and is not intended to imply that no work can be done on these days. The Contractor shall make his own determination of the effect of these conditions on his operations under this contract, and schedule his work accordingly.

1.44 USE OF INCLINOMETER FOR LONG BED DUMP TRUCKS (DACF BULLETIN 25 MARCH 1993)

The recommendation of EM 385-1-1, Section 16.B.15, is mandatory for this project.

1.45 AVAILABILITY OF SAFETY AND HEALTH REQUIREMENTS MANUAL (EM 385-1-1).

As covered by CONTRACT CLAUSE "ACCIDENT PREVENTION", compliance with EM 385-1-1 is a requirement for this contract. The plan shall include, but is not limited to, each of the topic areas listed in Appendix A. Copies may be purchased for \$31.00 each at the following address:

United States Government Bookstore
Room 118, Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4003
Telephone: (412) 395-5021 FAX: (412) 395-4547

Or downloaded from the following website:

<http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/toc.htm>

The Activity Hazard Analysis, AHA, form contained in the Safety Manual EM 385-1-1 has been replaced with the form attached at the end of this section. A word document of the form can also be received from the Corps field office. The contractor will be required to use this latest version containing Risk Assessment.

In the AHA a detail listing of work and hazardous activities must be included. Detailed site specific hazards and controls shall be provided in the AHA for each phase of the operation.

1.46 FIRE PROTECTION DURING CONSTRUCTION (MIL-HDBK-1008B PARA. 2.9.2)(15 APRIL 1991)

The Contractor is alerted to the requirements of Contract Clause "CLEANING UP" and more specifically to the requirements for fire protection during construction spelled out in EM 385-1-1 and NFPA No. 241 Building Construction and Demolition Operations. This item must be covered in the submittal required under Contract Clause "ACCIDENT PREVENTION".

1.47 HAUL ROADS

Whenever practical, one-way haul roads shall be used on this contract. Haul roads built and maintained for this work shall comply with the following:

a. One-way haul roads for off-the road equipment; e.g., belly dumps, scrapers, and off-the-road trucks shall have a minimum usable width of 25 ft. One-way haul roads for over-the-road haulage equipment only (e.g., dump trucks, etc.) may be reduced to a usable width of 15 ft. When the Contracting Officer determines that it is impractical to obtain the required width for one-way haul roads (e.g., a road on top of a levee), a usable width of not less than 10 ft. may be approved by the Contracting Officer, provided a positive means of traffic control is implemented. Such positive means shall be signs, signals, and/or signalman and an effective means of speed control.

b. Two-way haul roads for off-the-road haulage equipment shall have a usable width of 60 ft. Two-way haul roads for over-the-road haulage equipment only may be reduced to a usable width of 30 ft.

c. Haul roads shall be graded and otherwise maintained to keep the surface free from potholes, ruts, and similar conditions that could result in unsafe operation.

d. Grades and curves shall allow a minimum sight distance of 200 ft. for one-way roads and 300 ft. for two-way roads. Sight distance is defined as the centerline distance an equipment operator (4.5 ft. above the road surface) can see an object 4.5 ft. above the road surface. When conditions make it impractical to obtain the required sight distance (e.g., ramps over levees), a positive means of traffic control shall be implemented.

e. Dust abatement shall permit observation of objects on the roadway at a minimum distance of 300 ft.

f. Haul roads shall have the edges of the usable portion marked with posts at intervals of 50 ft. on curves and 200 ft. maximum elsewhere. Such markers shall extend 6 ft. above the road surface and, for nighttime haulage, be provided with reflectors in both directions.

1.48 NOT USED

1.49 NOT USED

1.50 CONSTRUCTION HAZARD COMMUNICATION

The Contractor is required to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1926.59). This standard is designed to inform workers of safe and appropriate methods of working with hazardous substances in the workplace. The standard has five requirements, and every hazardous or potentially hazardous substance used or stored in the work area is subject to all five. They are:

(1) Hazard Evaluation. Any company that produces or imports a chemical or compound must conduct a hazard evaluation of the substance to determine its potential health or physical hazard. The hazard evaluation consists of

an investigation of all the available scientific evidence about the substance. The Contractor is required to assure that all producers (manufacturer/distributors) have performed these evaluations and transmit the required information with any hazardous materials being used or stored on the project site. From the hazard evaluation, a substance may be classified as a health hazard, or a physical hazard. These classifications are then further broken down according to type:

Health Hazards	Physical Hazards
Carcinogens	Combustible liquids
Irritants	Compressed gases
Sensitizers	Explosives
Corrosives	Flammables
Toxic substances	Organic peroxides
Highly toxic substances	Unstable substances
Substances harmful to specific organs or parts of the body	Water-reactive substances

(2) Warning Labels. If a chemical is hazardous or potentially hazardous, the producer or importer must affix a warning label to every container of that chemical before it leaves his facility. The Contractor must assure these labels are attached and legible. The label must identify the chemical, state the hazard, and give the name and address of the producer or importer. If the hazardous substance is transferred to another container, that container must then be labeled, tagged, or marked with the name of the chemical and the appropriate hazard warning. Warning labels should be replaced immediately if they are defaced or removed.

(3) Material Safety Data Sheets. The producer or importer must also supply a material safety data sheet (MSDS). The Contractor must keep these available in the work area where the substance is used, so that the people using the substance can easily review important safety and health information, such as:

- The hazard possible from misuse of the substance
- Precautions necessary for use, handling, and storage
- Emergency procedures for leaks, spills, fire and first aid
- Useful facts about the substance's physical or chemical properties

(4) Work Area Specific Training. Because of hazardous substance may react differently depending on how it is used or the environment of the work area, the Contractor must conduct work area specific training; special training which takes the Contractor's operations, environment, and work policies into consideration. Work area training presents:

The hazardous substances which are present in the work place and the hazards they pose

Ways to protect against those hazards, such as protective equipment, emergency procedures, and safe handling

Where the MSDS's are kept, and an explanation of the labeling system
Where the Contractor's written Hazard Communication Program is located

(5) The Written Hazard Communication Program. In accordance with OSHA requirements, the Contractor must prepare a written Hazard Communication Program. This document will be included in the Contractor's Accident Prevention Plan. This document states how the Contractor plans to ensure that hazardous materials are appropriately labeled, how and where MSDS's will be maintained, and how employees will be provided with specific information and training.

1.51 NOT USED.

1.52 MECHANICAL ROOM LAYOUT (ORL).

Detailed mechanical room layout drawings shall be submitted for approval in accordance with SD-04 Section 01330. Layout drawings shall show location and maintenance clearances for all mechanical room equipment, and all utility runs/chases for mechanical, electrical, telephone and other similar systems. Drawings shall be submitted at the same time as the submittals for the equipment to be located within the mechanical room. These rooms include 4-Machinery House Middle Piers, 2-Machinery House End Piers, and 2-Void Rooms (located in the locks).

1.53 RIGHTS IN TECHNICAL DATA--NONCOMMERCIAL ITEMS (NOV 1995)
252.227-7013

(a) Definitions. As used in this clause:

(1) "Computer data base" means a collection of data recorded in a form capable of being processed by a computer. The term does not include computer software.

(2) "Computer program" means a set of instructions, rules, or routines recorded in a form that is capable of causing a computer to perform a specific operation or series of operations.

(3) "Computer software" means computer programs, source code, source code listings, object code listings, design details, algorithms, processes, flow charts, formulas and related material that would enable the software to be reproduced, recreated, or recompiled. Computer software does not include computer data bases or computer software documentation.

(4) "Computer software documentation" means owner's manuals, user's manuals, installation instructions, operating instructions, and other similar items, regardless of storage medium, that explain the capabilities of the computer software or provide instructions for using the software.

(5) "Detailed manufacturing or process data" means technical data that describe the steps, sequences, and conditions of manufacturing, processing or assembly used by the manufacturer to produce an item or component or to perform a process.

(6) "Developed" means that an item, component, or process exists and is workable. Thus, the item or component must have been constructed or the process practiced. Workability is generally established when the item, component, or process has been analyzed or tested sufficiently to demonstrate to reasonable people skilled in the applicable art that there is a high probability that it will operate as intended. Whether, how much, and what type of analysis or testing is required to establish workability depends on the nature of the item, component, or process, and the state of the art. To be considered "developed," the item, component, or process need not be at the stage where it could be offered for sale or sold on the commercial market, nor must the item, component, or process be actually reduced to practice within the meaning of Title 35 of the United States Code.

(7) "Developed exclusively at private expense" means development was accomplished entirely with costs charged to indirect cost pools, costs not allocated to a government contract, or any combination thereof.

(i) Private expense determinations should be made at the lowest practicable level.

(ii) Under fixed-priced contracts, when total costs are greater than the firm-fixed-price or ceiling price of the contract, the additional development costs necessary to complete development shall not be considered when determining whether development was at government, private, or mixed expense.

(8) "Developed exclusively with government funds" means development was not accomplished exclusively or partially at private expense.

(9) "Developed with mixed funding" means development was accomplished partially with costs charged to indirect cost pools and/or costs not allocated to a government contract, and partially with costs charged directly to a government contract.

(10) "Form, fit, and function data" means technical data that describes the required overall physical, functional, and performance characteristics (along with the qualification requirements, if applicable) of an item, component, or process to the extent necessary to permit identification of physically and functionally interchangeable items.

(11) "Government purpose" means any activity in which the United States Government is a party, including cooperative agreements with international or multi-national defense organizations, or sales or transfers by the United States Government to foreign governments or international organizations. Government purposes include competitive procurement, but do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data for commercial purposes or authorize others to do so.

(12) "Government purpose rights" means the right to--

(i) Use, modify, reproduce, release, perform, display, or

disclose technical data within the Government without restrictions; and

(ii) Release or disclose technical data outside the Government and authorize persons to whom release or disclosure has been made to use, modify, reproduce, release, perform, display, or disclose that data for United States government purposes.

(13) "Limited rights" means the rights to use, modify, reproduce, release, perform, display, or disclose technical data, in whole or in part, within the Government. The Government may not, without the written permission of the party asserting limited rights, release or disclose the technical data outside the Government, use the technical data for manufacture, or authorize the technical data to be used by another part, except that the Government may reproduce, release or disclose such data or authorize the use or reproduction of the data by persons outside the Government if reproduction, release, disclosure, or use is--

(i) Necessary for emergency repair and overhaul; or

(ii) A release or disclosure of technical data (other than detailed manufacturing or process data) to, or use of such data by, a foreign government that is in the interest of the Government and is required for evaluation or informational purposes;

(iii) Subject to a prohibition on the further reproduction, release, disclosure, or use of the technical data; and

(iv) The contractor or subcontractor asserting the restriction is notified of such reproduction, release, disclosure, or use.

(14) "Technical data" means recorded information, regardless of the form or method of the recording, of a scientific or technical nature (including computer software documentation). The term does not include computer software or data incidental to contract administration, such a financial and/or management information.

(15) "Unlimited rights" means rights to use, modify, reproduce, perform, display, release, or disclose technical data in whole or in part, in any manner, and for any purpose whatsoever, and to have or authorize others to do so.

(b) Rights in technical data.

The Contractor grants or shall obtain for the Government the following royalty free, world-wide, nonexclusive, irrevocable license rights in technical data other than computer software documentation (see Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation clause of this contract for rights in computer software documentations):

(1) Unlimited rights.

The Government shall have unlimited rights in technical data that are--

(i) Data pertaining to an item, component, or process which has been or will be developed exclusively with Government funds;

(ii) Studies, analyses, test data, or similar data produced for this contract, when the study, analysis, test, or similar work was specified as an element of performance;

(iii) Created exclusively with Government funds in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes;

(iv) Form, fit, and function data;

(v) Necessary for installation, operation, maintenance, or training purposes (other than detailed manufacturing or process data);

(vi) Corrections or changes to technical data furnished to the Contractor by the Government;

(vii) Otherwise publicly available or have been released or disclosed by the Contractor or subcontractor without restrictions on further use, release or disclosure, other than a release or disclosure resulting from the sale, transfer, or other assignment of interest in the technical data to another party or the sale or transfer of some or all of a business entity or its assets to another party;

(viii) Data in which the Government has obtained unlimited rights under another Government contract or as a result of negotiations; or

(ix) Data furnished to the Government, under this or any other Government contract or subcontract thereunder, with--

(A) Government purpose license rights or limited rights and the restrictive condition(s) has/have expired; or

(B) Government purpose rights and the Contractor's exclusive right to use such data for commercial purposes has expired.

(2) Government purpose rights.

(i) The Government shall have government purpose rights for a five-year period, or such other period as may be negotiated, in technical data--

(A) That pertain to items, components, or processes developed with mixed funding except when the Government is entitled to unlimited rights in such data as provided in paragraphs (b)(ii) and (b)(iv) through (b)(ix) of this clause; or

(B) Created with mixed funding in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes.

(ii) The five-year period, or such other period as may have been negotiated, shall commence upon execution of the contract, subcontract, letter contract (or similar contractual instrument), contract modification, or option exercise that required development of the items, components, or processes or creation of the data described in paragraph (b)(2)(i)(B) of this clause. Upon expiration of the five-year or other negotiated period, the Government shall have unlimited rights in the technical data.

(iii) The Government shall not release or disclose technical data in which it has government purpose rights unless--

(A) Prior to release or disclosure, the intended recipient is subject to the non-disclosure agreement at 227.7103-7 of the Defense Federal Acquisition Regulation Supplement (DFARS); or

(B) The recipient is a Government contractor receiving access to the data for performance of a Government contract that contains the clause at DFARS 252.227-7025, Limitations on the Use or Disclosure of Government-Furnished Information Market with Restrictive Legends.

(iv) The Contractor has the exclusive right, including the right to license others, to use technical data in which the Government has obtained government purpose rights under this contract for any commercial purpose during the time period specified in the government purpose rights legend prescribed in paragraph (f)(2) of this clause.

(3) Limited rights.

(i) Except as provided in paragraphs (b)(1)(ii) and (b)(1)(iv) through (b)(1)(ix) of this clause, the Government shall have limited rights in technical data--

(A) Pertaining to items, components, or processes developed exclusively at private expense and marked with the limited rights legend prescribed in paragraph (f) of this clause; or

(B) Created exclusively at private expense in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes.

(ii) The Government shall require a recipient of limited rights data for emergency repair or overhaul to destroy the data and all copies in its possession promptly following completion of the emergency repair/overhaul and to notify the Contractor that the data have been destroyed.

(iii) The Contractor, its subcontractors, and suppliers are not required to provide the Government additional rights to use, modify, reproduce, release, perform, display, or disclose technical furnished to the Government with limited rights. However, if the Government desires to obtain additional rights in technical data in which it has limited rights, the Contractor agrees to promptly enter into negotiations with the Contracting Officer to determine whether there are acceptable terms for

transferring such rights. All technical data in which the Contractor has granted the Government additional rights shall be listed or described in a license agreement made part of the contract. the license shall enumerate the additional rights granted the Government in such data.

(4) Specifically negotiated license rights.

The standard license rights granted to the Government under paragraphs (b)(1) through (b)(3) of this clause, including the period during which the Government shall have government purpose rights in technical data, may be modified by mutual agreement to provide such rights as the parties consider appropriate but shall not provide the Government lesser rights than are enumerated in paragraph (a)(13) of this clause. Any rights so negotiated shall be identified in a license agreement made part of this contract.

(5) Prior government rights.

Technical data that will be delivered, furnished, or otherwise provided to the Government under this contract, in which the Government has previously obtained rights shall be delivered, furnished, or provided with the pre-existing rights, unless--

(i) The parties have agreed otherwise; or

(ii) Any restrictions on the Government's rights to use, modify, reproduce, release, perform, display, or disclose the data have expired or no longer apply.

(6) Release from liability.

The Contractor agrees to release the Government from liability for any release or disclosure of technical data made in accordance with paragraph (a)(13) or (b)(2)(iii) of this clause, in accordance with the terms of a license negotiated under paragraph (b)(4) of this clause, or by others to whom the recipient has released or disclosed the data and to seek relief solely from the party who has improperly used, modified, reproduced, released, performed, displayed, or disclosed Contractor data marked with restrictive legends.

(c) Contractor rights in technical data.

All rights not granted to the Government are retained by the Contractor.

(d) Third party copyrighted data.

The Contractor shall not, without the written approval of the Contracting Officer, incorporate any copyrighted data in the technical data to be delivered under this contract unless the Contractor is the copyright owner or has obtained for the Government the license rights necessary to perfect a license or licenses in the deliverable data of the appropriate scope set forth in paragraph (b) of this clause, and has affixed a statement of the license or licenses obtained on behalf of the Government

and other persons to the data transmittal document.

(e) Identification and delivery of data to be furnished with restrictions on use, release, or disclosure.

(1) This paragraph does not apply to restrictions based solely on copyright.

(2) Except as provided in paragraph (e)(3) of the clause, technical data that the Contractor assets should be furnished to the Government with restrictions on use, release, or disclosure are identified in an attachment to this contract (see Attachment). The Contractor shall not deliver any data with restrictive markings unless the data are listed on the Attachment.

(3) In addition to the assertions made in the Attachment, other assertions may be identified after award when based on new information or inadvertent omissions unless the inadvertent omissions would have materially affected the source selection decision. Such identification and assertion shall be submitted to the Contracting Officer as soon as practicable prior to the scheduled date for delivery of the data, in the following format, and signed by an official authorized to contractually obligate the Contractor:

Identification and Assertion of Restrictions on the Government's Use, Release, or Disclosure of Technical Data.

The Contractor asserts for itself, or the persons identified below, that the Government's rights to use, release, or disclose the following technical data should be restricted--

Technical Data to be Furnished With Restrictions*	Asserted Basis for Assertion**	Name of Person Rights Category***	Asserting Restrictions****
(LIST)	(LIST)	(LIST)	(LIST)

*If the assertion is applicable to items, components, or processes developed at private expense, identify both the data and each such item, component, or process.

**Generally, the development of an item, component, or process at private expense, either exclusively or partially, is the only basis for asserting restrictions on the Government's rights to use, release, or disclose technical data pertaining to such terms, components, or processes. Indicate whether development was exclusively or partially at private expense. If development was not at private expense, enter the specific reason for asserting that the Government's right should be restricted.

***Enter asserted rights category (e.g. government purpose license rights from a prior contract, rights in SBIR data generated under another contract, limited or government purpose rights under this or a prior contract, or specifically negotiated licenses).

***Corporation, individual, or other person, as appropriate.

Date _____

Printed Name and Title _____

Signature _____

(End of identification and assertion)

(4) When requested by the Contracting Officer, the Contractor shall provide sufficient information to enable the Contracting Officer to evaluate the Contractor's assertions. The Contracting Officer reserves the right to add the Contractor's assertions to the Attachment and validate any listed assertion, at a later date, in accordance with the procedures of the Validation of Restrictive Markings on Technical Data clause of this contract.

(f) Marking requirements.

The Contractor, and its subcontractor or suppliers, may only assert restrictions on the Government's rights to use, modify, reproduce, release, perform, display, or disclose technical data to be delivered under this contract by marking the deliverable data subject to restriction. Except as provided in paragraph (f)(5) of this clause, only the following legends are authorized under this contract: the government purpose rights legend at paragraph (f)(2) of this clause: the limited rights legend at paragraph (f)(3) of this clause: or the special license rights legend at paragraph (f)(4) of this clause, and/or a notice of copyright as prescribed under 17 U.S.C. 401 or 402.

(1) General marking instructions.

The Contractor, or its subcontractors or suppliers, shall conspicuously and legibly mark the appropriate legend on all technical data that qualify for such markings. The authorized legends shall be placed on the transmittal document or storage container and, for printed material, each page of the printed material containing technical data for which restrictions are asserted. When only portions of a page of printed material are subject to the asserted restrictions, such portions shall be identified by circling, underscoring, with a note, or other appropriate identifier. Technical data transmitted directly from one computer or computer terminal to another shall contain a notice of asserted restrictions. Reproductions of technical data or any portions thereof subject to asserted restrictions shall also reproduce the asserted restrictions.

(2) Government purpose rights markings.

Data delivered or otherwise furnished to the Government with government purpose rights shall be marked as follows:

GOVERNMENT PURPOSE RIGHTS

Contract No. _____

Contractor Name _____

Contractor Address _____

Expiration Date _____

The Government's rights to use, modify, reproduce, release, perform, display, or disclose these technical data are restricted by paragraph (b)(2) of the Rights in Technical Data--Noncommercial Items clause contained in the above identified contract. No restrictions apply after the expiration date shown above. Any reproduction of technical data or portions thereof marked with this legend must also reproduce the markings.

(End of legend)

(3) Limited rights markings.

Data delivered or otherwise furnished to the Government with limited rights shall be marked with the following legend:

LIMITED RIGHTS

Contract No. _____

Contractor Name _____

Contractor Address _____

The Government's rights to use, modify, reproduce, release, perform, display, or disclose these technical data are restricted by paragraph (b)(3) of the Rights in Technical Data--Noncommercial Items clause contained in the above identified contract. Any reproduction of technical data or portions thereof marked with this legend must also reproduce the markings. Any person, other than the Government, who has been provided access to such data must promptly notify the above name Contractor.

(End of legend)

(4) Special license rights markings.

(I) Data in which the Government's rights stem from a specifically negotiated license shall be marked with the following legend:

SPECIAL LICENSE RIGHTS

The Government's rights to use, modify, reproduce, release, perform, display, or disclose these data are restricted by Contract No. _____)Insert contract number) _____, License No. _____ (Insert license identifier) _____. Any reproduction of technical data or portions thereof marked with this legend must also reproduce the markings.

(End of legend)

(ii) For purposes of this clause, special licenses do not include government purpose license rights acquired under a prior contract (see paragraph (b)(5) of this clause)_.

(5) Pre-existing data markings.

If the terms of a prior contract or license permitted the Contractor to restrict the Government's rights to use, modify, reproduce, release perform, display, or disclose technical data deliverable under this contract, and those restrictions are still applicable, the Contractor may mark such data with the appropriate restrictive legend for which the data qualified under the prior contract or license. The marking procedures in paragraph (f)(1) of this clause shall be followed.

(g) Contractor procedures and records.

Throughout performance of this contract, the Contractor and its subcontractors or suppliers that will deliver technical data with other than unlimited rights, shall--

(1) Have, maintain, and follow written procedures sufficient to assure that restrictive markings are used only when authorized by the terms of this clause, and

(2) Maintain records sufficient to justify the validity of any restrictive markings on technical data delivered under this contract.

(h) Removal of unjustified and nonconforming markings.

(1) Unjustified technical data markings.

The rights and obligations of the parties regarding the validation of restrictive markings or technical data furnished or to be furnished under this contract are contained in the Validation of Restrictive Markings on Technical Data clause of this contract. Notwithstanding any provision of this contract concerning inspection and acceptance, the Government may ignore or, at the Contractor's expense, correct or strike a marking if, in accordance with the procedures in the Validation of Restrictive Markings on Technical Data clause of this contract, a restrictive marking is determined to be unjustified.

(2) Nonconforming technical data markings.

A nonconforming marking is a marking placed on technical data

delivered or otherwise furnished to the Government under this contract that is not in the format authorized by this contract. Correction of nonconforming markings is not subject to the Validation of Restrictive Markings on Technical Data clause of this contract. If the Contracting Officer notifies the Contractor of a nonconforming marking and the Contractor fails to remove or correct such marking within sixty (60) days, the Government may ignore or, at the Contractor's expense, remove or correct any nonconforming marking.

(I) Relation to patents.

Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other with otherwise granted to the Government under any patent.

(j) Limitation on charges for rights in technical data.

(1) The Contractor shall not charge to this contract any cost, including, but not limited to, license fees, royalties, or similar charges, for rights in technical data to be delivered under this contract when--

(I) The Government has acquired, by any means, the same or greater rights in the data; or

(ii) The data are available to the public without restrictions.

(2) The limitation in paragraph (j)(1) of this clause--

(I) Includes costs charged by a subcontractor or supplier, at any tier, or costs incurred by the Contractor to acquire rights in subcontractor or supplier technical data, if the subcontractor or supplier has been paid for such rights under any other Government contract or under a license conveying the rights to the Government; and

(ii) Does not include the reasonable costs of reproducing, handling, or mailing the documents or other media in which the technical data will be delivered.

(k) Applicability to subcontractors or suppliers.

(1) The Contractor shall ensure that the rights afforded its subcontractors and suppliers under 10 U.S.C. 2320, 10 U.S.C. 2321, and the identification, assertion, and delivery processes of paragraph (e) of this clause are recognized and protected.

(2) Whenever any technical data for noncommercial items is to be obtained from a subcontractor or supplier for delivery to the Government under this contract, the Contractor shall use this same clause in the subcontract or other contractual instrument, and require its subcontractors or suppliers to do so, without alteration, except to identify the parties. No other clause shall be used to enlarge or diminish the Government's, the Contractor's, or a higher-tier subcontractor's or supplier's rights in a subcontractor's or supplier's technical data.

(3) Technical data required to be delivered by a subcontractor or supplier shall normally be delivered to the next higher-tier contractor, subcontractor, or supplier. However, when there is a requirement in the prime contract for data which may be submitted with other than unlimited rights by a subcontractor or supplier, then said subcontractor or supplier may fulfill its requirement by submitting such data directly to the Government, rather than through a higher-tier contractor, subcontractor, or supplier.

(4) The Contractor and higher-tier subcontractors or suppliers shall not use their power to award contracts as economic leverage to obtain rights in technical data from their subcontractors or suppliers.

(5) In no event shall the Contractor use its obligation to recognize and protect subcontractor or supplier rights in technical data as an excuse for failing to satisfy its contractual obligation to the Government.

1.54 LIMITATIONS ON THE USE OR DISCLOSURE OF GOVERNMENT-FURNISHED INFORMATION MARKED WITH RESTRICTIVE LEGEND DFARS 252.227-7025

(a)(1) For contracts requiring the delivery of technical data, the terms, "limited rights" and "Government purpose rights" are defined in the Rights in Technical Data--Noncommercial Items clause of this contract.

(2) For contracts that do not require the delivery of technical data, the terms "government purpose rights" and "restricted rights" are defined in the Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation clause of this contract.

(3) For Small Business Innovative Research program contracts, the terms "limited rights" and "restricted rights" are defined in the Rights in Noncommercial Technical Data and Computer Software--Small Business Innovative Research (SBIR) Program clause of this contract.

(b) Technical data or computer software provided to the Contractor as Government furnished information (GFI) under this contract may be subject to restrictions on use, modification, reproduction, release, performance, display, or further disclosure.

(1) GFI marked with limited or restricted rights legends.

The Contractor shall use, modify, reproduce, perform, or display technical data received from the Government with limited rights legends or computer software received with restricted rights legends only in the performance of this contract. The Contractor shall not, without the express written permission of the party whose name appears in the legend, release or disclose such data or software to any person.

(2) GFI marked with government purpose rights legends.

The Contractor shall use technical data or computer software received from the Government with government purpose rights legends for government purposes only. The Contractor shall not, without the express

written permission of the party whose name appears in the restrictive legend, use, modify, reproduce, release, perform, or display such data or software for any commercial purpose or disclose such data or software to a person other than its subcontractors, suppliers, or prospective subcontractors or suppliers, who require the data or software to submit offers for, or perform, contracts under this contract. Prior to disclosing the data or software, the Contractor shall require the persons to whom disclosure will be made to complete and sign the non-disclosure agreement at 227.7103-7 of the Defense Federal Acquisition Regulation Supplement (DFARS).

(3) GFI marked with specially negotiated license rights legends.

The Contractor shall use, modify, reproduce, release, perform, or display technical data or computer software received from the Government with specially negotiated license legends only as permitted in the license.

Such data or software may not be release or disclosed to other persons unless permitted by the license and, prior to release or disclosure, the intended recipient has completed the non-disclosure agreement at DFARS 227.7103-7. The Contractor shall modify paragraph (1)(c) of the non-disclosure agreement to reflect the recipient's obligations regarding use, modification, reproduction, release, performance, display, and disclosure of the data of software.

(c) Indemnification and creation of third party beneficiary rights.

The Contractor agrees--

(1) To indemnify and hold harmless the Government, its agents, and employees from every claim or liability, including attorneys fees, court costs, and expenses, arising out of, or in any way related to, the misuse or unauthorized modification, reproduction, release, performance, display, or disclosure of technical data or computer software received from the Government with restrictive legends by the Contractor or any person to whom the Contractor has released or disclosed such data or software; and

(2) That the party whose name appears on the restrictive legend, in addition to any other rights it may have, is a third party beneficiary who has the right of direct action against the Contractor, or any person to whom the Contractor has released or disclosed such data or software, for the unauthorized duplication, release, or disclosure of technical data or computer software subject to restrictive legends.

1.55 NOT USED.

1.56 NOT USED.

1.57 PARTNERING

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In order to most effectively accomplish this contract, the Government proposes to form a partnership with the Contractor to develop a cohesive building team. It is anticipated that this partnership would involve the Corps of Engineers, the Contractor, primary subcontractors and the designers. This partnership would strive to develop a cooperative management team drawing on the strengths of each team member in an effort

to achieve a quality project within budget and on schedule. This partnership would be bilateral in membership and participation will be totally voluntary. *1

1.58 ACTIVITY ENVIRONMENTAL ANALYSIS

Before starting any major phase of the work, an Activity Environmental Analysis shall be developed by the contractor and reviewed with the Government Representative. A major phase of the work is defined as an operation involving a type of work not previously experienced which presents possible sources of adverse environmental effects. This analysis will evaluate potential environmental consequences of the activity and the techniques which will be utilized to accomplish the work in an acceptable manner. This analysis includes: (1) the phase or activity of work; (2) the potential environmental consequences of the activity; (3) precautionary actions to prevent adverse environmental impacts; (4) actions in the event of an environmental incident; and (5) the appropriate reference to Federal, State, or Local standards, regulations, or laws.

1.59 NOT USED.

1.60 DAMAGE TO WORK (ORL)

*4

The responsibility for damage to any part of the permanent work shall be as set forth in CONTRACT CLAUSE: See Section 0700 FAR 52.236 PERMITS AND RESPONSIBILITIES. However, if in the judgment of the Contracting Officer, any part of the permanent work performed by the Contractor is damaged by flood or earthquake, the Contractor will make the repairs as ordered by the Contracting Officer and full compensation for such repairs will be made.

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*1

1.61 NOT USED

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1.62 OBSTRUCTION OF NAVIGABLE WATERWAYS

a. The Contractor shall--

(1) Promptly recover and remove any material, plant, machinery, or appliance which the Contractor loses, dumps, throws overboard, sinks, or misplaces, and which, in the opinion of the Contracting Officer, may be dangerous to or obstruct navigation;

(2) Give immediate notice, with description and locations of any such obstructions until the same are removed.

(3) When required by the Contracting Officer, mark or buoy such obstructions until the same are removed.

*1

(4) River traffic shall not be stopped at any time during the construction period. *1

(5) The Contractor is responsible for ensuring that all floating equipment and mooring lines are located outside the nominated

Traffic Navigation Area. The contractor is responsible for providing two buoys in the river prior to start of construction each year. The contractor will meet with the Contracting Officer, Coast Guard and Lockmaster prior to starting work each river season.

b. The Contracting Officer may--

(1) Remove the obstructions by contract or otherwise should the Contractor refuse, neglect, or delay compliance with paragraph a. above of this clause; and

*1

(2) **In the case of negligence**, deduct the cost of removal from any monies due or to become due to the Contractor; or

*1

c. The Contractor's liability for the removal of a vessel wrecked or sunk without fault or negligence is limited to that provided in Sections 15, 19, and 20 of River and Harbor Act of March 3, 1899 (33 U.S.C. 410 et.seq.).

d. Working In The River By The Contractor. The Contractor will not disrupt navigation without formal approval from the Contracting Officer, and only then with a clear and coordinated plan identifying areas and duration of construction activities see para. 1 (4) above for conflict. The Contractor is solely responsible for conducting his operations in such a manner as to avoid any interference with the safe and uninterrupted passage of all established river traffic. He shall be responsible for any action in connection with his operations, which causes interference with or prevents the safe passage of traffic past the site of work. The contractor will be required to work in the river during the five phases of the construction.

Phase 1 During Phase 1 the only river work will be the installation of mooring anchors and test driving of piles. During this river work the contractor shall provide a plan showing where and when he will be working in the river. If the contractor's plan reduces the width of the navigable pass below 1800' he will be required to let the Contracting Officer know 7 days ahead of time so that the Coast Guard can be notified as to how navigation traffic will need to pass the Olmsted site. Once the contractor has reduced the navigable pass width below 900' he will be required to have a helper boat and operators available 24 hours a day. The helper boat shall have a minimum of 800 horsepower. This boat shall have no other duties.

Phase 2 During Phase 2 all navigation traffic will pass through the 1400' navigable pass. If the contractor's plan reduces the width of the navigable pass below 1400' he will be required to let the Contracting Officer know 7 days ahead of time so that the Coast Guard can be notified as to how navigation traffic will need to pass the Olmsted site. Once the contractor has reduced the navigable pass width below 900' he will be required to have a helper boat with operators available 24 hours a day. The helper boat shall have a minimum of 800 horsepower. This boat shall have no other duties.

If during Phase 2 construction; and navigation traffic is using the

navigable pass and the contractor wishes to route traffic through the locks for a short period of time to eliminate the wakes by tows in the river for final grading, pile frames or for setting of a base shell the contractor needs to let the Contracting Officer know 72 hours ahead of time so that the Coast Guard can be notified as to how navigation traffic will need to pass the Olmsted site. The river elevation cannot be any higher than El. 304 based on the three day forecast for the locks to be used.

Phase 3 During Phase 3 all navigation traffic will pass through the 1400' navigable pass. If the contractor's plan reduces the width of the navigable pass below 900' he will be required to let the Contracting Officer know 7 days ahead of time so that the Coast Guard can be notified as to how navigation traffic will need to pass the Olmsted site. Once the contractor has reduced the navigable pass width below 900' he will be required to have his helper boat and operators available 24 hours a day. The helper boat shall have a minimum of 800 horsepower. This boat shall have no other duties.

If during Phase 3 construction; and navigation traffic is using the navigable pass and the contractor wishes to route traffic through the locks for a short period of time to eliminate the wakes by tows in the river for final grading, pile frames or for setting of a base shell the contractor needs to let the Contracting Officer know 72 hours ahead of time so that the Coast Guard can be notified as to how navigation traffic will need to pass the Olmsted site. The river elevation cannot be any higher than El. 304 based on the three day forecast.

*1

Phase 4 During Phase 4 all navigation traffic will be required to pass through the lock chambers unless the contractor's plan provides a navigable pass width of at least 700'. The Contractor shall notify in writing the Contracting Officer of his plan for Phase 4 construction so that the Coast Guard can be notified 72 hours in advance as to how navigation traffic will need to pass the Olmsted site. Also during the time when the navigation traffic is using the navigable pass and the navigable pass width is less than 900' the contractor will be required to have a helper boat and operators available 24 hours a day. The helper boat shall have a minimum of 800 horsepower. This boat shall have no other duties. If during phase 4 and navigation traffic is using the lock chambers and the river reaches El. 304 and the three day forecast indicates that the river will exceed El. 306 then the contractor will be required to remove enough of his floating plant in the river in order to provide a navigable pass width of 700'. Also the contractor will be required to have a helper boat and operators available 24 hours a day during the time when the river is above El. 306 and locking cannot take place. The helper boat shall have a minimum of 800 horsepower. This boat shall have no other duties. Once the river goes below El. 304 and the three day forecast indicates that the river will not go above El. 306 the contractor can resume work in the river. *1

If during Phase 4 construction navigation traffic is using the navigable pass and the contractor wishes to route traffic through the locks for a short period of time to eliminate the wakes by tows in the river for final grading, pile frames or for setting of a base shell the contractor needs to let the Contracting Officer know 72 hours ahead of time so that the Coast Guard can be notified as to how navigation traffic will need to pass the

Olmsted site. The river elevation cannot be any higher than El. 304 based on the three day forecast.

Phase 5 During Phase 5 all navigation traffic will be required to pass through the lock chambers. Therefore the contractor will be required to keep both lock chambers open during this time. Any shells that will be required to be launched from the Illinois bank during this time the Contracting Officer will need to be notified at least 3 days in advance so that the Coast Guard can be notified to inform river traffic that lock closures will be needed. If during phase 5 the river reaches El. 304 and the three day forecast indicates that the river will exceed El. 306 then the contractor will be required to remove enough of his floating plant in the river in order to provide a navigable pass width of 700'. Also the contractor will be required to have a helper boat and operators available 24 hours a day during the time when the river is above El. 306 and locking cannot take place. The helper boat shall have a minimum of 800 horsepower.

This boat shall have no other duties. Once the river goes below El. 304 and the three day forecast indicates that the river will not go above El. 306 the contractor can resume work in the river. Once the navigable pass is complete locking of all river traffic will be required once the river drops below EL. 293.

1.63 SIGNAL LIGHTS

The Contractor shall display signal lights and conduct his operations in accordance with the General Regulations of the Department of the Army and of the Coast Guard governing lights and day signals to be displayed by towing vessels with tows on which no signals can be displayed, vessels working on wrecks, dredges and vessels engaged in laying cables or pipe or in submarine or bank protection operations, lights to be displayed on dredge pipe lines, and day signals to be displayed by vessels of more than 65 feet in length moored or anchored in a fairway or channel, and the passing by other vessels of floating plant working in navigable channels, as set forth in Commandant U.S. Coast Guard Instruction M16672.2, Navigation Rules: International-Inland (Comdtinst M16672.2), or 33 CFR81 Appendix A (International) and 33 CFR 84 through 33 CFR 89 (Inland) as applicable.

1.64 NOT USED.

1.65 NOT USED.

1.66 NOT USED.

1.67 NOT USED.

1.68 NOT USED.

1.69 KEY PERSONNEL, SUBCONTRACTORS AND OUTSIDE ASSOCIATES OR CONSULTANTS
(17 AUGUST 1998)

In Connection with the services covered by this contract, any in-house personnel, subcontractors, and outside associated or consultants will be limited to individuals or firms that were specifically identified and

agreed to during source selection. The Contractor shall obtain the Contracting Officer's written consent before making any substitution for these designated in-house personnel, subcontractors, associates, or consultants.

1.70 NOT USED.

1.71 ORDER OF PRECEDENCE

a. The contract includes the standard contract clauses and schedules current at the time of contract award. It entails, (1) the solicitation in its entirety, including all drawings, cuts, and illustrations, and any amendments, and (2) the successful offeror's accepted proposal. The contract constitutes and defines the entire agreement between the Contractor and the Government. No documentation shall be omitted in any way bears upon the terms of that agreement.

b. In the event of conflict or inconsistency between any of the provisions of this contract, precedence shall be given in the following order:

1. Betterments: Any portions of the accepted proposal which both conform to and exceed the provisions of the solicitation.

*1

2. The provisions of the solicitations.

*1

3. All other provisions of the accepted proposal.

4. Any design products including, but not limited to, plans, specifications, engineering studies and analyses, shop drawings, equipment installation drawings, etc. These are "deliverables" under the contract and are not part of the contract, in the order of precedence herein.

1.72 NOT USED.

1.73 NOT USED.

1.74 POLLUTION PREVENTION PLAN

In accordance with the National Pollutant Discharge Elimination System (NPDES) Permit, a Pollution Prevention Plan has been developed as part of this project. This plan has been developed to meet the erosion and sediment control requirements for the State of Illinois. The Contractor will implement the Pollution Prevention Plan (PPP) that was prepared by the U.S. Army Corps of Engineers as shown on the plans, and as directed in these specifications. This PPP will be provided to the contractor as part of these documents must be implemented in accordance with the NPDES permit. A Notice of Intent (NOI) has been prepared by the U.S. Army Corps of Engineers and submitted to the State of Illinois. Commencement of any construction activity (ground disturbing activity) by the contractor shall not begin until 48-hours after the NOI letter has been postmarked. The Contractor shall maintain a copy of the State compliance letter, NPDES Permit and PPP at the construction site. Any changes made to the PPP must be documented and approved by the Contracting Officer. See Specifications

Section 01130 Paragraph 1.5 for additional requirements.

1.75 NOT USED

1.76 NOT USED

1.77 NOT USED

***3**

1.78 ***3 NOT USED**

***3**

1.79 INSPECTION FACILITIES, CORPS WORKBOAT AND FLOATING DOCK

In order to facilitate inspection, the Contractor will be required to furnish the following items:

A. To furnish, on the request of the Contracting Officer or Government inspector, the use of such boats, boatmen, scales, equipment and crew of the plant as may be reasonably necessary in inspecting and supervising the work. This will be applicable at the Olmsted site and at the Prefabrication Yard site, if a remote Prefabrication Yard sit is used.

B. To furnish, on the request of the Contracting Officer or Government inspector, suitable transportation from all points on shore designated by the Contracting Officer to and from various pieces of the plant. This includes the storage area on the Kentucky bank of the river. This will be applicable at the Olmsted site and at the Prefabrication Yard site, if a remote Prefabrication Yard site is used.

***1**

C. The Contractor shall furnish to the Government a 23ft (or larger) modified 5086 aluminum V hull workboat. This boat shall be in new condition and include a trailer and be delivered to the Olmsted Resident Office prior to the start of construction in the river. The boat shall be of standard design and certified by the Cost Guard for marine use. The Contractor shall be responsible for all licensing of the boat and trailer. The purpose of this boat will be for transportation of Government personnel only. The boat will mainly be used by Government Inspectors for inspection of the dam construction but may also be used for inspection of other projects during the life of the contract. The Contractor shall be prepared to provide normal maintenance, fuel, service, and repair on the workboat during the life of the contract. Below are the minimum requirements for the workboat and the required options and accessories as listed by SeaArk Marine of Monticello, AR. The workboat and accessories shall be submitted and approved in writing by the Contracting Officer prior to purchase by the Contractor. The Government may wish to inspect the fabrication of the workboat during its construction and/or fit up. ***1**

Minimum Requirements for the Corps Workboat:

The workboat shall be similar in design to the Little Giant by SeaArk Marine and shall include similar standard equipment & construction details as listed by SeaArk Marine for their Little Giant Series. Include a 4-Man standard cabin with aft cabin bulkhead & door as well as front door with bow storage compartment and hatch.

Provide the workboat with 115 HP Dual Yamaha or equal 4 cycle outboard gas motors with platform and protection bar. Props shall turn in opposite directions of each other to reduce the cavitation effect.

Provide a custom fitted trailer w/ marine swivel jack and wheel, winch system, tie down cables and hooks, submersible tail lights, side load guides, spare tire and hydraulic surge breaks. The Contractor shall also install an adequate towing package to a Corps vehicle, which will adequately handle the workboat and trailer including all electrical, and hitch attachments needed.

20 OPTIONS & ACCESSORIES REQUIRED FOR THE WORKBOAT AS LISTED (BY SEARK MARINE)

- | | |
|---|--|
| 1. Six Stainless Steel 10" cleats. | 11. Hydraulic Trim Tabs. |
| 2. Bench Seating/ Storage Boxes
(2 outside cabin, one inside) | 12. Level floatation when
flooded. |
| 3. Square Bow & Push Knees with
high pattern bow rails. | 13. Lifting eyes |
| 4. Custom Paint & Lettering
(U.S. Army Corps of Engineers w/ castle) | 14. 6" Transducer well. |
| 5. Running and Anchor Lights. | 15. 30 Amp shore power outlet. |
| 6. Dual battery system. | 16. Two flood lights on
cabin roof. |
| 7. Minimum 30 gallon optional fuel tank. | 17. Anchor package. |
| 8. Emergency lights | 18. Stern mounted flag pole. |
| 9. Engine installations w/ all gauges,
& controls, wiring. | 19. 12V receptacle in cabin. |
| | 20. Replace Navigator seat
w/ bench |
10. Hydraulic steering.

Additional Required Options as listed by Overton of Greenville, NC or Equal

- Four Step Removable Gunwale Hook Ladder. Overton # 39993
- Eight Movable Polyform Fenders w/ Rail Fender Hangers. Overton #22269.
- Equip workboat with all necessary safety items as called for in EM385-1-1 including the following items:
 - 1. Fire Extinguisher, mounted to interior of cabin. Overton #29649
 - 2. Air Horn with refillable canister, holder mounted to interior of cabin ,Overton #31591
 - 3. Hand Held 12V Spot Light, mount light holder to cabin, Overton #34008
 - 4. Vest Storage Bag, Overton #37600
 - 5. First Aid Kit, mounted to interior of cabin.
 - 6. Telescoping Boat Hook and Paddle, mounted to outside of cabin, Overton #28653
 - 7. 24" Life Preserver Ring Buoy and S.S. Bracket installed to exterior of cabin. Overton #201071 & #25488
 - 8. 100' of 3/8" nylon rope in a vinyl bag.

The Contractor shall maintain fuel in the workboat fuel tank as needed for daily operation. The fuel tank shall be topped off once each week as a minimum.

*1

Prior to acceptance and delivery of the workboat, the Contractor and appropriate Government personnel shall conduct a shakedown test. Any items needing correction during this time shall be corrected prior to delivery. *1

D FLOATING DOCK

Within 90 days of Notice to Proceed, the Contractor shall start his design (for approval), of a floating dock with fenders, cleats, handrail, and galvanized or aluminum metal gangway produced by a commercial dock manufacturer. The dock shall be complete prior to acceptance of the Corps workboat as described in the previous paragraph. The floating dock will be used to tie off the Corps workboat and skiffs when not in use. The dock shall be equipped with a 30 Amp shore power supply and security lighting. The location and access of this dock and power supply run shall be determined during the design review period for the dock but will be located near Cells 1 thru 5 as seen in the attached sketches at the end of this section. The floating dock shall not be a barge but shall be designed and constructed as a floating dock for exclusive use by the Government. This dock shall remain the property of the Government. Final installation and access to the dock will also be the responsibility of the Contractor. This dock shall be properly maintained and repaired (if needed) by the Contractor for the life of the contract. The design shall take into account the overall river height fluctuation of 45ft, from elevation 330 down to elevation 285.

Floating Dock Design shall be consistent with requirements of "LAYOUT and DESIGN GUIDELINES FOR SMALL CRAFT BERTHING FACILITIES" published by the Department of Boating and Waterways, State of California, 1629 S Street, Sacramento, CA 95814.

The manufacturer/supplier of the dock and gangway shall have a minimum of 5 years continuous experience in commercial pier, dock or gangway fabrication and may be required to submit a list of previous experience on similar projects.

The following items shall be submitted for review and approval prior to fabrication and erection: Dimensional layout of piers, docks, gangways and piles or anchorage systems to be furnished under this contract. Engineering calculations showing compliance with the design criteria specified above. All calculations will be stamped with the seal of a qualified licensed, professional engineer. Computations shall include as a minimum the following.

Compliance with combined live and dead load requirements considering both bending and deflection.

Compliance with freeboard requirements under normal load conditions.

Typical sections or details of the following:

Fixed piers, including pile connectors.

Floating docks, including flotation, and pile guides.

Finger dock or pier, including connection to main walkway.

Gangways, including connections to cells or fixed pier, handrails, and

handicap ramps.
Anchorage system.
Utility hangar and access system for electrical from source to dock &
lights.
Decking material and connection details.
Cleats-location and connection details Lighting details

E FLEET MOORING AREA SHORE POWER

In conjunction with the design of the floating dock the contractor shall start work on the fleet mooring area shore power. Provision for floating dock power requirements have been identified in the contract plans and specifications by which will allow both the floating dock and fleet mooring area to be operational prior to June 2005.

F UNDERWATER SURVEY EQUIPMENT

The Contractor shall provide along with the workboat a Model 825 portable survey recorder and optional software from Ross Laboratories, Inc. of Seattle, Washington or approved equal. The Transducer well of the workboat shall be utilized for this instrument. This equipment will remain the property of the Government but will be properly calibrated and maintained as recommended by the manufacturer for the life of the contract by the Contractor. See the following web address for additional information on the survey recorder by Ross, <http://www.rosslaboratories.com/>

1.80 SAFETY INCENTIVE CLAUSE

The Contractor shall provide a plan to encourage all employees to work safely. This plan shall be directed at the individual employee and shall be so designed such that it motivates all employees toward a safe work attitude. The plan shall be designed to be a positive incentive plan and must include a tangible reward and benefit to the individual employee during the physical, construction work on site. The reward frequency shall be at least once a month. This "Work Safety Incentive Plan" must be integrated into the overall "Accident Prevention Plan" which must be accepted prior to start of construction. The "Work Safety Incentive Plan" shall indicate who will administer the program and provide discrete details on how it will be administered. The Government will have final approval of the Work Safety Incentive Plan.

1.81 NOT USED

***1**

1.82 NOT USED

***1**

1.83 ALLOCATION OF STRUCTURAL DESIGN RESPONSIBILITY FOR THE HEAVY LIFT OF DAM SEGMENTS.

Responsibility- The equipment, devices and procedures indicated on the above "F" series drawings are noted as generally conceptual in nature. General Notes on Sheet F-1 and F-2 and on several F drawings indicated the nature of each drawing. It is intended that the contractor strictly comply with the designs on these drawings and details that are not conceptual. Where drawings are noted as conceptual, the contractor is required to

provide design and procedural details to supplement or replace the guidance indicated on the conceptual drawings details. See also Section 00800 para. 1.84 Supplemental Design for Heavy Lift.

Government Responsibility - If the contractor elected in his proposal package to perform in accordance with the conceptual drawing indications, the conceptual design on the indicated drawings (See notes on sheet F-2), will be completed to 100% by the Corps of Engineers after award for the contractor's use. Information from the contractor concerning his lifting equipment will be required to complete the design by the Corps of Engineers. Based on contractor cooperation with the exchange of information, the Government will be 100% responsible for the overall structural design.

Contractor Responsibility - If the contractor does not propose to use the conceptual design of the above F Drawing(s), then the contractor shall submit all necessary design details for Government review. The Government will retain Engineer of Record responsibility for the overall structural design intent of the applicable F drawings.

1.84 SUPPLEMENTAL DESIGN BY THE GOVERNMENT'S ARCHITECT-ENGINEER

As noted in Section 0800 paragraph 1.83, certain designs may be provided by the contractor. To accomplish such design, the Government's Architect-Engineer of Record may be utilized through the Government's contract with the A-E. All business processes and communication will be through the Government as apart of its administration of the A-E and construction contracts.

*1

1.85 MANAGEMENT INFORMATION SYSTEM

Management Information System (MIS) - The Management Information System (MIS), will be used by both the Contractor and the Government for tracking and controlling schedule, cost, reports, and submittals. As a minimum the system must have the following capabilities.

*4

- a. Planning and scheduling
- b. Cost estimating, budgeting and accounting reports
- c. Technical reports

*4

The MIS is considered critical to the success of cost reimbursement contract. This MIS should integrate cost schedule information to provide a minimum: tracking of costs incurred, tracking of costs scheduled, projection of cost and schedules, and time phased budget and spending curves. The schedule portion of this MIS should include a network analysis system as described in Specification Section 01320. Automated information should be remotely accessible at the work site and other locations to allow for: cost tracking of all costs including but not limited to actual labor, equipment, purchases, subcontracts, and other commitments, obligations, and expenditures; and evaluation of the impact of changes to the contract cost schedule.

The Contractor shall provide MIS procedures anticipated for tracking all phases of costs, from subcontracting, material, labor and overheads, to

invoice for cost. The cost tracking shall be performed in a Work Breakdown Structure (WBS) format, with various defined levels of control. The upper levels of the WBS shall be where the Contractor's cost roll-up to levels where the COR will manage costs, schedule and funding. The MIS and/or accounting system must be capable of recording and tracking costs by separate project funds in addition to work schedule items.

Cost and schedule control will be maintained through use of Earned Value Metric Process and the implementation and reporting of the critical path method for schedule control. As part of the earned value analysis the contractor shall prepare the following and include them in the monthly performance reports: Budget Cost of Work Scheduled (BCWS), Budget at Completion (BAC), Budget Cost of Work Performed (BCWP), Actual Cost of Work Performed (ACWP), Estimate to Completion (ETC) and Estimate at Completion (EAC).

Panning and Scheduling - The planning and scheduling system shall be based on a network analysis theory embodied in the critical path method (CPM) which shows the time needed for each step of the project and also the steps that must be taken in a logical sequence. For details on the project schedule see Section 01320 "Project Schedule".

Cost estimating, budgeting and accounting systems shall be required of the Contractor. The cost accounting system shall be in accordance with the cost accounting standards.

Reporting - The contractor shall provide reports to the Government as follows:

a. Bi-Weekly Reports - Bi-weekly reports will be prepared summarizing the work completed during the two-week period; work planned for upcoming two week period, and summary of work completed to date.

b. Monthly Performance Reports - A monthly cost and schedule report will be required. This report will include, a narrative summary of work performed, updated project schedule, and cost performance report (CPR). The CPR will contain the budgeted, earned value; actual cost of work performed for the period and project to date; and budgeted and estimated costs at completion. The report shall compare actual costs, accruals and estimates at completion to the budget at the required levels of the WBS. The contractor will notify the Government when they are within sixty days of funds exhaustion. Budget and accounting data contained in these reports will be available to the Government via electronic data file transfer. The monthly performance report shall also include a milestone report, and a six-month forecast by month and a 12-month look ahead by quarter.

c. Quarterly Reports - At the end of each quarter submit a contract funds status report. This report will include actual to date and quarterly amounts for: cost versus budget, estimate at completion, schedule and major milestone status and discussion of issues/problems.

Records Management - The MIS will support providing on-line query and search capability so that needed records and data can be located and status determined. A centralized records management system is required and must

include a records management plan, document control procedures, system security and user training.

The details for the above processes will be negotiated as Advance Agreements after award. *1

1.86 CONCRETE PLACEMENT DRAWINGS

***1**

The following shall be submitted in accordance with specification Section C-03201. *1

(a) Lift Key Drawings. At least 60 days prior to the submission of concrete lift drawings, the Contractor shall submit for approval, a master sequence of concrete placements. The applicable requirements of the specifications and drawings shall be incorporated. Each "LIFT KEY" drawing will be to scale and contain one shell or one shell's concrete infill.

(b) Concrete Lift Drawings. A concrete lift drawing shall be furnished for each placement of concrete. Each drawing shall contain only one placement. These drawings shall be to scale and the scale used shall be consistent and adequate to clearly show the details of placement. Reference to the appropriate drawings used in the preparation of the drawings shall be shown on each drawing. The appropriate reinforcement placement drawings numbers and fabricated embedded item submittal numbers shall be shown on the corresponding concrete placement drawings. The placement drawings shall not be less than 22 X 34 inches in size. The Contractor shall review each placement drawing for compliance with the contract and coordinate each placement drawing with related related shop drawings to assure completeness and accuracy. The Contractor will appoint someone in his CQC staff that will be responsible for this activity and indicate his approval on each drawing as evidence of such review. Any deviation from the plans, specifications or related shop drawings shall be marked appropriately on the ENG Form 4025 and explained in writing in sufficient detail to verify compliance with the intent of the contract. Drawing submittals shall be limited to no more than 20 individual placement drawings per calendar week. If the Contractor plans to submit more than 20 per week, the Government may require an additional 10 days for review for those over 20 a week. The Contractor shall submit four copies of each placement drawing for review at least 60 days prior to scheduling the placement. After review of the drawing by the Government, one copy will be returned and marked with an appropriate action code. This procedure will be repeated until all corrections have been made and the drawings approved. If drawings are repeatedly submitted with corrections needed, the Contractor's person responsible for their completeness will be removed from that position. After approval, the Contractor shall furnish three copies of each placement drawing to the Government marked "FOR CONSTRUCTION" and an electronic version on CD. Distribution of the FOR CONSTRUCTION drawings shall be made by the Contractor at least one week prior to the beginning of any construction on the placement. Lift drawings must be approved and distributed prior to holding the preparatory phase meeting for any lift's placement.

(c) Electrical/Mechanical Placement Drawings. Electrical placement drawings shall be submitted to show all electrical items to be embedded. All electrical placement information shall be furnished for each placement of

concrete and only one placement shall be shown on a drawing. The placement drawing shall be part of the corresponding concrete placement drawing. Placements without electrical/mechanical items shall be noted on the corresponding concrete placement drawings. Each drawing shall show all dimensions for accurate placement and will include the location of all electrical, instrumentation, and mechanical embedded items such as grounding, conduit number, size, location and anchor bolts for each electrical/mechanical item, etc. After approval, the Contractor shall furnish three copies of each placement drawing to the Government marked "FOR CONSTRUCTION" and an electronic version on CD. Distribution of the FOR CONSTRUCTION drawings shall be made by the Contractor at least one week prior to the beginning of any construction on the placement.

***1**

(d) Reinforcing Placement Drawings. Placement drawings for reinforcing steel shall conform to the requirements set forth in **Spec** Section 03201 and the drawings. Additional requirements and submittal procedures shall conform to paragraph (b) above and the following: ***1**

Placement drawings shall conform to the standards of ACI 315 with the following additional requirements. Drawings shall be drawn to scale with the scale shown on the drawings. These drawings will help identify congested areas and show adjustments in the steel to overcome identified areas. Concrete dimensions of the structure shall be shown along with the location of construction joints, and (typical) locations of all embedded items such as sheet pile walls, pintles, sill beams, side seals, master pile brackets, anchor bolts, structural steel, pre-stressing components, conduits, wall armor, piping, piling, flat jack piping, etc., the size, spacing, shape and location of the bars and bar supporting system in the structure; the location and type of all butt splices and location and length of all lap splices; and schedule/bar lists containing the quantity, shape, size, dimensions and bending detail for individual bars identified on a particular drawing. Schedule/bar lists shall be shown on the drawing and be separated and identified for each concrete lift. Only those bars shown and identified on a particular lift drawing shall be contained in the schedule/bar list on that particular drawing. Each placement drawing shall contain references to appropriate contract drawings used in the preparation of the placement drawing. Lettering scale selected shall be suitable for reduction to half-size and microfilming and shall not be smaller than 5/32 inches in height. Minimum scale selected for plan, elevation and section views or reinforcement details for elements of the structure shall be 1/4" = 1'-0" with larger scale used where appropriate. The modification and/or alteration of reproducible copies of contract drawings will not be acceptable for original placement drawings. After approval, the Contractor shall furnish three copies of each placement drawing to the Government marked "FOR CONSTRUCTION" and an electronic version on CD. Distribution of the FOR CONSTRUCTION drawings shall be made by the Contractor at least one week prior to the beginning of any construction on the placement.

***1**

1.87 **WORK AUTHORIZATION DOCUMENT**

The Work Allocation Document (WAD) is designed for management control of cost under cost-reimbursement construction contracts. The WAD system is designed to serve as the primary tool for management and control of costs. The WAD system is used to allocate obligated contract funds by the

Government to the contractor and to further control the obligation or expenditures of funds for identified work.

The WAD system is a series of documents prepared by the Contracting Officer and issued to the contractor for each feature cost item, line item or work breakdown structure (WBS) item to be executed under this contract. The Government and the contractor will agree on the budget amount for each WAD. The contractor will not be given authority to proceed with any work or incur any costs, even though money is obligated on the contract, until a written document signed by the Contracting Officer or Contracting Officer's Representative, is received by the contractor authorizing the contractor to proceed.

Following the issuance of a WAD by the Contracting Officer, the contractor will prepare work items for execution of the work included in the WAD. The contractor prepared work item will include the number of the WAD, a description of the work and resources to be used and a budget estimate of costs for the work item. The work items will be submitted to the Government for approval prior to the incurrence of costs. The cumulative budget cost estimate for work items included in a WAD shall not exceed the total budget estimate for the WAD without prior amendment and approval of the Government.

The contractor will provide monthly cumulative (actual against budget) cost incurrence reports against each WAD. The contractor will maintain backup data in the form of actual cumulative cost incurrence for each work item. This latter information will be prepared in sufficient detail to readily identify cost trends of actual against budget for joint Corps/contractor monthly cost management and control meetings.

1.88 CHANGE MANAGEMENT

The Government and the contractor will establish a procedure to be used that ensures that all changes are reported and tracked throughout the life of the contract. The procedure CHANGE MANAGEMENT will track any work item not anticipated in the total estimated cost that impacts cost or schedule. The contractor will provide prompt, written notification to the Contracting Officer any time a situation arises that the contractor considers to constitute a change to the contract. The written notice must include the information found in FAR 52.243-7 subparagraph (b) (1)-(6). This Advance Agreement will be negotiated after award. *1

*3

1.89 *3 SCAFFOLDING *3

July 2003

The following requirements supplement EM 385-1-1. In the event of a conflict between these requirements and EM 385-1-1, the more strict requirement shall take precedence.

All scaffold systems shall be erected, inspected and disassembled under the direction of a competent person. The competent person must be present and on site during these operations. The qualifications and training of the competent person and the crew performing the work shall be submitted to the

Contracting Officer and accepted prior to commencement of the work. All scaffold systems must be inspected daily and certified as usable prior to use each days use by the competent person. Scaffolds shall also be inspected and certified by the competent person upon completion of any changes to the scaffolding system i.e. adding or removing a level or etc. The competent person must be present and on site during these changes to the scaffold system. The contractor shall develop a system that notifies all parties of the certification status. The use a red/green tag system denoting the serviceability is an acceptable certification system.

A scaffold erection plan shall be submitted for all scaffold systems regardless of type scaffold to be used. This plan shall include erection and dismantling operations and all manufacture's details of the system and shall demonstrate compliance with EM 385-1-1. The plan shall be accepted by the Contracting Officer prior to the erection of the scaffold. This plan shall be reviewed at the preparatory and initial meetings with all parties involved in the scaffolding operation and use thereof. In the event others crafts will be using the scaffolding system, they shall also be briefed on the proper use of the system.

Every level of conventional and masonry type scaffolding systems shall be fully planked and include handrails and toe boards. The contractor is advised that he must analyze the added weight of this requirement on the capacity of the scaffold system and adjust his operations accordingly. All personnel erecting and dismantling scaffolds must be protected by a personal fall protection system.

Access to any type scaffold system above 6 (six) feet shall be by stair tower. *3

-- End of Document --

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06/03

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Amendment #0004
SECTION 00810

AWARD FEE PLAN
06/03

PART 1 GENERAL

1.1 Introduction

This Award Fee Plan sets forth procedures and guidelines that the Louisville District, U.S. Army Corps of Engineers will use to evaluate contractor performance. This award fee evaluation plan is established to determine award fees payable under this contract for the Olmsted Dam construction. The payment of any award fee is contingent upon the contractor's performance and its compliance with contractual requirements. Award fee performance evaluation determinations will be made two (2) times per year.

The purpose of the award fee is to motivate the contractor to superior contract performance in the categories described in this plan. The contractor may earn all or part of the award fee. The amount shall be based on a subjective evaluation by the government of the contractor's performance. The government will continually monitor all aspects of the contractor's performance. The standards by which the contractor's performance is gauged may not be susceptible to precise definition; therefore, general areas on which particular emphasis will be placed when evaluating the contractor's performance are set forth in this plan. The period of evaluation is the segment of the contractor's period of performance specified in the award fee plan to be evaluated for purposes of establishing the period's award fee.

1.2 Award Fee Pool

The award fee pool is that portion of the contract fee available to be awarded for contractor performance in accordance with the criteria contained in this plan. The maximum award fee available for the contractor to earn during any evaluation period is that award fee based on the estimated dollar amount of the work to be performed during that period. In no case will the amount of award fee available during an evaluation period exceed the total award fee amount available for the contract period.

1.3 Regulatory Requirements

1.3.1 Federal Acquisition Regulation

Requirements for an award-fee plan are contained in the Federal Acquisition Regulation (FAR) and its supplements. FAR 16.405-2 specifies that "A cost-plus-award-fee contract is a cost-reimbursement contract that provides for a fee consisting of (1) a base amount fixed at inception of the contract and (2) an award amount that the contractor may earn in whole or

in part during performance and that is sufficient to provide motivation for excellence in such areas as cost, schedule, quality, management, technical ingenuity, and safety. The amount of the award fee to be paid is determined by the Government's judgmental evaluation of the contractor's performance in terms of the criteria stated in the contract. This determination and the methodology for determining the award fee are unilateral decisions made solely at the discretion of the Government." The FAR specifies that an award fee project is appropriate when "the likelihood of meeting acquisition objectives will be enhanced by using a contract that effectively motivates the contractor toward exceptional performance and provides the Government with the flexibility to evaluate both actual performance and the conditions under which it was achieved; and any additional administrative effort and cost required to monitor and evaluate performance are justified by the expected benefits." FAR notes that the number of evaluation criteria and the requirements they represent will differ widely among contracts. The criteria and rating plan should motivate the contractor to improve performance in the areas rated, but not at the expense of at least minimum acceptable performance in all other areas. Cost-plus-award-fee contracts must provide for evaluation at stated intervals during performance, so that the contractor will periodically be informed of the quality of its performance and the areas in which improvement is expected. Payment of fee earned during a period of evaluation shall be paid within 30 days after the Award Fee Determining Official (AFDO) issues their decision. This makes effective the incentive, which the award fee can create, by inducing the contractor to improve poor performance or to continue good performance.

1.3.2 Defense Federal Acquisition Regulation Supplement

The Defense Federal Acquisition Regulation Supplement (DFARS) part 216.405-2 further specifies that award fee is not earned when the fee-determining official has determined that contractor performance has been sub-marginal or unsatisfactory. Also, it requires that the basis for all award fee determinations be documented in the contract file. The DFARS allows the contracting activity to establish a board to evaluate the contractor's performance. In addition, it allows the contractor an opportunity to present information on its own behalf.

1.3.3 Army Federal Acquisition Regulation Supplement

The Army Federal Acquisition Regulation Supplement (AFARS) Subpart 5116.4 contains requirements for cost-plus-award-fee contracts in Subpart 5116.4052. AFARS notes that properly used award fees motivate contractors to improve performance with an opportunity for close monitoring of the contractor's performance. The intended goal of award fee contracting is to motivate the contractor's performance in areas critical to program success that are susceptible to measurement and evaluation. An award fee arrangement provides an incentive for the contractor to improve performance and provides a process for the government to assess the contractor's performance. Once the decision has been made to use an award fee contract, the evaluation plan and organizational structure must be tailored to meet the needs of the particular acquisition. The award fee plan must clearly identify the specific evaluation criteria for assessing contractor performance. The criteria should take into account program risk, as well as

be appropriate for the designated period.

The AFARS specifies that the award fee pool should be the total of the available award fee dollars for each evaluation period for the life of the contract. The base fee is not earned and is, therefore, paid on a regular basis without the contractor's performance being evaluated. Since the available award fee during the evaluation period must be earned, the contractor begins each evaluation period with 0% of the available fee pool and works up to the evaluated fee for each evaluation period. Contractors do not begin with 100% of the available pool and have deductions withdrawn to arrive at the evaluated fee for each evaluation period. Earning of award fee will be in accordance with this award fee plan, and should be directly commensurate with the level of performance under the contract. A contractor should not receive the maximum amount of award fee under a contract without a demonstrated superior level of performance, as provided for in the award fee plan.

The AFARS includes specific requirements for use of evaluation boards. The contracting officer must appoint an Award Fee Determining Official (AFDO) in writing. The AFDO will appoint in writing the Award Fee Evaluation Board (AFEB) and its chairperson. Such appointment letters will clearly outline the responsibilities and limitations of the AFEB and its chairperson. AFEB membership should consist of those personnel most knowledgeable of the requirements and contractor performance in the areas to be evaluated. Selection of board members must be coordinated with management responsible for technical requirements. The AFEB chairperson is responsible for ensuring that all AFEB evaluators are sufficiently trained in their responsibilities. AFEBs and AFDOs must document the rationale for their decision(s). The AFDO may alter the AFEB's recommended award fee; however, it must be documented in sufficient detail to show that the integrity of the award fee determination process has been maintained.

1.4 Roles and Responsibilities

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1.4.1 **Principal Assistant Responsible for Contracting (PARC)**

The **PARC** will appoint an Award Fee Determining Official (AFDO) in writing.

1.4.2 Award Fee Determining Official (AFDO)

The AFDO shall be the designated official who determines the fee to be awarded to the Contractor based on the findings and recommendations submitted by the Award Fee Evaluation Board (AFEB). The AFDO will appoint in writing the Award Fee Evaluation Board and its chairperson. The Louisville District's, District Engineer **or the Deputy District Engineer** is the proposed AFDO. The appointment letters will clearly outline the responsibilities and limitations of the AFEB and its chairperson. *4

1.4.3 Award Fee Evaluation Board

AFEB members review the monitors' evaluation of the contractor's performance, considering all information from pertinent sources, and arriving at an earned award fee recommendation to be presented to the AFDO.

The AFEB may also recommend changes to this plan. In general, the AFEB will be selected from individuals familiar with, but not directly involved

in the project. The Olmsted Locks & Dam Project Manager has been tentatively appointed as the Chairperson. The Board shall assure that their findings and recommendations are consistent with available data. The Chairperson for the Board will be responsible for assuring the AFEB are properly trained. The AFDO may alter the AFEB recommended award fee, however it must be documented in sufficient detail to show that the integrity of the award fee determination process has been maintained. The AFEB is comprised of USACE and possibly customer representatives who perform the in-depth review of all aspects of contractor performance as reported to the board by the Government monitors and other pertinent sources. The AFEB will also take into consideration any input from the contractor. The AFEB determines to what degree performance measures have been met by the contractor and based on their review and analysis, will prepare an Award Fee Evaluation Board Report and submit the report and recommendation as to the appropriate award fee to the AFDO. AFDO should provide timely feedback to the contractor regarding its performance. Feedback should be provided for both positive and negative contractor performance, and should be provided promptly to the contractor such that corrections can be made. Monitors should also provide feedback to contractor (i.e. monthly).

The AFEB chairperson distributes, when received, the contractor's self-evaluations to the entire AFEB. Note: The contractor is not required to submit a self-evaluation. The AFEB should review the contractor's self-evaluations and respond quickly with comments or corrections. The AFEB Chairperson should speedily return comments to the contractor. The AFEB should evaluate the contractor's performance against objectives specified in this award fee plan.

1.4.4 AFEB Recorder

The AFEB recorder is responsible for coordinating the administrative actions required by the Performance Monitors, the AFEB and the AFDO, including:

- (1) receipt, processing and distribution of evaluation reports from all required sources;
- (2) scheduling and assisting with internal evaluation milestones, such as briefings; and;
- (3) accomplishing other actions required to ensure the smooth operation of the Award Fee Evaluation Board.
- (4) Documenting the actions of the AFEB.

1.4.5 Award Fee Monitors

The AFEB chairman will select individuals as performance monitors as needed. The monitors, usually comprised of the PDT or project field personnel are selected to provide input to the AFEB. Performance monitors will be comprised of individuals knowledgeable and involved in the routine oversight of the project or project aspects. In order to provide a fair and reasonable evaluation, monitors must observe, assess, and document the performance of the contractor on a close, continual basis. The monitors review documentation of performance; i.e. field logs, daily reports, cost performance reports, schedules, performance metrics, etc., in their

respective areas of knowledge and expertise, and develop interim and end-of-period evaluation reports as directed by the AFEB. Monitors maintain written records of the contractor's performance so that a fair and accurate evaluation is obtained. Prepare interim and end-of-year evaluation reports as directed by the AFEB.

Monitors will need to discuss performance perspectives on a regularly scheduled basis either in person, by conference, or electronically, as the situation dictates. For ease of evaluations, interim reporting will be required from the monitors on a monthly basis.

1.5 Available Award-Fee Amount

The award fee earned will be based on the contractor's performance during each evaluation period, and will be determined at the completion of evaluation periods. The percentage shown in the tables is the maximum available weighting of the award-fee score that can be earned during that period.

The contractor may be allowed to voucher some portion of the award fee at the determination of the Contracting Officer. This may be granted with the understanding that once the award fee amount is determined, the contractor will voucher for the balance of the award fee due, or in situations of poor performance, may owe the government all or part of the award fee portion prepaid.

1.6 Evaluations

Evaluations will be performed consistent with this Award Fee Plan. Specific timeframes for changes to the grading criteria, notification to the contractor, briefings from monitors, etc., are detailed in the "End of Period Evaluations" and "Award Fee Plan Change Procedures" Sections of the this Award Fee Plan.

1.7 End-of-Period Evaluations

AFEB Recorder notifies each AFEB member and performance monitor 30 calendar days prior to the end of the evaluation period regarding the end of period evaluations. Performance monitors prepare and submit their evaluation reports to the AFEB 10 work days following the end of the evaluation period. The AFEB may request individual briefings from Performance Monitors on an area requiring clarification. The Board will consider all monitors' reports and information from all sources and make their recommendations. The Board's determination and recommendation will be submitted, in writing, in the form of an Award Fee Recommendation Report. The AFEB report will be retained as a part of the project contract files. The AFEB prepares its evaluation report and recommendation to the AFDO. The AFDO will determine the final amount for the evaluation period based on the AFEB report and their own perception of the Contractor's performance.

The tentative timeline for the review process is as follows:

5 months into the evaluation period, the AFEB Recorder sends notification to the AFEB regarding the end of the evaluation period and triggers the review period.

Following the performance period, the monitors have 10 working days to submit their monitoring reports to the AFEB. Any Contractor self-evaluations are also due within 5 working days following the performance period.

AFEB has 10 working days to deliver fee evaluation report to AFDO.

AFDO has 5 working days to make decision and issue fee determination.

If the award fee funds are not obligated the Contracting Officer (CO) has 5 days following the AFDO's decision to issue a modification to obligate the funds for the fee.

1.8 Contractor's Self-Evaluation

The contractor will be allowed five (5) working days following the period, in which to present any data or information in its behalf. This written evaluation may be taken into consideration by the AFDO during the evaluation.

1.9 Evaluation Process

The AFEB Chairperson will begin and manage the evaluation process each evaluation period such that the final determination of the fee earned will be accomplished within 25 working days after the end of the evaluation period.

The AFEB Chairperson will compile the AFEB members' scores and comments in each category and lead the meeting to develop consensus scores in each of the categories. The AFEB Chairperson will prepare a summary report of the team's evaluations to document the overall evaluation. The final report will contain a matrix showing numerical ratings and the dollar value of the task order's fee pool for the evaluation period, and by evaluation category. The matrix will show an overall contract evaluation based upon the scores in the matrix weighted by appropriate factors. The AFEB's report will summarize significant issues in each category and discuss the monitors reports, where the Board agreed and why and where the Board didn't agree and why. The AFEB will identify significant differences between the government's and the contractor's ratings (if submitted) for the same work, and will make every reasonable effort to ensure that the statements are supported by facts before presentation to the AFDO.

The AFEB Chairperson will forward the final report through the Contracting Officer to the AFDO for review, approval and signature. The Contracting Officer will prepare a letter that informs the contractor's general management of the amount and basis of the fee awarded. Upon receipt of the AFDO's letter, the contractor will submit a public voucher for payment of the earned award fee, . Unearned award fee amounts earned do not carry over to subsequent periods.

The Contracting Officer may offer or the contractor may request a debriefing meeting with the AFEB. The AFEB may conduct such a debriefing session with the contractor to discuss the evaluation, to highlight strengths and weaknesses of contractor performance. The contractor may be

required to prepare and present action plans to address weaknesses identified during the evaluation period, and to report on the progress of the action plans.

1.10 Control of Documents

The contents of the criteria, inputs from the Monitors, reports to the AFEB, and AFDO and documentation supporting the award fee determination are procurement sensitive and shall not be released outside of USACE. USACE will maintain only the minimum number of copies of all award fee documentation and reports prepared in accordance with this criteria. All working papers of the of the AFEB members and the AFDO shall be retained for "Government Use Only".

1.11 Evaluation Periods

The Contractor will be evaluated not less than twice per year. In general, two six-month evaluation periods will be used. One period will extend from 1 January to 30 June and the second evaluation period will be from 1 July to 31 December. The evaluation periods can be structured on a six-month calendar basis, as described above, or may be based on project specific milestones or activities, as agreed upon by the USACE and Contractor.

1.12 Performance Criteria

The following evaluation criteria define the relative importance to the Government of each of contract performance indicators. Details of the criteria are contained in Table 1.

***3**

A. Management - Includes the evaluation of developing, updating, and executing the project within the award fee period. This category includes use of best-value analysis, compliance and improvement in contracting and subcontracting methods and goals, resource tracking and reporting, management of subcontractors, coordination with the government, use of management tools, efficient procurement, effectiveness of property control system and invoice completeness and timeliness and monthly Cost Performance Reports. The AFEB will evaluate the Contractor's technical ingenuity in performing/implementing the planned activities. Use and effectiveness of innovative work technologies to solve a problem or increase work production. Technical activities include innovative approaches to site challenges, in-the-wet construction methodology, effective use of technical ideas suggested by the government and effective use of interactive planning. Analyze contractor's labor techniques, selection and effective utilization of materials and tools, equipment and subcontractors and technical decision making.

B. Cost - Assesses the contractor's efforts to control costs through effective cost accounting, manpower utilization, forward budgeting procedures and programming techniques. The contractor must be able to track and report costs at the lowest Work Breakdown Structure (WBS) level. This requires the contractor to quantify and demonstrate cost performance on the project including variance analysis and information on cost trends. Cost performance will be evaluated based on performance against the projected cost agreed to at award, including any increases that are a result of a

contract modification, providing cost variance analysis and implementing corrective actions to control costs.

C. Schedule - Will be evaluated based on the timeliness in preparing a usable, detailed project schedule, adhering to scheduled dates for activities and milestones, providing schedule variance analysis, and communicating and implementing corrective actions to meet critical schedule items. This requires the contractor to provide appropriate logic and networking of technical activities. The quality and timeliness of the contractor to maintain and update the schedule will be evaluated.

D. Quality - Will be accessed by reviewing the effectiveness and adherence to the quality control and quality assurance plan, quality of work plans, shop drawings, reports and designs.

E. Safety & Environmental Compliance - Assesses the contractor's compliance with safety and health plans, maintenance of an excellent safety record, as well as compliance with the USACE Health and Safety Manual and other safety requirements. Accuracy, appropriateness and quality of any employee monitoring data and safety reporting will be evaluated. The protection of the environment through prudent work practices will be reviewed.

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1.13 Weighting Factors

The performance criteria is weighted as shown on the "Contractor's Performance Evaluation Report" attached to this Award Fee Plan. The Government has weighted the performance criteria in accordance criteria in accordance with the importance placed on the criteria. These weights will be factored into the score assigned to the contractor.

1.14 Evaluation Scale

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Excellent (100 - 90) Exceeds expectation , high quality output. Of exceptional merit; exemplary performance in a timely manner; very minor (if any) deficiencies with no adverse effect on overall performance. Performance is uniformly well above standards. Self-initiated, innovative management techniques have resulted in superior quality, timeliness, and effective operations.

Very Good (89 - 70) Very effective performance, fully responsive to contract requirements; contract requirements accomplished in a timely, efficient and economical manner for the most part; only minor deficiencies. Performance in most areas is well above standards while the remaining efforts meet task order requirements.

Good (69 - 50) Effective performance; fully responsive to contract requirements; reportable deficiencies, but with little identifiable effect on overall performance. Performance in some areas is above standard while some areas meet task order requirements.

Satisfactory (49-30) Meets minimum acceptable standards; adequate results; reportable deficiencies with identifiable but not substantial, effects on overall performance. Performance in most areas meets standards,

is satisfactory and is equivalent to that expected of an average qualified contractor.

Unsatisfactory (0) Does not meet minimum acceptable standards in one or more areas, which adversely affect overall performance. Poor performance. The contractor will receive no award fee for the portion of the available pool designated for the performance evaluation criteria on which performance is unsatisfactory.

The government will evaluate the contractor in each performance category, and will assign a numerical rating to each. The weighted sum of the numerical scores given for each category will be applied to the available award fee pool (e.g., an overall numerical rating of 89 will yield an award fee equal to 89% of the award fee available) for the evaluation period. **See Table 2. Contractor Performance Evaluation Report for a sample evaluation report.** *3

1.15 Award-Fee Plan Change Procedure

All significant changes will be approved by the Contracting Officer. The AFEB Chairperson can approve all other changes. Examples of significant changes include changing evaluation criteria, and adjusting weights to redirect contractor's emphasis to areas needing improvement. The contractor may recommend changes to the Contracting Officer (CO) no later than fourteen (14) days prior to the beginning of the new evaluation period. After approval, the CO shall notify the contractor in writing of any change(s).

USACE may elect to unilaterally change these performance categories or weight of any category to encourage performance in specific areas. Unilateral changes may be made to the award-fee plan if the contractor is provided written notification by the CO thirty (30) days before the start of the upcoming evaluation period. Changes effecting the current evaluation period must be by mutual agreement of both parties.

PART 2 PRODUCTS NOT USED

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-- End of Section --

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Amendment #0004
SECTION 01710

EXECUTION REQUIREMENTS FOR CONSTRUCTION
06/02

PART 1 GENERAL

This section specifies the execution requirements associated with the construction of the Olmsted Dam, including: advance preparations; the order and coordination of work; and verification of the final product.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API RP-2A (1991) Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms

API RP-7G (August 1998) Recommended Practice for Drill Stem Design and Operating Limits; 16th Ed

API Spec. 7 (June 1998) Specification for Rotary Drill Stem Elements, 39th Ed

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC (1989) Manual of Steel Construction, Allowable Stress Design; Ninth Ed

ACI INTERNATIONAL (ACI)

ACI 357 (1997) Guide for the Design and Construction of Fixed Offshore Concrete Structures

ENGINEERING MANUALS (EM)

EM 385-1-1 (1996) Safety and Health Requirements Manual

1.2 NOT USED

1.3 CONSTRUCTION PROJECT DESCRIPTION

The Olmsted Dam construction is part of the Locks and Dams 52 and 53 Replacement Project. As such the dam construction is part of a larger system, which includes construction and operation of other system components including: Olmsted Locks, Olmsted Approach Walls, storage pad on the Kentucky Bank, river control dikes, associated scour control systems, and adjoining river and wild-life areas. The Olmsted Dam includes: a tainter gate structure, a navigable pass structure, boat abutment structures, seismic isolation joints, fixed weir, and associated scour stone.

1.3.1 Design Requirements

Depending on the Contractor's ways and means (See paragraphs 1.83 and 1.84 of Section 00800 SPECIAL CLAUSES), the Contractor may be responsible for the design of products associated with the construction of the Olmsted Dam, including, but not limited to:

- Material selections (e.g.: concrete components/admixtures, sealing/caulking materials, and specialty steel materials/components).
- Prefabrication facilities (e.g.: precast yard, load-out facilities, and staging facilities).
- Specialty construction equipment (e.g.: heavy-lift crane barge, screeding equipment, vibro-compaction vessel, specialty work barges; articulated mat vessel, concrete delivery systems, and high-pressure water jetting equipment).
- Construction accessories (e.g.: spreader beams, temporary mooring systems, positioning jigs, and positioning systems); however, the Government is responsible for the design of the sheet pile walers.
- All concrete mix designs, other than the tremie concrete mix design, which will be provided by the Government (e.g.: includes precast concrete mixes, cast-in-place mixes to be placed in-the-dry, and secondary placement mixes).
- Inspection/survey systems: (e.g.: bathymetry survey vessel, shell installation survey systems; tremie concrete sounding system; and underwater inspection systems).
- Temporary scour protection systems, and if necessary for the Contractor's construction methods then any flow deflectors (e.g. possible use of existing, Government supplied, flow deflectors).

1.3.2 Performance Requirements

For all construction operations in the river, the Contractor shall plan and organize the work in such a manner so as to minimize the risk of disruption to work. At a minimum this planning and organizing shall include the following activities.

- The Contractor shall provide an adequate number of concrete shells

for installation during a given construction phase to ensure that there is essentially no risk that prepared foundation work in the river will not be covered and protected by a concrete shell that has been completely filled with tremie concrete.

- The Contractor is required to provide the capability to supply a peak of 150 cyd/hr of tremie concrete; but shall not schedule the use of more than 100 cyd/hr of tremie concrete, in order to reduce the risk of disruption to the delivery of tremie concrete in the river.
- The Contractor shall hold planning/organizing meetings with his appropriate construction personnel prior to each new in the river operation.
- The Contractor shall be prepared to rapidly respond (within 24 hours) to control excessive scour (see Section 01351 UNDERWATER SURVEY, RIVER MONITORING, AND SCOUR REPAIR, for monitoring requirements) occurring due to construction activities. These preparations shall include stockpiling (at the construction site), and being capable to deploy, 5-inch maximum diameter scour stone within the footprint of the dam, around the perimeter of sheet piles, and other structural obstructions to river flow at the bottom of the river.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Lifting Frames and Template Safety Plans; G AR

The Contractor shall prepare and submit for approval plans for the safe operation of all lifting frames and templates as described in Subpart 2.4.1. These safety plans shall be submitted, by the Contractor, no later than sixty (60) days prior to the use of the associated frames and/or templates.

Weight Monitoring Plan; G AR

The Contractor shall prepare and submit for approval plans for the monitoring of the weight of all medium and heavy lifts as described in Subpart 3.2.1. The Contractor shall submit these plans no later than sixty (60) days prior to the fabrication of any medium or heavy lift element.

Shell Load-Out Plan; G AR

The Contractor shall prepare and submit for approval plans for loading-out the precast concrete shells from the precast yard into the river for

transport to the dam site as described in Subpart 3.2.2. The Contractor shall submit these plans no later than ninety (90) days prior to the fabrication of any load-out facility.

Heavy-lift Installation Plan; G AR

The Contractor shall prepare and submit for approval plans for the installation of the heavy-lifts, including all precast concrete shells, as described in Subpart 3.2.3. The Contractor shall submit these plans no later than ninety (90) days prior to the fabrication of any precast concrete shell.

Test Pile Driving Plan; G AR

The Contractor shall prepare and submit for approval plans for driving Test (Indicator) Piles as described in Subpart 2.8.2. The Contractor shall submit these plans no later than sixty (60) days prior to driving any test piles.

Corrective Grouting Plan; G AR

The Contractor shall prepare and submit for approval plans for corrective grouting of voids identified with a tremie concrete infilled shell, as described in Subpart 3.7.1. The Contractor shall submit these plans no later than sixty (60) days prior to use of any corrective grouting.

High Pressure Water Jetting Plan; G AR

The Contractor shall prepare and submit for approval plans for a high pressure water jetting system, as required in Subparts 2.3.1 and 3.7.2. The Contractor shall submit these plans no later than sixty (60) days prior to demonstration of the system during the tremie concrete tests as required per section 01720 UNDERWATER CONCRETE FIELD DEMONSTRATIONS. At a minimum the submittal should include:

- a) For silt re-suspension, plan view drawings for jetting in each Tainter Gate Stilling Basin and Sill shell and Navigable Pass shells. The drawings must show tremie holes, pipe piles, landing pads, underdrains, interior walls, end walls and any other item that may impede rotation of the jetting system. Areas bounded by arcs shall be shown extending from each tremie hole representing the area to be jetted. A table shall be prepared that lists each tremie hole for each shell, along with the number, radius and sweep (in degrees) of each arc required per tremie hole.
- b) It is noted that at certain locations, such as the downstream section of the navigable pass shells, the pile reinforcement and dowels extending from the bottom of the shells overlap and will prevent the jetting system from rotating a full 360 degrees.

Controlled Flooding Plan; G AR

The Contractor shall prepare and submit for approval plans for the controlled flooding of the dewatered tainter gate bays, while installing

the tainter gates, as described in Subpart 1.12.3. The Contractor shall submit these plans no later than ninety (90) days prior to installation of a tainter gate.

Underwater Physical Measurements Plan; G AR

The Contractor shall prepare and submit for approval plans for the underwater physical measurement of particular installation positions achieved, in accordance with Subpart 3.5.4. The Contractor shall submit these plans no later than sixty (60) days prior to the performance of these underwater physical measurements.

Engineering Qualifications; G AR

The Contractor shall submit the qualifications of their engineering personnel and sub-contractor that are to be used to design the construction apparatus and equipment as described in Subpart 1.5. The Contractor shall submit these qualifications no later than thirty (30) days after receiving the Notice to Proceed.

Towboat and Crew Qualifications

The Contractor shall submit the qualifications of their towboat and crew that are to be used during construction, as described in Subpart 1.13. The Contractor shall submit these qualifications no later than sixty (60) days prior to use of any towboat and crew.

Temporary Construction Facilities; G AR

The Contractor shall prepare and submit site plans indicating the proposed location and dimensions and details of all work areas for the temporary construction facilities. The site plan shall be complete and detail all work areas, the number of trailers to be used, avenues of ingress/egress to the areas and shall incorporate all erosion and sedimentation requirements, administrative field office facilities, batch plant layout, access road layout, precast concrete areas, load-out areas, and any other details necessary to develop the work site. Furthermore, the Contractor shall prepare and submit a plan for restoring the construction areas to the original, or better, conditions. The Contractor shall submit these plans no later than sixty (60) days prior to the beginning of construction on these facilities.

Construction Apparatus Fabrication Facilities Plan

The Contractor shall prepare plans presenting the characteristics and capabilities of the fabrication facilities for the construction apparatus, equipment and vessels. The Contractor shall submit these plans no later than sixty (60) days prior to the use of these facilities.

Hazard Plans

In accordance with Subpart 3.2.3, the Contractor shall submit a hazard plan for all the shell installation activities that could pose a significant hazard to human life, significant economic loss, or significant delay in

the construction schedule; following the guidance given in EM 385-1-1. The Contractor shall submit these plans no later than sixty (60) days prior to installing any precast concrete shell.

Qualification of Marine Surveyor

Certification for the marine surveyor that will perform review of the vibro-compaction vessel, any articulate mat placement vessel, and any floating concrete batch plant, must be submitted in accordance with Subpart 1.13. The Contractor shall submit these qualifications no later than sixty (60) days after receiving Notice-to-Proceed.

Qualification of Crane Operators

Certification for the crane operators that will perform any medium or heavy lifts, must be submitted in accordance with Subpart 1.13. The Contractor shall submit these qualifications no later than thirty (30) days prior to the performance of any medium or heavy lifts.

Prototypes and Demonstrations; G AR

The Contractor shall prepare and submit for approval reports of the Prototypes required in Subpart 1.8 and Demonstrations required in Subpart 3.8. The Contractor shall submit these reports no later than sixty (60) days prior to fabrication of these prototypes, and performance of these demonstrations.

SD-02 Shop Drawings

Layout and Details for Lifting Frames and Templates; G AER

The Contractor shall prepare and submit for approval complete shop drawings that show all lifting frames and templates as described in Subpart 2.4.1. These drawings shall be submitted no later than thirty (30) days prior to the beginning of fabrication of the related frames and/or templates.

Layout and Details for Tainter Gate Sill Lower Pier Wall Guide Pintles; G AER

The Contractor shall prepare and submit for approval complete drawings for the Tainter Gate Sill Lower Pier Wall Guide Pintles shown on S-296 and S-297 of the drawings. These drawing shall be submitted no later than ninety (90) days prior to the beginning of fabrication of these pintles.

Layout and Details for Underwater Forms for Monolith 12; G AR

The Contractor shall prepare and submit for approval complete shop drawings for the underwater forms required for Monolith 12 of the Navigable Pass as indicated in the F-series of drawings. These drawings shall be submitted no later than thirty (30) days prior to the beginning of fabrication of these forms.

Layout and Details for Spreader Beams; G AR

The Contractor shall prepare and submit for approval complete drawings that show all spreader beams required for either medium or heavy lifts. These drawings shall be submitted no later than sixty (60) days prior to the beginning of fabrication/procurement of these spreader beams.

Layout and Details for Reinforcing Steel Cage Assemblies; G AER

The Contractor shall prepare and submit for approval complete drawings, and details, for all reinforcing steel cage assemblies that are organized so as to include all inserts/embedments and so as to allow the cage assemblies to be lifted by the pipe pile templates and transported through the water to its prescribed location at the bottom of the river. These drawings shall be submitted no later than sixty (60) days prior to the beginning of fabrication / procurement of these reinforcing steel cage assemblies.

Layout and Details for SBS-1, Boat Abutments Shell Positioning Systems; G AR

The Contractor shall prepare and submit for approval complete shop drawings, and details, for positioning systems for installing the precast concrete shells for SBS-1, the Right Boat Abutment and the Left Boat Abutment, with equal or better positional capabilities as those indicated in the F-series of drawings. These drawings shall be submitted no later than sixty (60) days prior to the beginning of fabrication/procurement of these positioning systems.

SD-04 Samples

Sealants; G AR

The Contractor shall submit for approval samples of all sealants that the Contractor plans to use for permanent constructions. The Contractor shall submit these samples no later than sixty (60) days prior to use of the associated sealants.

Brushes for Tremie Containment; G AR

The Contractor shall submit for approval samples of brushes to be used for containment of tremie concrete. The requirements for these brushes is presented in Subpart 2.5.6. The Contractor shall submit these samples no later than sixty (60) days prior to use of the associated brushes.

Bond Breaker for Frame Shear Keys; G AR

The Contractor shall submit for approval samples of bond breaker material to be used on lifting/tremie frame shear keys. The requirements for this bond breaker is presented in Subpart 2.5.7. The Contractor shall submit these samples no later than thirty (30) days prior to use of the associated bond breaker.

SD-05 Design Data

Structural Calculations for Frames and Templates; G AR

Except as indicated in Paragraphs 1.83 and 1.84 of Section 00800 SPECIAL

CLAUSES, the Contractor shall prepare and present structural calculations that complete the designs of all lifting frames and templates, in accordance with Subpart 2.4.1. These calculations shall be submitted no later than ninety (90) days prior to the beginning of fabrication of the related frames and/or templates.

Structural Calculations for Tainter Gate Sill Lower Pier Wall Guide Pintles;
G AR

The Contractor shall prepare and submit for approval structural calculations that complete the design of the Tainter Gate Sill Lower Pier Wall Guide Pintles, indicated conceptually on S-296 and S-297. These calculations shall be submitted no later than ninety (90) days prior to the beginning of fabrication of these pintles.

Structural Calculations for Underwater Forms for Monolith 12; G AR

Except as indicated in Paragraphs 1.83 and 1.84 of Section 00800 SPECIAL CLAUSES, the Contractor shall prepare and submit for approval structural calculations that complete the design of the underwater forms for Monolith 12 of the Navigable Pass, indicated conceptually in the F-series of drawings. These calculations shall be submitted no later than ninety (90) days prior to the beginning of fabrication of these forms.

Structural Calculations for Spreader Beams; G AR

The Contractor shall prepare and submit for approval structural calculations for all spreader beams required for either medium or heavy lifts, in accordance with Subpart 2.5.3. These calculations shall be submitted no later than sixty (60) days prior to the beginning of fabrication/procurement of these spreader beams.

Structural Calculations for Nuts for Drill Collars; G AR

The Government shall prepare structural calculations for all nuts to be used for the lifting drill collars, as indicated conceptually in the drawings.

Structural Calculations for Adjustable Sheet Pile; G AR

The Contractor shall prepare and submit for approval structural calculations for adjustable sheet piles, as indicated in on P-4 of the drawings. These calculations shall be submitted no later than ninety (90) days prior to the beginning of fabrication of these adjustable sheet piles.

Naval Architectural Calculations for the Vibro-Compaction Vessel; G AR

The Contractor shall prepare and submit for approval naval architectural calculations for the vibro-compaction vessel, indicated conceptually in the F-series of drawings. These calculations shall be submitted no later than ninety (90) days prior to the beginning of fabrication/procurement of the vibro-compaction vessel.

1.5 QUALIFICATIONS

The Contractor shall submit, for Government approval, the qualifications and background of the engineering personnel and sub-contractors that are to design the construction apparatus and vessels. All such personnel shall have college degrees, professional licenses appropriate for their design work, and at least five (5) years of experience in designing the type of equipment/apparatus/vessel under consideration.

1.6 REGULATORY REQUIREMENTS

All lifting frames and templates shall meet the allowable stress design requirements of API RP-2A, API RP-7G, and AISC, as referenced in Subpart 1.1.

Construction and transport cases for the precast concrete shells meet the requirements of ACI 357, as referenced in Subpart 1.1.

1.7 FIELD EXAMPLES

The contract drawings present numerous field examples of construction means and methods that the Contractor could employ during the construction of Olmsted Dam. These field examples include, but are limited to the following:

- Precast yard and launching facilities layout.
- Pipe pile and sheet pile driving templates.
- Heavy and medium lift crane barges.
- Screeding equipment.
- Construction vessels including floating batch plants, vibro-compaction vessels, pile driving vessels, articulated mat vessels, and dredging equipment.

1.8 PROTOTYPES

The Contractor is required to complete a Wicket Gate Display Pit prototype associated with the performance of the construction work.

1.9 PRE-INSTALLATION CONFERENCE

The Contractor shall hold a pre-installation conference that includes Government representatives in order to review the installation equipment and procedures for the: sheet pile walls, the pipe piles, the bottom reinforcing steel cages, the concrete shells, and the tremie concrete.

1.10 DELIVERY, STORAGE, AND HANDLING

The Contractor shall review their material delivery, storage and handling plans with the appropriate Government representatives.

1.11 PROJECT SITE CONDITIONS

The drawings indicate the location of the project site and the adjoining areas. The site is near several environmentally sensitive areas as indicated in the drawings. Furthermore, the Olmsted Locks and Approach Walls are located adjacent to the dam site. The river bottom alluvium is generally non-cohesive, has a variable bathymetry, and is subject to sand wave action under appropriate river conditions, see Section 00800 SPECIAL CLAUSES, and the Government supplied CD of river related information.

1.11.1 Environmental Requirements

See Section 01130 ENVIRONMENTAL PROTECTION.

1.11.2 Existing Conditions

River bottom contours shown on the drawings were developed from soundings taken in October 1997. Actual contours at time of construction may differ; however, the Government will provide the Contractor with the latest sounding scheduled to be taken in June of 2002.

Pertinent Government boring logs, cross-sections and profiles, as shown in Volume 6 of the drawings.

1.11.3 Field Measurement

The in-the-river field measurements shall meet the requirements giving in Section 01351 UNDERWATER SURVEY, RIVER MONITORING, AND SCOUR REPAIR, and in Subpart 3.5.4.

1.12 SEQUENCING AND SCHEDULING

During the preparation of the construction sequencing and construction scheduling plans, according to the requirements of Section 01320 PROJECT SCHEDULE, the Contractor shall comply with the following requirements (which are listed in approximate order of performance) for the order and coordination of work, and the seasonal and river condition restrictions given in subparts 1.43 and 1.62 of Section 00800 SPECIAL CLAUSES:

- 1) The schedule shall consider river navigation throughout the entire project. The Contractor's construction activities shall be scheduled accordingly. Coordination between the Contractor, the Olmsted Resident Engineer's Office and the Olmsted Lockmaster is essential to the completion of the project. See Section 00800 SPECIAL CLAUSES, Paragraph 1.62 for specific details concerning working in the river.
- 2) Development of, and approvals for, the various required concrete mix designs and aggregate quality testing are expected to be critical and delivery of materials for testing shall begin shortly (no later than 60 days) after notice to proceed, in accordance with the requirements of Sections 03300, 03301, 03410 and 03800, GENERAL CONCRETE REQUIREMENTS; CAST-IN-PLACE STRUCTURAL CONCRETE; PRECAST CONCRETE FOR SHELLS; AND TREMIE MASS CONCRETE; respectively.
- 3) The Wicket Gate Prototype, together with one wicket gate, shall be

- completed prior the fabrication of the production wicket gates.
- 4) The indicator piles shall be driven prior to driving the production piles.
 - 5) The two tremie mass concrete demonstration tests shall be completed prior to the placement of any production tremie concrete, in accordance with Section 01720 UNDERWATER CONCRETE FIELD DEMONSTRATIONS.
 - 6) The sheet pile walls adjacent to the locks structure shall be installed shortly after the local rip rap has been removed, and before the local excavation has reached full depth.
 - 7) The downstream sheet piles, for any given segment location, shall be driven before the upstream sheet piles.
 - 8) Vibro-compaction shall be performed after rough dredging, and before backfilling and/or screeding.
 - 9) The Contractor must install the downstream rip rap, and any paving blocks prior to installing the corresponding tainter gate stilling basin segment, or navigable pass shell segment, leaving no more than a 20-ft gap between the upstream end of the rip rap and the downstream end of the stilling basin segment/paving block section. After the installation of the corresponding stilling basin segment/paving block section, the Contractor must fill any gap in the downstream rip rap prior to installing the corresponding tainter gate sill segment or navigable dam monolith.
 - 10) The Contractor shall install a reinforcing steel cage assembly, including its pre-install piles, pile template and geotextile fabric within six (6) hours of the completion of screeding in the area for that cage assembly.
 - 11) Pile driving may not be conducted within 125 ft. of any freshly placed concrete that has a compressive strength of less than 1,000 psi. Furthermore, the Contractor shall never have a linear reach of driven, but exposed (i.e.: not covered by a precast concrete shell), pipe piles that is more than 360 feet in length.
 - 12) The Contractor must install a tainter gate stilling basin segment prior to installing the corresponding tainter gate sill segment. Furthermore, the Contractor must not schedule Over-the-Winter construction breaks that would leave a tainter gate stilling basin segment installed without its corresponding tainter gate sill segment installed.
 - 13) The first shell that the Contractor installs shall be SBS-1.
 - 14) The shells shall be installed in an order and manner that prevents any two-blocking. i.e. in a manner so that no two pieces of equipment are in the same place at the same time. The F-series of drawings shows one acceptable order of shell installation.

- 15) The Contractor shall provide provisions to monitor the temperature of the infilled shells without disrupting construction operations, for a minimum of 28-days after the infilled concrete has been placed in a given shell, in accordance with Section 13517 THERMISTOR, and both the I-, and the F-series, of drawings. The Contractor shall calibrate the thermistors before the concrete placement and record the concrete temperatures once per hour for the first twelve (12) hours after the concrete placement, and once per twelve (12) hours for the next twenty (28) days.
- 16) Isolation Joint 1 shall not be installed until the infilled concrete in LP-1 has reached a minimum compressive strength of 3,000 psi.
- 17) Isolation Joint 2 shall not be installed until the infilled concrete in both LP-6 and the Right Boat Abutment have reached a minimum compressive strength of 3,000 psi.
- 18) The piezometers for a given shell not be installed through that shell until the infilled concrete in that shell has reached a minimum compressive strength of 3,000 psi.
- 19) The lifting frame for a given shell shall not be removed from that shell until the infilled concrete in that shell has reached a minimum compressive strength of 1,000 psi.
- 20) The Contractor shall not schedule Over-the-Winter breaks that would leave a shell installed in the river without being completely infilled with tremie concrete.
- 21) The Contractor shall place concrete articulated mats at the leading edge of shell construction as indicated in the drawings.
- 22) The tainter gates shall be preassembled into a nearly complete condition and transported into their respective Tainter Gate Bays as indicated in the drawings, and the two Government supplied maintenance bulkheads shall be used to dewater each given Tainter Gate Bay in order to complete the installation of the tainter gates and seals in-the-dry.
- 23) The Contractor shall schedule the installation of the tainter gates so as to minimize the risk of over-topping the maintenance bulkheads used to dewater a given Tainter Gate Bay. See also Subpart 1.12.3.
- 24) The Tainter Gate bays shall not be dewatered until all of the concrete infilling the lower pier wall shells of the adjoining Tainter Gate Pier Walls has reached a minimum compressive strength of 3,500 psi.
- 25) The tainter gates shall not be installed until the appropriate trunnion girder port-tensioning operations are completed.
- 26) The Contractor may not schedule Over-the-Winter construction breaks between the construction of the following Tainter Gate Segments: TGS-1/SB-1 and TGS-2/SB-2; nor between TGS-2/SB-2 and TGS-3/SB-3; nor between TGS-4/SB-4 and TGS-5/SB-5; nor between TGS-5/SB-5 and TGS-6/SB-6.

- 27) The wicket gates shall be installed on the Navigable Pass shells prior to their transport into the river.
- 28) The sheet pile cells for the fixed weir shall not be modified until all of the sheet piles for the dam construction have been out-loaded.

1.12.1 Foundation and Sheet Pile Walls Preparations

The screeding process must be conducted in a controlled manner that will eliminate all high spots and extensive depressions, in accordance with the requirements given in 02722 SCREEDING.

The Contractor shall survey the installed positions of the Master piles, and shall adjust the welded positioning of the arms of the associated brackets in order to ensure the appropriate connection of the brackets and Master piles during installation of the shells. Bracket arms may be shifted up to 2-1/4" from side to side while maintaining the design distance from the center line of one arm to another.

1.12.2 Precast Shell Preparation/Installation

Placement of concrete for precast units for the dam segment shell and stilling basin units will require particular care to assure dimensional accuracy and stability. This will require control of concrete production, placement and curing procedures.

Consolidation for the dam monolith shells, mass and general purpose concrete will be per standard procedures using internal vibrators. Requirements for concrete consolidation are stated in Section 03300 GENERAL CONCRETE REQUIREMENTS of the specifications. Concrete placement will not be permitted when weather conditions prevent proper placement and consolidation, or when conditions will adversely affect the quality of the concrete. Physical protection of the concrete is also addressed in Section 03300 GENERAL CONCRETE REQUIREMENTS of these specifications, and includes protection from precipitation and temperatures during concrete placement. Protection from premature drying, extremes in temperatures, rapid temperature change, and mechanical injury immediately after placement, and continued protection from excessive heat, vibratory equipment or pile-driving equipment are also specified.

1.12.3 Evacuation and Flooding of Tainter Gate Bay Area

The Contractor's gate installation sequencing plan shall make proper allowances for river fluctuations. The Contractors sequencing plan shall consider that, during installation of the tainter gate, the water levels in the gatebay between the bulkheads must remain below the level of the river for the bulkheads to properly seal and maintain the gatebay water level. In this regard the Contractor shall review the available hydrographs and river data to determine how much the river could fall during the time period required to completely attach the gate to the trunnion hub and the operating cylinder. The Contractor shall plan for rising river levels as described below.

The Contractor shall develop, for approval, a controlled flooding plan for the tainter gate bay area in the event the bulkheads could be overtopped by the river. Under no situation shall the river be allowed to overtop the bulkheads and the bulkheads shall be removed prior to such occurrence. As a minimum the plan shall indicate evacuation procedures, methods of controlled flooding, methods to protect the incomplete work, methods for pulling the bulkheads and methods of raising and securing the tainter gate at the dogging elevation. In addition, the plan shall contain a time line schedule for completing said activities. After flooding of the work area, the bulkheads shall be removed and the gate raised and secure at the dogging elevation. The Contractor shall be prepared to take all these necessary actions day or night including weekends to insure completion of these activities as specified. The Contractor shall have on-site the necessary materials and equipment to complete these activities within 48 hours of implementation.

The Contractor shall use the National Weather Service 3 day forecast to determine when to evacuate the work area and commence flooding. In addition the Contractor shall be watchful of changing discharge flows from Barkley and Kentucky Lakes which have affects on the river elevation at the site. Anytime the river elevation is within five feet of the top of the downstream bulkheads (excluding the splash barrier) the Contractor shall be in a high alert status and watchful of changing river conditions. The Contractor shall initiate evacuation 24 hours prior to the river exceeding elevation 301.0 based on the river forecast. The Contractor shall then immediately commence flooding the area if the river forecast indicates an overtopping and shall complete all activities to and including the removal of bulkheads and raising and dogging the gate at least 24 hours prior to it reaching elevation 303.5. In the event after evacuation the river forecast does not indicate an overtopping the contractor shall monitor the river forecast and coordinate any further actions with the Contracting Officer. In the event the Contracting Officer is not available the Contractor shall initiate such evacuation and flooding based on the above conditions without the approval of the Contracting Officer. Unless directed otherwise by the Contracting Officer in an emergency situation, controlled flooding shall commence from the downstream end of the unwatered area. Once the water elevation in the work area reaches 265.0, flooding can commence from the upstream side also.

The Contractor will not be allowed to start and set any bulkheads in a gate bay in anticipation of beginning work whenever the river is above elevation 299.0 or above elevation 297.0 and rising. Based on the historical hydrographs, the Contractor shall plan starting the tainter gate work accordingly. The Contractor shall have available on site all necessary equipment and material too fully complete the work in the dewatered gate bay prior to setting the bulkheads. In addition, prior to setting the bulkheads in each tainter gate bay the Contractor shall receive the approval of the Contracting Officer.

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Damage to permanent work in the event of such flooding noted above shall be paid for as specified in the contract clause "Damage to Work".

1.13 CERTIFICATIONS

The Contractor shall provide the following:

- 1) Certification of Towboat Operators and Crew: The towboat operators and crew must have a minimum of five years of experience as qualifications.
- 2) Certification of the medium and heavy lift crane operators: The crane operators must have a minimum of five years of experience as qualifications.
- 3) Certification of Marine Surveyors, that will responsible for strength, stability, and draft documentation on floating equipment: Proof that the Marine Surveyors are registered Naval Architects.

1.14 MAINTENANCE

During the construction period, the Contractor is required to maintain both the prefabrication, and construction site, areas in a safe and orderly manner.

1.14.1 Maintenance Service

The Contractor is required to establish and maintain a trench, for trapping river sediment, upstream of any section of installed cut-off wall until the corresponding dam segment has been completely infilled with concrete.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Concrete Materials

Sources of all concrete materials have not have been pre-qualified for this project. All materials, including cementitious materials and aggregates, are to be tested prior to approval. Subsequent testing is to occur during the duration of concrete production to assure continued compliance with the requirements of the specifications. Material approval is to be conducted by the Engineering Research Development Center - ERDC (Waterways Experiment Station - WES), Structural Laboratory, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, and provided within 180 days from submittal of materials for approval. The Contractor has the option of having material approval testing conducted first or concurrently with the concrete mixture proportioning. If the Contractor chooses the latter option, the contractor assumes the risk if a material fails to be approved while the mixture proportions are developed. A new source will be designated, by the Contractor, to replace the unapproved material, and mixture proportions will be redeveloped, by the Contractor, when the replacement material is

approved.

2.2 PREFABRICATION FACILITIES

The prefabrication facilities shall conform with the requirements given in Section 01352 HANDLING AND INSTALLATION OF HEAVY LIFT ELEMENTS and Section 01501 HEAVY LIFT TRANSPORT FROM OFF-SITE CASTING FACILITY.

2.3 SPECIALTY CONSTRUCTION EQUIPMENT

The heavy-lift crane barge shall conform with the requirements given in Section 01352 HANDLING AND INSTALLATION OF HEAVY LIFT ELEMENTS. The screeding equipment shall conform with the requirements given in Section 02722 SCREEDING. The vibro-compaction equipment shall conform with the requirements given in Section 02250 GROUND IMPROVEMENT BY VIBRO-COMPACTION. Floating batch plants shall conform with the requirement given in Section 03800 TREMIE MASS CONCRETE.

2.3.1 High-Pressure Water Jetting Equipment

The Contractor shall design and provide a high-pressure water jetting system that is suitable for both putting sediment trapped beneath the concrete shells into suspension (prior to tremie placement), and to jet laitance from the top surface of interrupted tremie concrete placements. This system shall be designed to be able to extend through the tremie holes in the concrete shells, and shall be designed so as not to damage: the reinforcing steel cages (or any attachments to these cages), the concrete shells, any previously placed tremie concrete, or the geotextile fabric.

One such system may consist of a steel vertical pipe, capable of rotating 360 degrees, with a 90-degree elbow at the bottom. A high-pressure flexible hose (whose length past the elbow may vary from 0 to 20 feet) may either be passed through the vertical pipe and elbow or attached to the elbow. Water pumped under pressure through the hose may be used to extend the hose horizontally. To ensure that the hose remains horizontal, ports may be provided in the top and bottom of the hose. Telescopic and articulating systems may also be used. See subpart 3.7.2 for further details.

2.3.2 Articulated Mat Vessel

The Contractor shall provide a vessel suitable for deploying and recovering the articulated concrete mats.

2.4 CONSTRUCTION COMPONENTS

2.4.1 SPECIAL LIFTING FRAMES AND GUIDE FRAMES

Several guides, templates and frames are required for use in the construction of the Olmsted Dam and are addressed in this section. Lifting Frames are required for handling the Tainter Gate, the Right Boat Abutment and the Navigable Pass shells and have been analyzed to work structurally with these precast concrete shells. Except as indicated in Paragraphs 1.83 and 1.84 of Section 00800 SPECIAL CLAUSES, other special templates and

frames that the Contractor may be fully responsible for both laying-out, and designing, are addressed in Subparts 2.4.1.2, 2.4.1.3, 2.4.1.4, and 2.4.1.5. The Contractor is required to use Registered Engineers for the design of all frames (including all lifting frames), guides, and templates.

The requirements of AISC, and Sections: 05090, 05120 and 05500, WELDING, STRUCTURAL; STRUCTURAL STEEL; and MISCELLANEOUS METAL, respectively, of Division 5 of these specification will be followed in the design of these templates and frames.

2.4.1.1 Lifting Frames for the Tainter Gate, Right Boat Abutment and Navigable Pass Shells

The Contractor shall fabricate as many frames as necessary to provide the various configurations, shown in the F-series of drawings, for lifting the Tainter Gate Sill and Stilling Basin Shells, the Right Boat Abutment Shell and the Navigable Pass Shells for Monoliths 1 to 12. These frames are to be available for concurrent use at all in-the-river work times. Also, when performing in-the-river work for Navigable Pass Shells for Monoliths 1 thru 12, at least two identically configured frames shall be available at all times. The lifting frames shown in the F-series of drawings are intended to be reconfigurable for different lifts; however, it is the Contractor's responsibility to determine how many frames will be necessary to have available at any one time in order to complete the shell installation for any given construction season.

All main members of these lifting frames have been designed and typical frame joint details are provided, together with all of the design forces for all of the frame joints. The joints in these frames are indicated as bolted connections for ease of re-configuration; however, the Contractor may alter the type of joints, and connections, at his own expense. The Government is responsible for completing the design of all the frame joints. The Contractor is required to lift the frames from the tops of the lifting frame legs at the location and with the loads indicated on the drawings. The Government is responsible for the design of the lifting points at the tops of the lifting frame legs, as well as completion of the connections at the bottoms of the lifting frame legs to the precast concrete shells. The Contractor is also responsible for the design and provision of the laitance containment boxes, all indicated seals, and indicated positioning systems, associated with the lifting frames.

The drawings show typical design details for both the connections of the frames to the concrete shells (together with the design forces for all the connections to the shells) and of the connections of the frames to lifting beams. The Government is responsible for completing the design of all connections from the lifting frames to the concrete shells, in order to resist the forces indicated on the drawings. These connections shall use drill collars (designed per API Spec. 7) as the main lifting structural components and shall utilize shear keys that key into each of the tremie access holes in the shells while being configured to allow for access of the tremie pipes through the tremie holes, as indicated in the drawings. The Government is responsible for designing guidance systems to be used for stabbing in the drill collar extensions used for disconnecting the lifting frames from the shells underwater; which the Contractor is responsible to fabricate and utilize. The Government is responsible for designing and the

Contractor is responsible for providing all nuts associated with the drill collars. The Government is responsible for detailing the grout bags that are to be used at the mating interface between the lifting frames and the shells in order to correct for geometric (tolerance) differences between the lifting frames and shells. The connections to the Tainter Gate Sill and Stilling Basin shells shall be detailed as pinned connections, and the connections to the Navigable Pass and Right Boat Abutment shells shall be detailed as moment resisting connections, as indicated in the drawings. These connections are designed for an underwater lift as shown on the drawings.

Should the Contractor propose to lift the shells in a manner different than that shown on the drawings, then it is the Contractor's responsibility to re-analyze the shells and to design the shell connections, the lifting frames and the lifting frame connections.

The drawings show typical design details for the tremie concrete delivery systems supported by the lifting frames, together with typical details for the deck system on top of the frames. The Contractor is responsible for the final design, and implementation, of all apparatus for the tremie concrete delivery systems, as well as for the deck systems on top of the frames.

The drawings show typical details of systems for the lifting frames to temporarily affect seals at the tops of the sheet pile walls, and to provide level tremie concrete surfaces between the sheet piles walls and the precast concrete shells. The Government is responsible to finalize the design of all these sealing and forming systems.

The drawings indicate how the lifting frames are laid-out to contain tremie concrete laitance exiting from input, and bleed, ports in the shells. The Contractor is required to finalize the design of these containment systems in order to prevent the concrete laitance from contaminating the river water.

The drawings indicate that the legs of the lifting frames are to have bottom steel plates, with stiffeners, and bottom compression seals. The Government is required to finalize the design of these lift frame leg details associated with the interface with the concrete shells, for the interface forces given on drawings F-136, F-137, and F-141, including the design of shear keys at each tremie hole as indicated conceptually on drawing F-65. These interface details shall leave the surface of the concrete shells clean and smooth after the removal of the frame from the infilled shells.

The insitu weight of the lifting frames and all associated apparatus and equipment shall not weigh less than the weights indicated on the drawings, as this weight is required to prevent uplift of the shells during tremie placement operations.

The lifting frames are also required to serve as spotting towers to assist in locating the precast concrete shells underwater. The Contractor is required to design and implement survey targets and systems required to use the lifting frames as spotting towers.

The lifting frames are also required to serve as work platforms to support the tremie concrete placement operations. The Contractor is required to select and to provide to the Government all safety and function related features, including all safety and fall prevention systems, platforms, handrails and access/egress ways required for personnel working on the lifting frames. The Government is responsible for completion of the structural design incorporating the features provided.

The lifting frames are required to remain attached to the tops of each precast concrete shell until the infill tremie concrete has reached a minimum compressive strength of 1,000 psi.

2.4.1.2 Pile Guide Frames

The drawings show conceptual designs for pile guide frames that are used to serve as templates for aligning the pipe piles, bottom reinforcing steel cages and the bottom geotextile fabric sheets, as well as also serving as lifting frames for the same piles, reinforcing cages, and geotextile fabric sheets. The concepts shown were developed to assist in meeting the stringent placement tolerances and schedule requirements. In accordance with Paragraph 1.83 of Section 00800 SPECIAL CLAUSES, the Contractor does not need to adopt the layout of the Pile Guide Frames shown. However, if the Contractor does adopt the layout shown, the Government will complete the design of the Pile Guide Frames. If layout shown is not adopted, the Contractor is responsible for designing and fabricating Pile Guide Frames that perform the following functions:

- Maintain the pipe piles, the reinforcing steel cages, and the geotextile fabric sheets in alignment during the installation and pile driving operations.
- Support the weight of the reinforcing steel cages, and geotextile fabric sheets during installation and pile driving, without disrupting the integrity of the screed backfill base material.
- The Pile Guide Frames must match the geometry of the sheet pile walls, and the footprint of the precast concrete shells and skirts.
- Provide for means to release the reinforcing steel cages, and geotextile fabric sheets.
- Serve as spotting towers in order to locate the pipe piles, reinforcing steel cages and geotextile fabric sheets underwater.
- Serve as reference frames for re-strike testing of the designated piles.
- Resist all river and environmental forces.

2.4.1.3 Sheet Pile Guide Frames

The drawings show conceptual designs for sheet pile guide frames that are used to serve as templates for aligning the master piles and sheet piles. The concepts shown were developed to assist in meeting the stringent

placement tolerances and schedule requirements. In accordance with Paragraph 1.83 of Section 00800 SPECIAL CLAUSES, the Contractor does not need to adopt the layout of the Sheet Pile Guide Frames shown. However, if the Contractor does adopt the layout shown, the Government will complete the design of the Sheet Pile Guide Frames, otherwise, the Contractor is responsible for designing and fabricating Sheet Pile Guide Frames that perform the following functions:

- Align and support master piles to the tolerances specified.
- Align and support the sheet piles between the master piles to the tolerances specified.
- Resist all river and environmental forces.

2.4.1.4 Paving Block Setting Frames

The drawings show conceptual designs for Paving Block Setting Frames that are used to both lift and align the paving blocks in the Navigable Pass area. The concepts shown were developed to assist in meeting the stringent placement tolerances and schedule requirements. In accordance with Paragraph 1.83 of Section 00800 SPECIAL CLAUSES, the Contractor does not need to adopt the layout of the Paving Block Setting Frames shown. However, if the Contractor does adopt the layout shown, the Government will complete the design of the Paving Block Setting Frames, otherwise, the Contractor is responsible for designing and fabricating Paving Block Setting Frames that perform the following functions:

- Align and support the paving blocks during installation.
- Allow for the wire rope lifting system designed into the paving blocks.
- Serve as a spotting tower.
- Resist all river and environmental forces.

2.4.1.5 Left Boat Abutment Lifting Frame

The drawings show a conceptual design for a lifting frame for the Left Boat Abutment. The concept shown does not contribute to the strength of the Left Boat Abutment but serves to provide uniform lifting loads at the designated locations. In accordance with Paragraph 1.83 of Section 00800 SPECIAL CLAUSES, the Contractor does not need to adopt the layout of the Left Boat Abutment lifting frame shown. However, if the Contractor does adopt the layout shown, the Government will complete the design of the Left Boat Abutment Lifting Frame, otherwise, the Contractor is responsible for designing and fabricating a lifting frame that will uniformly support the shell as indicated during installation as well as resist all river and environmental forces. The loads from this lifting frame into the Left Boat Abutment shell shall be in the vertical direction.

2.4.2 In-River Concrete Delivery Systems

The in-river concrete delivery systems shall have a high degree of

redundancy that will allow the concrete delivery to continue if any of the component pieces of equipment were to break down. The concrete delivery systems for the segment shell tremie infill operations shall be installed, and tested, prior to lifting the first segment to place. If the concrete delivery system fails the test, it will be repaired/refurbished and retested at no additional expense to the Government. Other requirements for the in-river concrete production systems are given in 03800 TREMIE MASS CONCRETE.

2.5 CONSTRUCTION ACCESSORIES

2.5.1 Sheet Pile Walers

In accordance with Paragraph 1.83 of Section 00800 SPECIAL CLAUSES, if the Contractor elects to retain the concept indicated on the drawings, then the Government will complete the design of these items; otherwise, the Contractor shall design, and provide, a sheet pile waler system comparable to that shown in the F-series of drawings. This sheet pile waler system shall be provided as required to retain the arches of sheet piles between Master Piles in the shape indicated in the drawings, while resisting differential soil, tremie concrete, and water current, induced forces.

2.5.2 Positioning Jigs

The Contractor shall design, and provide, positioning jigs that will hold the various embedded steel components including those associated with the wicket gates and hurters in their required alignments to the tolerances given in Section 11290 WICKET GATES. Some of these jigs shall be used to ensure that the lifting drill collars embedded in the concrete shells shall match the corresponding drill collar lifting locations on the lifting frames.

2.5.3 Spreader Beams

The Contractor shall design, and provide, spreader beams for the required medium lift segments, including but not limited to: the upper tainter gate pier wall shells; the upper portion of the right tainter gate training wall shell; the service bridge segments, and the training wall segment for Monolith 12 of the Navigable Pass. All medium lift segments, and the training wall segment on Monolith 12, are designed using vertical forces at the designated lifting points, and the Contractor is required to design the spreader beams so as to impart vertical loads into these segments during lifting operations.

2.5.4 Shell Positioning Systems

In accordance with Paragraph 1.83 of Section 00800 SPECIAL CLAUSES, if the Contractor elects to adopt the conceptual solution indicated on the F-series drawings, then the Government will complete the design of the Shell Positioning Systems; otherwise, the Contractor shall design and provide shell positioning systems for the tainter gate stilling basin shell SBS-1, the Right Boat Abutment and the Left Boat Abutment. These positioning systems shall have equal or superior capabilities to the systems indicated in the drawings.

2.5.5 Temporary Mooring Systems

All temporary mooring systems shall conform with Section 02460 PERMANENT AND TEMPORARY MOORINGS. If the Contractor elects to construct a shell out-loading system near the approaches to the locks then the Contractor shall construct a temporary dolphin system, with equal or superior capabilities to that shown in the drawings, in order to control and protect the heavy-lift crane barge while it is working at the out-loading facilities.

2.5.6 Brushes for Tremie Containment

The Government shall design and the Contractor shall provide wire brushes or equivalent which shall contain tremie concrete and prevent pollution of the river. Locations requiring brushes include but are not limited to the following locations:

- a) From the outriggers of the lifting frames to the sheet pile walls and paving blocks (see the F-series of drawings) and
- b) from the navigable pass paving blocks to the downstream sheet pile wall (see the S-series of drawings).

2.5.7 Bond Breaker for Lifting/Tremie Frame Shear Keys

The Contractor shall provide bond breaker material to be applied to shear keys in lifting/tremie frame legs. Bond breaker shall be selected to minimize damage to hardened tremie concrete when the lifting frame has been removed from a tremied shell.

2.6 TREMIE CONCRETE MIXES

In accordance with Section 03800 TREMIE MASS CONCRETE, the Contractor is required to submit a Concreting Plan for each phase of work during which tremie concrete is to be placed. The plan shall provide a detailed description of all equipment and methods to be used for concrete batching, mixing, transportation, conveyance, and placement. Additional requirements are provided in Section 03800 TREMIE MASS CONCRETE of these specifications.

The contractor is required to submit the Concrete Plan at least 90 days prior to the start of concrete placement for any phase of the concrete work. The plan must be submitted to the Contracting Officer for comment and approval.

2.7 FABRICATION

The Contractor shall identify all fabrication facilities for construction equipment and vessels to the Contracting Officer.

2.7.1 Bottom Steel Reinforcing Cage/Pile Template Assembly

The Contractor shall complete the design of bottom steel reinforcing cages for the Tainter Gate, and the Navigable Pass, monoliths indicated on the drawings to include the following features:

- Each cage shall be pre-assembled in-the-dry, together with the associated geotextile fabric and embedded items, in a manner suitable for lifting and installation using a pile driving template.
- The embedded items pre-assembled together with the cages shall include, but not be limited to the associated: drainage pipes, installation stakes, and chairs to support the reinforcing cage. All items attached to the reinforcing steel cages shall be adequately secured to resist loads from the tremie concrete placement while maintaining their correct location and alignment. The Contractor shall design, and provide, both the installation stakes and the chairs.
- The pipe piles may be pre-positioned in the template, with the bottom tip of the piles extending through the reinforcing steel cage, in-the-dry as indicated in the F-series of drawings.
- Each cage shall be attached to a pile driving template, where the piles may be pre-installed in the template, in such a manner that the pile tips pass through the cage, and so that the piles are supported by the template.
- Either the Contractor or the Government (see Paragraph 1.83 of Section 00800 SPECIAL CLAUSES) shall design and provide a system to adjust both the horizontal and vertical position of reinforcing steel cage and pipe piles after the initial installation of the template.
- Either the Contractor or the Government (see Paragraph 1.83 of Section 00800 SPECIAL CLAUSES) is responsible for the design and provide a quick release system suitable for releasing a reinforcing steel cage from the template underwater after the pipe piles have been driven.

2.7.2 Support of the Precast Concrete Shells Within the Precast Yard

During the fabrication of the precast concrete shells, and during transport of the shells within the precast yard, the Contractor shall support the shells in a manner that prevents overstressing of the shells, in accordance with the construction requirements given in ACI 357.

2.7.3 Product Tolerances

Product tolerances are presented in the specification sections governing the given construction activity. Subpart 3.5.3, together with Section 03410 PRECAST CONCRETE FOR SHELLS govern shell fabrication.

2.8 TESTS, INSPECTIONS, AND VERIFICATIONS

2.8.1 Bathymetry Survey

The Contractor shall provide bathymetry surveys that meet the requirements given in Section 01351 UNDERWATER SURVEY, RIVER MONITORING, AND SCOUR REPAIR, shell installation survey systems. The tremie concrete sounding system shall conform to the requirements presented in Section 13855 SOUNDING EQUIPMENT FOR TREMIE PLACEMENT. and underwater inspection systems

2.8.2 Test Pile Driving

As specified in Section 02462 STEEL PIPE PILES, the Test Pile Driving Plan must be submitted by the Contractor and approved by the Government before the pile driving is initiated. Therefore, time is critical in submitting the Test (or Indicator) Pile Driving Plan.

The Test Pile Driving should be undertaken as the first order of work for the dam foundation system.

The Contractor is required to deliver the pile driving log to the Government within 5 days following completion of each Test Pile.

Revisions to the Pile Installation Plan must be submitted to the Government within 10 days of completing the Pile Tests.

2.8.3 Testing Wicket Gates and The Maintenance Box

The Contractor shall allow seven days per season during the construction of the navigable pass to allow for the Government to use its wicket lifter boat to raise and test the wickets.

The maintenance box will be delivered prior to the end of the first season of the navigable pass construction. The Government will test the maintenance box by setting it on a completed section of the navigable pass.

The Contractor will allow five days in the schedule for the Government to set and test the maintenance box.

PART 3 EXECUTION

3.1 EXAMINATION

Underwater inspection requirements are specified in Section 01351 UNDERWATER SURVEY, RIVER MONITORING, AND SCOUR REPAIR. The Contractor shall follow these procedures to monitor the movable river bottom in the general area of the dam, and to inspect the river bottom under the footprint of each shell within three (3) hours immediately preceding the installation of both the reinforcing steel cage for that shell as well as for that shell itself.

3.2 PREPARATION

3.2.1 Weight Monitoring Plan

The Contractor shall establish a weight monitoring plan to control the weight of the precast concrete shells. The purpose of the weight monitoring program for the dam shells is to ensure that each segment can be lifted during load-out and transport.

3.2.2 Shell Load-Out Plan

The Contractor shall prepare a Shell Load-out Plan that addresses the following issues:

- a. River stage
- b. River traffic conditions
- c. Predicted river stage
- d. Work period and weather windows
- e. Horizontal control of the shells as they are lifted
- f. River velocity at installation location
- g. Support of the shell against over-loading during load-out

3.2.3 Heavy-lift Installation Plan

The Contractor shall prepare a Shell Installation Plan. The Contractor's Installation Plan should detail each step of the installation process for all medium, and heavy, lifts, and should include an Active Hazard Analysis (AHA), as required by EM 385-1-1 SAFETY AND HEALTH REQUIREMENTS MANUAL, which identifies potential hazards during the installation operation. The operation plan shall describe the setdown process, positioning measures, real-time coordination of crane barge operations with the surveying system for each type of large precast elements. Particular consideration shall be given to applications of guide systems (such as stabbing pintles and flat jacks as shown on the contract drawings) in the setdown process. The plan shall require that the Contractor shall notify the Olmsted Resident Engineer's Office when each medium, or heavy, lift is within 24" of contacting any previously placed structures, so that the Olmsted Resident Engineer's Office will coordinate with the Olmsted Lockmaster to stop river traffic for the following two hour period, in order to minimize the risk of damage from wake-induced motions of the medium, and heavy, lifts during set-down. The plan should further identify what steps the Contractor plans to take to minimize the probability of the hazard occurring, and if the hazard occurs, what steps the Contractor will take to reduce the hazard's effects.

The Installation Plan shall also account for all of the associated requirements given in Section 01352 HANDLING AND INSTALLATION OF HEAVY LIFT ELEMENTS.

3.2.4 Protection

Piles are not permitted to be driven within 125 feet of concrete that has a compressive strength of less than 1,000 psi.

The Contractor shall exercise care to protect the lock walls, the sheet pile walls and the fixed weir from damage due to dredging operations. The Contractor will develop any special measures required for material removals adjacent to these structures.

The Contractor shall exercise exercise care during the dredging operations to protect the docking cellular structure, at the West end of the Locks, from damage. The Contractor will develop any special measures required for removing materials adjacent to this structure. Over excavation adjacent to the docking cellular structure may compromise the stability of the structure.

3.2.5 River Bottom Surface Preparation

Prior and during shell installation, the river bottom shall be maintained clear of excessive sediment, and debris. The Contractor shall dredge the upstream sediment trap, so that the sediment remains more than 5-feet below the top of the sheet pile cut-off wall, in order to avoid river bottom sediment from being transported over the top of the sheet pile cut-off wall.

In the event that sediment is deposited at the footprint of a shell after the steel reinforcing cage & piles are set and prior to a shell being set, the Contractor will remove the material. The Contractor shall submit his plan for removing this material for approval. Air-lifting the sediment will be allowed as an option. The Contractor shall use caution when air-lifting and not over excavate or damage the filter fabric. If the volume of sediment is greater than 100 cubic yards the collected material shall be placed in a hopper barge and decanted. The collected material shall be handled similar to other excavated material as specified else where in these specifications. Refer to Paragraph 1.8.1 of Section 02482 DREDGING for requirements related to the preparation of the river bottom in advance of the in-the-wet season in which the pipe piles and shells are to be installed in a given area.

3.3 SHELL ERECTION

Lifting and transport of the precast concrete shells shall be performed in accordance with Section 01352 HANDLING AND INSTALLATION OF HEAVY LIFT ELEMENTS, Section 01501 HEAVY LIFT TRANSPORT FROM OFF-SITE CASTING FACILITY, and Section 01732 INSTALLATION APPARATUS. During load-out of the shells the Contractor shall support the shells in manner that will prevent overstressing of the shells, according to the construction requirements given in ACI 357. Other aspects of the shell installation procedures are given in Subpart 3.4

3.4 SHELL INSTALLATION

The Contractor shall perform a thorough survey of the entire transport route from precasting facility to the installation location to ensure adequate horizontal and vertical clearance.

The Contractor shall provide towboats with sufficient horsepower to maneuver the heavy-lift crane in the maximum anticipated currents during transport.

3.5 APPLICATIONS ASSOCIATED WITH INSTALLATION

It is critical that the lift height restrictions with-in the Tainter Gate Pier Wall shells, as noted on the drawings, not be exceeded as this may cause loads in excess of the pier wall design due to excessive heat of hydration of the infill and mass concrete, and excessive hydraulic pressure acting on the shell or other similar applications.

For SBS-1 and SBS-6 the underside of the stilling basin slab shall be completely infilled with tremie concrete, and that concrete infilled tremie concrete shall have achieved a minimum compressive strength of 1,000 psi, before the training wall portions of the shells are infilled with tremie

concrete.

As indicated in the drawings, for SBS-6 the portion of the 42-inch and 54-inch diameter lifting frame leg within the training wall shell shall be designed to remain within the training wall shell after the other portions of the lifting frame have been removed, and this sacrificial portion of the leg shall be completely infilled with tremie concrete.

The training wall portion of the shells shall be filled with water during transport, with no more than a 5-foot differential head between the water elevations on the inside and outside of the shell being transported.

For TGS-1 through TGS-6 and SBS-1 through SBS-6, tremie concrete shall be placed in accordance with the sequence indicated in the drawings.

The Contractor shall grout void spaces associated with the shell installation pintles and recesses, using grout lines as indicated in the S-series of drawing, and using non-shrink cementitious grout with a specified design 28-day compressive strength of 5,000 psi.

3.5.1 Special Techniques for Connecting Lifting Frames and Shells

The nuts for the drill collars that lock the lifting frames to the Tainter Gate Sill and Stilling Basin shells shall be made snug, but need not be torqued prior to the lifting operations. The nuts for the drill collars that lock the lifting frames to the Navigable Pass shells shall be torqued to a value of between 10 and 15% of the rated torque capacity of the drill collar.

The Contractor is responsible for the design and provision of positioning systems for aligning each lifting frame with the shell that it is to be connect to.

3.5.2 Interface with Other Structures

Both the existing locks structure and the existing cellular structure for the fixed weir have sheet pile interlocks that the Contractor shall locate, inspect, and connect to, in order to complete the cut-off wall system for the dam. The Contractor shall also interface the permanent scour protection systems with both the locks structure scour protection system, and the Kentucky River Bank, in a manner so as to minimize scour in these two areas.

3.5.3 Construction Tolerances

Construction tolerances are presented in the specification sections governing the given construction activity. As this section together with Sections 01732 INSTALLATION APPARATUS, 11287 TAINTER GATES, GATE SUPPORT BEAMS AND ANCHORAGES, and 11290 WICKET GATES, govern shell installation, the following shell/template/pintle installation tolerances are given:

- Shell Location,
 - horizontal, absolute: +/- 4 in.
 - horizontal, relative to adjoining shells: +/- 1 in.

- Pier Wall,
out of plumbness, from vertical, in both directions: +/- 1/2 inch
- Reinforcing Steel Cage,
horizontal, absolute: +/- 4 in.
horizontal, relative to previously placed cage: +/- 2 in.
- Drainage Pipe Location,
horizontal, relative to reinforcing cage: +/- 1/2 in.
- Pintle Location,
horizontal, relative to receiving pintle recesses: +/- 1/4 in.
- Pintle Recess Location,
horizontal, relative to specified pintle locations: +/- 1/4 in.
- Out-of-plumbness for the pintles shall not exceed: +/- 1/16 in.

The Contractor shall adopt the following procedures, with regard to the pintles, in order to ensure that the shells within the Tainter Gate section of the dam are positioned properly:

- 1) The pintles on the first stilling basin shell (SBS-1) to be installed are welded onto the pintle beams based upon the surveyed locations of the pintle recesses of the first sill shell (SS-1) to be installed and SBS-2.
- 2) Once the tremie/lifting frame has been secured to SBS-1, (in-the-dry) the Contractor shall survey the SBS-1 pintle locations relative to fixed targets on the top of the tremie/lifting frame.
- 3) SBS-1 shell is set in the river. The global position of the lifting frame is determined via a survey of the above water fixed targets on the tremie/lifting frame. With the global survey results the Contractor produces a CAD plan showing the outline of SBS-1 including the location of the pintles.
- 4) Pintles on SS-1 are welded onto the pintle beams based upon the surveyed locations of the pintle recesses of SS-2.
- 5) Once the tremie/lifting frame has been secured to SS-1, (in-the-dry) the Contractor shall survey the SS-1 pintle locations relative to fixed targets on the top of the tremie/lifting frame.
- 6) SS-1 shell is set in the river. Initial positioning occurs through contact with the pintles while the horizontal flat jacks accomplish final positioning. The global position of the lifting frame is determined via a survey of the above water fixed targets on the tremie/lifting frame. With the global survey results the Contractor modifies the existing CAD plan to show the outline of the SS-1 shell and pintles in addition to the existing shells.
- 7) Repeat steps 1), 2), and 6) for SBS-2

- 8) The Contractor shall use the CAD plan to determine the relative location of the 3 exposed sill pintles and the 1 stilling basin pintle. A triangular jig or template is lowered over the pintles to verify the locations, in accordance with Subpart 3.5.4.
- 9) Pintles on SS-2 are welded onto the pintle beams based upon the surveyed locations of the pintle recesses of SS-3, in order to correct the relative position of the pintles to match the pattern of the pintle recesses on SS-3, and to correct the position of SS-3 in order to adjust for any mis-alignments of the previously placed shells.
- 10) Repeat steps 2) and 6) for SS-2.
- 11) For the remaining tainter gate stilling basin and sill shells, repeat the last sequence of steps taken for SBS-2 and SS-2.

3.5.4 Physical Measurements of Underwater Installation Positions

In addition to the underwater survey requirements presented in Section 01351 UNDERWATER SURVEY, RIVER MONITORING, AND SCOUR REPAIR, the Contractor is required to make physical measurements of the particular underwater installation positions, in accordance with the following:

- 1) The Contractor shall physically measure, and/or make pliable moldings, of the positions of the tops of the installed landing pad piles, relative to the nearest members of the Pile Guide Frame. If pliable moldings are made, they shall separate from the installed landing pad piles without being damaged, or lost underwater, and they shall maintain their position relative to the Pile Guide Frame during the period until the frame is raised above water for joining with the next reinforcing steel cage and pile assembly, at which time the pliable moldings shall be measured in the dry. These measurements of the relative distances from one of the Pile Guide Frames to the installed landing pad piles, shall then be used to adjust the locations of the flat jack landing pad assemblies on the underside of the associated precast concrete shell in order to achieve the relative tolerances, between the landing pad assemblies and the landing pad piles, specified in Section 01732 INSTALLATION APPARATUS.
- 2) The Contractor shall fabricate a triangularly shaped steel jig that will allow the Contractor to physically measure, and/or make pliable moldings, of the relative positions of all four of the installed pintles that are to be engaged by the next tainter gate sill shell, SS-2 to SS-6, to be installed. The Contractor shall deploy the triangular jig while the lifting frame is still on the corresponding stilling basin shell, SBS. The Contractor shall lower the jig underwater onto the four corresponding pintles, while referencing the location of the jig to the lifting frame, and then either make physical measurements, or pliable moldings, of the positions of the pintles relative to the jig. The jig should then be recovered above water.

If pliable moldings are made, they shall separate from the installed pintles without being damaged, or lost underwater, and they shall

maintain their position relative to the jig during the period until the jig is raised above water, at which time the pliable moldings shall be measured in the dry. These measurements of the relative distances from one pintle to the next, shall then be used to adjust/finalize the positions of pintles to be welded to the pintle beams, in order to achieve the requirements specified in Subpart 2.7.2, and in Section 01732 INSTALLATION APPARATUS.

3.6 MANUFACTURER FIELD SERVICE

The Contractor shall provide access for the Government representative to the manufacturer's field service representative in order to discuss and review technical details for at least the following field service operations:

- Flat jacking and grouting operations
- Grout bag operations
- Corrective grouting operations
- Tendon jacking and grouting operations for the tainter gate anchorages
- All injected seal operations

3.7 ADJUSTING/CLEANING

3.7.1 Corrective Grouting

Should the core drilling specified in 13854 UNDERWATER CORING, or the non-destructive testing cited in 03800 TREMIE MASS CONCRETE, identify the presences of voids, or extensive segregation, either in the tremie concrete, or between the tremie concrete and the precast concrete shells, then, the Contractor shall use injection grouting in order to completely fill the voids and/or segregated zones. Extraction of a core will be performed by the Contractor as directed by the Contracting Officer; however, testing of the core will be conducted by the Government. Testing of cores will not be the sole basis for concrete acceptance when concrete is suspect, and all pertinent information will be considered. The injected grout may be either a cementitious, or a polymer, grout, and shall have a 28-day compressive strength of no less than 5,000 psi. As necessary, and prior to grouting, the voids, and/or segregated zones, shall be flushed in order to ensure that any loose material has been washed-out, and so that the injected grout will fully bond to the surrounding tremie, and/or precast concrete.

3.7.2 Water Jet Cleaning

The Contractor shall use the water jetting system cited in Subpart 2.3.1 in order to a) re-suspend silt located beneath a shell after that shell is installed (prior to tremie placement) and b) to jet laitance from previously placed concrete, including cleaning-off, in-the-dry, of any laitance on top of the tremie concrete seal pour at the bottom of the

Tainter Gate Lower Pier Wall shells. Minimum requirements for both cases are given below.

a) The water jetting system must be introduced down each tremie hole to suspend silt prior to placement of tremie concrete. The system shall be operated so as to avoid interference with the pre-installed piles, tremie reinforcing steel cages with associated geotextile fabric, underdrains, landing pad assemblies, interior walls and end walls. The Contractor is not responsible for jetting in areas made inaccessible by these obstructions.

Jetting may occur simultaneously at multiple tremie holes but is prohibited when tremie concrete is being placed. Placement of tremie concrete should begin no later than 60 minutes after the first hole has been jetted. River water may be used for the jetting operation and the Contractor shall jet with a volume of water equal to that below the shell and above the geotextile fabric. The water jets shall be directed at an angle and a pressure that is demonstrated to remove sediment from a reinforcing steel cage during the tremie concrete placement tests, as required per section 01720.

b) Jetting under a shell to clean off laitance is only required if a tremie pour is interrupted per subpart 3.7.10 of section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT. This jetting shall be performed using a system that is capable of applying a minimum pressure of 500 psi, but no more than 1000 psi, on the top surface of the previously placed tremie concrete. The jetting on any given surface shall continue for one minute and tremie placement shall resume within 60 minutes of the end of the jetting operation.

3.7.3 Infilling of Holes and Recesses in the Concrete Shells

The Contractor is responsible for infilling all construction related holes and recess in the precast concrete shells in a manner that will result in equal, or better abrasion resistance as the concrete used in the precast concrete shells. The holes and recesses include, but are not limited to, the tremie placement holes, the threaded recesses for the embedded lifting drill collars, and as necessary the any incompletely filled bleed holes.

3.8 DEMONSTRATIONS

For demonstration requirements, the Contractor is directed to the requirements cited in the individual specifications.

3.9 PROTECTION DURING CONSTRUCTION

The Contractor shall protect the Locks structure from undermining due to scour of the adjacent river bottom. The F-series of drawings indicates one plan that could be followed in order to protect the Locks structure. Furthermore, the Contractor shall provide a minimum stand-off distance of 300-feet from the construction equipment to the navigation traffic lanes in order to safeguard against vessel impact.

-- End of Section --

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DIVISION 02 - SITE WORK

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SECTION 02200

Amendment #0004

EARTHWORK, FILL, AND STONE PROTECTION

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all plant, labor, equipment, and materials, and performing all operations in connection with the construction of landside and riverside grading and fills, foundation preparation, dam foundation materials, stone protection and bedding as shown on the drawings and as specified herein. See Section 02482 Dredging for dredging excavation operations and Section 02315 for earthwork for the wicket gate display pit.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 02482 DREDGING
Section 02315 EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS

1.3 REFERENCES

The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto or as required.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(2002) Standard Specification for Concrete Aggregates
ASTM C 127	(2001) Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C 136	(2001) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM E 11	(2001) Standard Specification for Wire-Cloth and Sieves for Testing Purposes

CORPS OF ENGINEERS (COE)

COE CRD-C 144	(1992) Resistance of Rock to Freezing and Thawing
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1.4 NOT USED

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Placement Plan; G AR

The Contractor shall submit no later than 60 days prior to placement of material, a placement plan that indicates how the material will be delivered to the site and the plan for placing all materials.

Earthwork Plan; G AR

The Contractor shall submit no later than 60 days prior to the start earthwork of operations an earthwork plan that indicates the procedure for excavating, filling, placing foundation materials for the dam and the scour protection system. It shall address sequencing of cut and fill as it pertains to the cut off sheet pile walls, walers to protect the reverse loading of fill or tremie concrete placement. Plan shall also include the contractors proposed borrow material (source of river alluvium) site, and the disposal of excess and unsatisfactory material. As part of the disposal, the plan shall indicate layout of disposal area, heights, slopes, compaction methods, and the means to transport material from barge to trucks and haul roads to the disposal areas. Plan shall also include plan for maintenance dredging of work site.

SD-02 Shop Drawings

Sources of Materials; G R

The sources of materials from which the Contractor proposes to obtain the material shall be submitted to the Contracting Officer at least 210 days in advance of the time when the material will be required in the work.

SD-06 Test Reports

Gradation Testing of Materials; G R

Gradation Testing of Materials reports showing the results of testing the proposed materials. The Government reserves the right to sample and test all materials proposed for use.

SD-07 Certificates

Waybills and Delivery Tickets

Certified waybills and delivery tickets for materials.

1.6 TERMINOLOGY

1.6.1 Foundation Stone

In this specification Section, the term "Foundation Stone" will include Select Fill, Drainage Stone and Leveling Course stone material. Also in this section the term "Scour Stone" shall include the Riprap and Bedding Stone for the scour protection system and the Graded Stone B for the river dikes and the Graded Stone C for the bank paving for the river dikes.

1.6.2 Suitable Material

Suitable material for disposal back into the river shall meet the gradation requirements as specified in Paragraph 2.5 - River Alluvium Fill. Suitable material to be placed in the river shall be placed as specified in Paragraph 3.3.1 - Placement of River Alluvium, Select Backfill, Drainage Stone. PART 2 PRODUCTS

2.1 GENERAL

All stone for stone protection, & bedding shall be durable stone as approved by the Contracting Officer. The sources from which the Contractor proposes to obtain the material shall be selected well in advance of the time when the material will be required in the work. Unless otherwise specified, all test samples shall be obtained by the Contractor and witnessed by a representative of the Contracting Officer, and delivered, at the Contractor's expense to the Materials Testing Center, Engineer Research and Development Center (ERDC), 3909 Halls Ferry Road, Vicksburg, MS, 39180-6199, no later than 180 days in advance of the time when the placing of the stone protection is expected to begin. Fill materials, graded stone/bedding, and stone protection shall meet all gradation and quality requirements provided in this section.

2.2 MATERIALS

2.2.1 Foundation Stone (Select Fill, Drainage Stone, and Leveling Course)

Select Fill material shall consist of hard, durable, crushed gravel, or crushed stone material meeting the gradation requirements of ASTM C 33, coarse aggregate size 6 (3/4 to 3/8 inch). Drainage Stone and Leveling Course shall consist of hard, durable, gravel, crushed gravel, or crushed stone material meeting the gradation requirements of ASTM C 33, coarse aggregate size 1 (3-1/2 to 1-1/2 inch) for Drainage Stone and coarse aggregate size 7 (1/2 inch to No. 4) for Leveling Course. ASTM C 33 shall be used for gradation requirements. Quality requirements shall be in accordance with Paragraph 2.3 - QUALITY.

2.2.1 Scour Stone (Stone Protection) Riprap, and Bedding Stone

Scour Stone shall be durable limestone and of a suitable quality to ensure permanence in the structure and climate in which it is to be used. It shall be free from cracks, seams, and other defects that would tend to increase unduly its deterioration from natural causes. The inclusion of quantities of dirt, sand, clay, and rock fines will not be permitted.

Either boulders or quarried rock may be used for Scour Stone if conforming to the applicable requirements of paragraph 2.3 as to quality. Neither the breadth nor the thickness of any piece of stone shall be less than one-third of its length. The material shall be reasonably well graded from the minimum size stone permitted to the maximum size stone permitted, shown in the tables below.

2.2.2 Gradation

SCOUR STONE GRADATION TABLES:

TABLE 1
(FOR RIPRAP 15,720#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	15720 - 6288
50	4653 - 3144
15	2329 - 983

TABLE 2
(FOR RIPRAP 10,799#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	10799 - 4320
50	3197 - 2160
15	1600 - 675

TABLE 3
(FOR RIPRAP 5,529#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	5529 - 2212
50	1637 - 1106
15	819 - 346

TABLE 4
(FOR RIPRAP 3,200#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	3200 - 1280
50	947 - 640
15	474 - 200

TABLE 5
(FOR RIPRAP 2,333#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	2333 - 933
50	691 - 467

TABLE 5
(FOR RIPRAP 2,333#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
15	346 - 146

TABLE 6
(FOR RIPRAP 1,638#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	1638 - 655
50	485 - 328
15	243 - 102

TABLE 7
(FOR RIPRAP 691#)

PERCENT LIGHTER BY WEIGHT (SSD)	LIMITS OF STONE WEIGHT, LB.
100	691 - 276
50	205 - 138
15	102 - 43

TABLE 8
BEDDING STONE

STONE WEIGHT (Pounds)	CUMMULATIVE PERCENT (Finer by Weight)
400	100
250	70 - 100
100	50 - 80
30	32 - 58
5	15 - 34
1	2 - 20
< 1/2-inch	0 - 5

2.3 QUALITY

One hundred and eighty (180) days will be required for the Materials Testing Center at Engineer Research and Development Center (ERDC) to evaluate stone sources. The quality of Foundation Stone and Scour Stone material shall meet or exceed the following standards:

Test	Test Value or Finding
Specific Gravity (ASTM C 127)	> 2.5
Freeze-Thaw (COE CRD-C 144)	< 5.0 %
Wet-Dry (ASTM C 127)	< 1.0 %
Unit Weight (ASTM C 127)	> 155 lb/ft ³

***4**

These tests are required for all Foundation and Scour Stone material in the contract regardless of its source. Sources selected for testing shall be

ledge sampled by the Contractor under the supervision of the Contracting Officer. The Contractor shall provide no less than 2,500 pounds of 3,200# and 2,333# and 1,638#, and no less than 1,000 pounds of 691#, and bedding stone to the Materials Testing Center, Engineer Research and Development Center (ERDC), 3909 Halls Ferry Road, Vicksburg, MS, 39180-6199, no later than 180 days in advance of the time when the placing of the stone protection is expected to begin. For larger size stone provide testing samples shall be determined from shot or muck pile. Acceptance testing will require 180 days to evaluate the material. Supply and shipment of the samples shall be at the expense of the Contractor. Testing will be performed by the government in accordance with the applicable COE CRD-C or ASTM test methods. The material from the proposed source shall meet the quality requirements of this paragraph. Previous test data and other information on stone quality are included in the Concrete Materials Design Memorandum and are available for review in the District Office. A total of four(4) sets of tests shall be performed for each gradation over the life of the contract. Quality assurance testing of stone material by the Government does not relieve the contractor of quality control requirements.

*4

2.4 GRADATION TESTING

The Foundation Stone and Scour Stone material shall be tested at the quarry prior to use of materials. The tests shall be performed once for each stone size prior to placement, and as requested by the Contracting Officer to guarantee continuing uniformity of the material. A total of four (4) sets of Tests shall be performed periodically during the life of the contract. Sieve analyses of the Foundation Stone materials shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11. The gradation for all Scour Stone materials shall be in accordance with the "Louisville District Method" attached at the end of this specification.

2.5 RIVER ALLUVIUM FILL

River alluvium fill material shall generally consist of hard, durable, cohesionless, granular materials. The granular materials shall consist of sand or sand and gravel, shall be free of concentrations of clay/silt lenses and balls, and debris, and shall meet the following gradation requirements:

Sieve Designations U.S. Standard Square Mesh	Percentage by Weight Passing
4-inch	100
No. 4	30 - 100
No. 200	0 - 10

The quality of the river alluvium fill shall be subject to approval by the Contracting Officer or his authorized representative. This fill material will require procurement from an off-site source or dredging of material from the riverbed. No dredging for fill will be permitted within 500-feet of the dam construction site, in the navigation channel, between river miles 961.0 and 963.5, 965.5 and 971, or between miles 947 and 958 (except

any existing commercial sand and gravel dredging permitted between 947 and 958). The Contractor shall at his expense, perform sieve analyses and gradation tests to demonstrate that the material is in conformance with these specifications. Tests, except where modified, shall be made as indicated below in the presence of the Contracting Officer, unless otherwise authorized. The Contractor shall furnish the Contracting Officer reports of all required analyses and tests in duplicate. The required gradation of river alluvium fill material shall be checked by the Contractor by performing a sieve analysis prior to delivery of the material to the site of placement. The sieve analysis shall be made in accordance with ASTM C 136. One sieve analysis will be required for every 1,000 cubic yards of material placed.

2.6 LANDSIDE FILL

Fill material for landside work shall be satisfactory material as specified in Section 02315.

PART 3 EXECUTION

3.1 GENERAL

Select Fill, Drainage Stone and Levelling Course for the structure, and Riprap and Bedding Stone for stone protection shall be placed to the lines and grades shown on the drawings. Excavation and fill shall conform to the lines and grades required for the dam structures and scour protection, as indicated on the drawings.

3.2 EXCAVATION/BEDDING PREPARATION (DREDGING)

Areas which require excavation or fill for foundation preparation or stone protection bedding placement shall be dredged in accordance with Section 02482 DREDGING. Stone protection shall be placed in conjunction with dredging operations where practical.

3.3 PLACEMENT

3.3.1 Placement of River Alluvium, Select Backfill, Drainage Stone

Material shall be spread uniformly, in a satisfactory manner, to the slope lines and grade indicated on the drawings or as directed. Placing of material by methods that will tend to segregate the particle sizes will not be permitted. Material shall be finished to present a reasonably even surface free from mounds or wind rows. Underwater placement shall be by clamshell only. The material shall be lowered to within 5-feet of the riverbed before the material is released. Under no circumstances shall the material be allowed to freefall more than 5-feet to the riverbed.

3.3.2 Placement of Riprap and Bedding Stone for Stone Protection

Filter stone, leveling course, stone protection and bedding shall be placed within the limits shown on the drawings or otherwise required by the Contracting Officer. Placement of stone protection shall commence within 48 hours after the bedding layer has been approved by the Contracting

Officer. Stones shall be placed on the bedding in such a manner as to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids, and shall be constructed within the specified tolerances as shown below, to the lines and grades shown on the drawings. Stone protection shall be placed to its full course thickness in one operation and in such a manner as to avoid displacing the bedding material.

Stone protection placed underwater shall be verified for thickness and location by a hydrographic survey as specified in Section 01351. The larger stones shall be well distributed and the entire mass of stones in their final position shall be roughly graded to conform to the gradation specified in Section 2 above. The finished stone protection shall be free from objectionable pockets of small stones and clusters of larger stones. Placing stone protection in layers will not be permitted. Placing stone protection by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted. The desired distribution of the various sizes of stones throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placing, or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment may be required to the extent necessary to obtain a reasonably well graded distribution of stone sizes as specified above. Underwater placement shall be by clamshell only. The material shall be lowered to within 5-feet of the riverbed before the material is released. Under no circumstances shall the material be allowed to freefall more than 5-feet to the riverbed.

3.3.3 Placement of Landside Fills

Placement of landside fill shall be as specified in Section 02315.

3.3.4 Placement of Disposable Material

Excess suitable material may be placed in the approved areas of the river or into landside disposal areas. All unsuitable material shall be placed in landside disposal areas. Landside placement shall be in accordance with Section 02315 and river placement in accordance with Paragraph 3.3.1 - Placement of River Alluvium, Select Backfill, Drainage Stone.

3.3.5 Tolerances for Placement of Materials

Select fill, filter stone, levelling course, and stone protection and bedding shall have the minimum (nominal) layer thickness shown on the drawings. The top surfaces of the materials shall be permitted to deviate from the lines shown on the drawings within the following limits.

MATERIAL PLACEMENT TOLERANCES

<u>Surface Type</u>	<u>Plus</u>	<u>Minus</u>
Riprap 3,200 lb. to 15,720 lb.	24"	-12"
Riprap 205 lb to 1,638 lb.	12"	-12"
Bedding Stone for Riprap	12"	-12"
Earthwork Grading	6"	- 6"
Select Fill	6"	- 6"

MATERIAL PLACEMENT TOLERANCES

<u>Surface Type</u>	<u>Plus</u>	<u>Minus</u>	
Drainage Stone	6"	- 6"	
Leveling Course (see Section 02722)	0"	- 6"	
*3 Drainage Stone beneath Paving Blocks	0"	- 6"	*3

Either extreme of such tolerance shall not be continuous over an area greater than 300 square feet.

3.4 CONTRACTOR QUALITY CONTROL

The General Contractor shall provide an experienced project management and quality control staff, secure the services of independent testing agencies as required, and shall establish and maintain a quality control system for all construction in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

LOUISVILLE DISTRICT TEST METHOD

STONE GRADATION TESTS

GENERAL: The following test methods shall be used to determine the gradation of all stone protection specified in the contract.

An initial gradation test for approval shall be performed from a stockpile at the stone source by the Contractor at the direction of the Contracting Officer.

The method consists of selecting a random load prior to the leaving the source. Care should be taken to prevent contamination of the sample or loss of material by dumping the sample on a tarp or plywood. These size/quantity requirements are shown below. This sample should reflect all production, processing and loading methods in effect at the time to produce the material for the final specified product sample size.

<u>STONE SIZE</u>	<u>SAMPLE SIZE</u>
205 lb., 691 lb. Graded Stone C / Bedding Stone	15 Ton
1638 lb., 2333 lb., 3200 lb.	40 Ton
5529 lb., 10799 lb., 15720 lb.	160 Ton

The materials shall be tested as follows:

- a) Determine the weight of the entire sample.
- b) Pass the sample through the appropriate screen sizes.
- c) Weigh portions of the sample retained by each screen.
- d) Plot the gradation curve.

The results of this test will be recorded and calculated in the form presented below.

STONE GRADATION TEST

Material _____ Total Weight of Sample _____

Location (source) _____

Screen Size % Passing Specification Req.

Engineering Form 4055 and 4056, or similar, will be used to plot resultant curves.

-- End of Section --

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SECTION 02462

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Amendment #0004
SECTION 02462

STEEL PIPE PILES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 139	(2000) Standard Specification for Electric-Fusion (Arc) Welded Steel Pipe (NPS 4 and Over)
ASTM A 252	(1998e1) Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM A 572/A 572M	(2001) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM D 4945	(2000) Standard Test Method for High-Strain Dynamic Testing of Piles

AMERICAN PETROLEUM INSTITUTE (API)

API-5L	(2000) Line Pipe
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AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2002) Structural Welding Code - Steel
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1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Pile Driving Equipment; G AER

Submit descriptions of all pile driving equipment at least 60 days prior to

commencement of work.

SD-02 Shop Drawings

Delivery, Storage, and Handling; G R

Submit delivery, storage, and handling plans for piles at least 30 days prior to delivery of piles to the job site.

Pile Connectors; G AER

Submit detail drawings of pile connectors prior to fabrication.

Pile Driving Templates; G AER

Submit detailed drawings for each pipe pile driving template required.

Pile Placement; G AER

Submit pile placement plan at least 30 days prior to commencement of work.

Pile Driving Analyzer; G ER

Submit the qualifications and experience of the personnel proposed to perform the required PDA/CAPWAP work.

SD-05 Design Data

WEAP ANALYSES; G AER

Analyses for the 24-inch diameter pipe piles for the Tainter Gate Structure, the Navigable Pass and the Left Boat Abutment to demonstrate that the proposed pile driving equipment will drive the piles to the proposed tip elevations at the locations required.

Wave Equation Analyses

Submit wave equation analysis.

SD-06 Test Reports

Pile Driving Records

Submit the proposed form for compiling pile driving records 30 days prior to commencement of work.

Pile Driving Tests; G ER

Submit pile driving test data within one (1) week after each test is completed.

Pile Driving Analyzer Data; G ER

Submit pile driving analyzer data within one (1) week after each test is

completed.

Dynamic Testing of Driving Test Piles

Submit reports of the dynamic testing of piles within one (1) week after dynamic testing is completed.

Pile Driving Records

Submit pile driving records daily.

Pile Weld Testing Records

Submit records of nondestructive testing (NDT) of pipe pile welds upon delivery of piles.

1.3 DELIVERY, STORAGE, AND HANDLING

Delivery, storage, and handling of materials shall conform to the requirements specified herein and in Section 05500 MISCELLANEOUS METAL. Plans for the delivery, storage, and handling of piles shall be developed and submitted in accordance with paragraph SUBMITTALS.

1.3.1 Delivery and Storage

Piles shall be stacked during delivery and storage so that each pile is maintained in a straight position and is supported every 10 feet or less along its length (ends inclusive) to prevent exceeding the maximum camber or sweep. Piles shall not be stacked more than 15 feet high. All piles, pile splices and cutoffs, pile connectors and pulled piles that remain at the completion of the project shall become the property of the Contractor and shall be removed from the site.

1.3.2 Handling

Piles shall be lifted using a cradle or multiple-point pick-up to ensure that the maximum permissible camber is not exceeded due to insufficient support, except that a one-point pick-up may be used for lifting piles that are not extremely long into the driving leads. Point pick-up devices shall be of the type that clamp the to pile at each pick-up point. Piles shall not be dragged across the ground. The Contractor shall inspect piles for excessive camber and for damages before transporting them from the storage area to the driving area and immediately prior to placement in the driving leads. Camber, curvature in the pile in the direction along the pile, shall be measured with the pile laying on a flat surface and shall be the distance between the bottom of the pile at mid-length and the flat surface. Camber shall be measured in two external directions. The maximum permissible camber shall be 0.2 percent of the length of the pile. Piles having excessive camber will be rejected.

PART 2 PRODUCTS

2.1 MATERIALS

Material orders, material lists and material shipping bills shall conform to the requirements of Section 05120 STRUCTURAL STEEL.

*4

2.1.1 Steel for Pipe Piles

Except as noted otherwise in this specification, steel for 24-inch diameter pipe piles shall conform to ASTM A 252. The carbon equivalency (CE), as defined in AWS D1.1 shall not exceed 0.45. The sulfur content shall not exceed 0.05 percent. Welds made at a permanent manufacturing facility shall be made by either an automatic fusion weld, or an electric resistance welding process. Steel for 96-inch diameter isolation joint pipe piles shall conform to ASTM A 139 Grade E. Dam pipe pile sizes and required steel yield strength shall be as listed below:

Tainter Gated Dam - 24-inch dia., 1" wall thickness, min. yield 60 ksi, minimum length-38 feet, excluding the connection pipe.

Right Boat Abutment - 24-inch dia., 0.625" wall thickness, min. yield 52 ksi, minimum length-33 feet, excluding the connection pipe.

Navigable Pass - 24-inch dia., 0.625" wall thickness, min. yield 52 ksi, minimum length-33 feet, excluding the connection pipe.

Left Boat Abutment - 24-inch diameter, 0.625" wall thickness, min. yield 52 ksi minimum length-54 feet, excluding the connection pipe.

Isolation Joint Transitions - 96-inch dia., 1-1/2" wall thickness, length as shown on the drawings. *4

2.1.2 Pipe Piles

The 24-inch diameter pipe piles shall be longitudinally welded pipe with bevelled ends. Pipe piles shorter than 40 feet long shall be furnished full length. Where 24-inch diameter pipe piles are required to be longer than 40 feet (left boat abutment) the piles may be furnished with one full penetration welded splice. Pipe for the 96-inch diameter piles shall be made from bent, welded plates with staggered splices. Pipe piles shall not be spirally welded. Nondestructive testing requirements are specified in specification section 05090, WELDING, STRUCTURAL. Pile weld testing records shall be submitted to the Contracting Officer. Acceptance and repair criteria shall conform to AWS D1.1, Section 6. Lengths of piles shall be determined as specified in paragraph INSTALLATION, subparagraph LENGTHS OF PERMANENT PILES and paragraph PILE TESTS.

2.1.3 Pile Connectors

*4

Steel for pile connectors (**connection pipe and plates**) shall conform to ASTM A 572/A 572M, Grade 50 or API-5L, Grades X52, X60 and Grade X70, seamless, as applicable. *4

2.1.4 Polyurethane Foam

Polyurethane foam shall be pre-formed with the following properties:

<u>Property</u>	<u>ASTM Standard</u>	<u>Test Value</u>
Minimum Density	D1622	2.0 lb./cu. ft.
Compressive Strength	D1621	15 psi to 30 psi
Shear Strength	C273	15 psi to 30 psi
Closed Cells, Min.	D2856	95%
Water Absorption, Max.	D2842	2.0 lb./cu. ft.

Materials to attach the foam to the piles shall be appropriate for immersion and shall be determined by the Contractor.

2.2 FABRICATION

Fabrication shall conform to the requirements shown and as specified herein and in Section 05120 STRUCTURAL STEEL.

2.2.1 Pile Connectors

Pile connectors shall be attached to the piles as shown. Welding shall conform to the requirements of Section 05090 WELDING, STRUCTURAL.

PART 3 EXECUTION

3.1 PILE DRIVING EQUIPMENT

The Contractor's equipment selection shall consider that the 24-inch diameter piles shall be driven under water and that the use of followers will be required to transfer the driving energy directly to the 24-inch pipe pile. The Contractor will not be allowed to impact nor grip the smaller diameter connector pipe. Selected equipment shall protect the polyurethane foam around the connector pipe from damage during driving. The 96-inch diameter pipe piles shall be driven from above water. The Contractor shall select the proposed pile driving equipment, including hammers and other required items, and submit complete descriptions of the proposed equipment in accordance with paragraph SUBMITTALS. Final approval of the proposed equipment is subject to the satisfactory completion and approval of pile driving tests. Changes in the selected pile driving equipment will not be allowed after the equipment has been approved except as directed. No additional contract time will be allowed for Contractor proposed changes in the equipment. The Contractor shall perform and submit WEAP analyses to demonstrate that his proposed driving equipment will drive the 24-inch diameter piles and the 96-inch diameter piles, through the varying materials to be encountered, to the proposed tip elevations without overstressing the piles at the Tainter-Gated Dam, the Navigable Pass and at the Left Boat Abutment.

3.1.1 Pile Driving Hammers

Pile driving hammers for the 24-inch diameter pipe piles shall be of the impact type. The 96-inch diameter pipe piles for the isolation joints may

be driven with either impact or vibratory hammers.

3.1.1.1 Impact Hammers

Impact hammers shall be steam, air, diesel or hydraulic hammers of the single acting, double-acting, or differential acting type. The size or capacity of hammers shall be as recommended by the manufacturer for the pileweight and soil formation to be penetrated. The rated energy of the hammer for the 24-inch diameter piles shall be a minimum of 150,000 foot-pounds. Hammers shall be capable of hard driving in excess of 20 blows per inch. Boiler, compressor, or engine capacity shall be sufficient to operate hammers continuously at the full rated speed. The power plant for hydraulic hammers shall have sufficient capacity to maintain at the hammer, under working conditions, the volume and pressure recommended by the manufacturer. If hydraulic hammers are used, unless directed otherwise by the Contracting Officer, the hammer settings during driving of the production piles shall be the same as the settings used during the driving tests. Hammers shall have a gage to monitor hammer bounce chamber pressure for diesel hammers or pressure at the hammer for hydraulic, air and steam hammers. This gage shall be operational during the driving of piles and shall be mounted in an accessible location for monitoring by the Contractor and the Contracting Officer. Two spare operational bounce chamber readout units shall be available on site. The Contractor shall provide bounce chamber pressure gage correction tables and charts for the type and length of hose to be used with the pressure gage to the Contracting Officer. In accordance with paragraph SUBMITTALS, submit the following information for each impact hammer proposed:

- a) Make and model.
- b) Ram weight (pounds).
- c) Anvil weight (pounds).
- d) Rated stroke (inches).
- e) Rated energy range(foot-pounds).
- f) Rated speed (blows per minute).
- g) Steam or air pressure, hammer, and boiler and/or compressor (psi).
- h) Rated bounce chamber pressure curves or charts, including pressure correction chart for type and length of hose used with pressure gage(pounds per square inch).
- i) Pile driving cap, make, and weight (pounds).
- j) Cushion block dimensions and material type.
- k) Power pack description.
- l) Follower details (impact hammers), including overall dimensions, impedance and compatibility with pile head details.

3.1.2 Vibratory Hammers

The use of vibratory hammers is allowed only for the 96-inch diameter piles for the isolation joints. The size or capacity of hammers shall be as recommended by the manufacturer for the pile weight and soil formation to be penetrated. Vibratory hammers, for use in driving the 96-inch diameter pipe piles, shall have a minimum rated eccentric moment of 21,000 inch pounds. The hammer shall provide for maintaining a rigid connection between the hammer and the pile. In accordance with paragraph SUBMITTALS, submit the following information for each vibratory hammer proposed:

- a) Make and model.
- b) Eccentric moment(inch-pounds).
- c) Dynamic force(tons).
- d) Steady state frequency or frequency range (cycles per minute).
- e) Vibrating weight (pounds).
- f) Amplitude(inches).
- g) Maximum pull capacity(tons).
- h) Non-vibrating weight (pounds).
- i) Power pack description.

3.1.3 Pile Driving Template or Frame

Hammers shall be supported and guided with a driving template or driving frame. The driving frame for the dam piles shall be similar to the frame depicted on the F series drawings, shall provide similar capabilities to that shown and shall be capable of maintaining the placement and driving tolerances specified herein. The driving frame design shall include methods to reference previously driven piles to assure that the driving tolerances can be maintained from setting to setting. Two intermediate supports for the pile in the frame shall be provided to reduce the unbraced length of the pile during driving and pulling. The Contractor shall also provide suitable templates for the piles required for the isolation joints.

These templates shall be capable of maintaining the relative locations of the various isolation joint elements.

3.1.4 Pile Extractors

Pile extractors may be vibratory and/or impact pile driving hammers. Impact hammers are required for pulling piles not extractable with vibratory hammers.

3.2 INSTALLATION

3.2.1 Lengths of Permanent Piles

All piles shall be furnished in double random lengths with a minimum length as specified in paragraph 2.1.1 herein. The Contracting Officer may adjust the required lengths after the conclusion of the pile driving tests. The Contractor shall limit his first order for piling to the number required during the first year of installation. The Contractor shall order 50 more piles than the number of piles required for the initial production pile driving operation. These extra piles will be utilized to conduct the driving tests and as splices, if required by the Contracting Officer. The pile lengths for the twenty (20) piles used for the driving tests shall be as specified in paragraph 3.3 PILE TESTS. The remaining THIRTY (30) piles, to be used as splices if required, shall have a 1-inch wall and a minimum length of 35 feet. If the driving tests indicate that overlength piles are required, the number of overlength piles will be determined by the Contracting Officer. The Contractor may order all of the remaining piles to complete the project upon receipt of the Contracting Officer's approval to do so.

3.2.2 Pile Driving Records

The Contractor shall develop a form for compiling pile driving records which must be approved. A sample of the format desired can be obtained from the Contracting Officer. Complete and accurate records of the pile driving operations shall be compiled on the approved form and submitted in accordance with paragraph SUBMITTALS. The Contractor shall input all driving data required herein into a database for use by the Contracting Officer. The database shall be compatible with the existing ACCESS software and the ACCESS database that the Contracting Officer has for all previous pile driving at the site. The database shall be maintained on a daily basis with completed and verified copies furnished to the Contracting Officer weekly when pile driving is ongoing. Driving records for each pile shall include date driven, pile identification number, pile dimensions, location, top elevation, tip elevation, description of hammer used, number of blows required for each foot of penetration throughout the entire length of the pile and for each inch of penetration in the last foot of penetration, total driving time in minutes and seconds, and any other pertinent information as required or requested such as unusual driving conditions, interruptions or delays during driving, damage to pile resulting from driving, heave in adjacent piles, and depth and description of voids formed adjacent to the pile. Additional data required to be recorded for impact hammers include hammer stroke and/or energy setting, the rate of hammer operation and the length of the bounce hose. The Contracting Officer shall determine the data required in instances where vibratory hammers are utilized. As a minimum, this data shall include dynamic force, frequency and rate of penetration for each foot of driving.

3.2.3 Pile Placement

A pile placement plan which shows the installation sequence and the methods proposed for controlling the location and alignment of piles shall be developed and submitted in accordance with paragraph SUBMITTALS. Foundation preparation removal of unsuitable material and densification of foundation fill, where required, shall be completed in the area prior to the placement of piles for driving. Piles shall be placed accurately in

the correct location and alignments, both laterally and longitudinally, and to the vertical lines indicated. The Contractor shall establish a permanent base line to provide for inspection of pile placement by the Contracting Officer during pile driving operations. The base line shall be established prior to driving permanent piles and shall be maintained during the installation of the permanent piles. A final lateral deviation from the correct location at the cutoff elevation of not more than 3 inches will be permitted for vertical piles. In addition, the distance between the centerlines of the 96-inch diameter piles shall not be less than 9'-0" nor more than 9'-6". A final variation in alignment of not more than 1/8 inch per foot of longitudinal axis will be permitted. A vertical deviation of not more than +0 to -3 inch from the correct cut off elevations shown will be permitted. The correct relative position of all piles shall be maintained by the use of templates or by other approved means. Piles not located properly or exceeding the maximum limits for lateral deviation, and/or variation in alignment shall be pulled and redriven at a location directed at no additional cost to the Government.

3.2.4 Pile Penetration Criteria

All pipe piles shall be driven to the top elevation shown on the drawings. The Contracting Officer may direct that the longer piles from a double random length material order, if available, be driven in selected locations. Refusal is defined as a blow count in excess of 20 blows per inch of penetration.

3.2.5 Pile Driving

The Contracting Officer shall be notified 30 days prior to the date pile driving is to begin. Piles shall not be driven within 125 feet of fresh concrete until it has attained a minimum compressive strength of 1000 psi. Permanent and test piles shall be driven with hammers of the same model and manufacturer, same energy and efficiency, and using the same driving system. Hammers shall be operated at all times at the speed and under the conditions recommended by the manufacturer. Prior to driving and with the pile head seated in the hammer, each pile shall be checked to ensure that it has been aligned correctly. When driving piles on a sloping surface, pile driving shall begin at the lowest elevation and proceed up the slope. All piles in the row (along the dam axis) at the lowest elevation shall be driven before driving piles in the higher row. Once pile driving has begun, conditions such as alignment shall be kept constant. Each pile shall be driven continuously and without interruption until the required depth of penetration has been attained. Deviation from this procedure will be permitted only when driving is stopped by causes that reasonably could not have been anticipated or when the Contracting Officer indicates that the pile will be used for a restrike test. A pile that can not be driven to the required depth because of an obstruction, as indicated by a sudden unexplained change in blow count and drifting, shall be pulled and redriven or shall be cut off and abandoned, whichever is directed. Where piles are directed to be cut off, the cutoff elevation shall be 12 inches below the pile top elevation shown on the drawings. Any voids around piles or abandoned holes for pulled piles shall be backfilled and densified to the same density as the surrounding soil.

3.2.5.1 Splicing Piles

Except as specified in MATERIALS above, splicing of the 24-inch diameter piles will be permitted only when directed by the Contracting Officer. Any pile that has been spliced shall be driven with the spliced section (shortest section) at the pile tip. The 96-inch diameter piles for the isolation joints may be spliced prior to the beginning of the driving operation. Welded splices shall be full penetration and shall conform to the requirements of Section 05090 WELDING, STRUCTURAL.

3.2.5.2 Jetting and Predrilling

Jetting of the 24-inch diameter piles will not be permitted. If hard driving conditions are encountered during driving of the 96-inch diameter piles for the isolation joint predrilling may be allowed by the Contracting Officer. If the Contracting Officer allows predrilling, based on his review of the Contractor's proposed methods, an equitable cost adjustment will be made in accordance with the contract clause CHANGES.

3.2.5.3 Heaved Piles

When driving piles in clusters or under conditions of relatively close spacing, observations shall be made to detect heave of adjacent piles. Heaved piles shall be backdriven to original depth of penetration without additional cost to the Government.

3.2.5.4 Pulled Piles

Piles damaged or impaired for use during driving shall be pulled and replaced with new piles, or shall be cut off and abandoned and new piles driven as directed without additional cost to the Government. The Contracting Officer may require that any pile be pulled for inspection. Piles pulled as directed and found to be in suitable condition shall be redriven at another location as directed. Piles pulled as directed and found to be damaged shall be replaced by new piles at the Contractor's expense. An equitable adjustment in the contract price will be made for piles that are pulled and are suitable to be redriven.

3.3 PILE TESTS

Pile Driving Tests - Pile driving tests shall be performed as specified herein. The Contracting Officer will develop the correlation between pile driving resistance, pile length and pile capacity during the pile driving tests for the selected pile driving system. Based on the correlations developed, the Contracting Officer may change the pile length for the permanent piles. Changes in the approved pile driving system during or after completion of tests will not be allowed unless additional tests are performed as directed to establish the correlation between driving resistance and pile capacity for the proposed changed system. For changes in the approved pile driving system proposed by the Contractor, required additional pile driving tests shall be performed at the Contractor's expense and no additional contract time will be allowed.

3.3.1 Pile Driving Tests

A total of twenty pile driving tests shall be performed, at locations selected by the Contracting Officer along the entire length of the dam axis. Six of the test locations will utilize 1-inch wall piles. Piles for the remaining 14 tests shall be furnished with 5/8-inch wall thickness. In general, the test locations will be approximately 20 to 30 feet upstream of each of the twenty dam segments. All pile driving tests shall be conducted during the same construction season and prior to driving of any production piles. The Contracting Officer will be present during each pile driving test. Pile driving tests shall be carried to completion without interruption except as indicated for restrrike testing. Pile driving tests shall be conducted with the same equipment that the Contractor intends to use for the production piles. The piles for each driving test shall match the piles to be used in the adjacent, downstream segment, including the complete pile connector. Excavation of overburden materials in the area of the tests may be required depending on river conditions. The pile lengths for the driving tests shall provide enough length to reach the tip elevation of the deepest piles proposed for the structure immediately downstream of the area where the test piles are being driven. Any pile driving test not accomplished in accordance with this specification shall be redone at no additional cost to the Government. Each driving test pile shall be pulled or driven or cut off a minimum of two feet below the required excavation line within one (1) week after the completion of that pile driving test. If the test piles are pulled or cut off, all damages shall be documented. Pulled test piles shall be removed from the site when directed.

3.3.2 Dynamic Testing of Driving Test Piles

The Contractor shall perform dynamic testing of driving test piles and permanent piles to determine velocity of stress wave propagation, acceleration, monitor hammer and drive system performance, assess pile installation stresses and integrity, and to evaluate pile capacity. The Contractor shall utilize a subcontractor, with at least 20 years of experience, that specializes in dynamic testing, interpretation of the results and wave equation analysis. Personnel, with a minimum of 10 years of experience in performing wave equation analysis, dynamic testing, and interpretation of results on high capacity (300-600 tons) steel piles, shall be furnished to install and operate the testing equipment, and to interpret its results. Equipment to obtain dynamic measurements, record, reduce and display its data shall be furnished and meet the requirement of ASTM D 4945. The equipment shall have been calibrated within 12 months thereafter throughout the contract duration. All power requirements for operating the equipment shall be supplied by the Contractor. Prior to commencing pile driving, wave equation analyses which reflect the proposed pile driving equipment and the various subsurface conditions anticipated shall be performed and the results submitted in accordance with paragraph SUBMITTALS.

3.3.2.1 Test Piles

Dynamic testing (PDA and CAPWAP) shall be performed on all driving test piles as indicated. Testing shall be performed during the full length of pile driving and restrikes. Piles for the pile driving tests shall be

restruck 3 days or 7 days after driving, as directed by the Contracting Officer, to determine the effects of pile setup. During the initial drive, the piles shall be driven to an elevation three feet above the required top elevation. The hammer shall be warmed up prior to restriking. Restriking shall consist of driving the pile to the proper grade.

3.3.2.2 Permanent Piles

Dynamic pile testing, using a pile driving analyzer (PDA/CAPWAP) program as manufactured by Pile Dynamics Inc., Warrensville Heights, Ohio or approved equal, shall be performed on five (5) percent of the permanent piles during the full length of initial driving and during restrike driving. Tested piles shall be as selected by the Contracting Officer over the duration of installation. The Contracting Officer may also select piles to be restruck. These piles shall be driven to a point three feet above the required grade and shall be restruck not less than 72 hours after the initial drive. The Contracting Officer will direct testing of additional piles if the hammer or driving system is modified or replaced.

3.3.2.3 Reports

A summary report of dynamic test results for test piles shall be prepared and submitted in accordance with paragraph SUBMITTALS. The report shall discuss pile capacities obtained from dynamic testing and also include velocity of stress wave propagation, acceleration, evaluation of hammer and driving system performance, driving stress levels, and pile integrity. A CAPWAPC, or similar, analysis of the dynamic test data shall be performed on data obtained from the end of initial driving and the beginning of restrike for all driving test piles as directed. The analysis shall be used to predict pile capacity, establish resistance distribution, and predict quake and damping factors. Refined wave equation analyses incorporating the results of dynamic testing and analysis shall be included. For permanent piles, a field summary report shall be prepared and submitted in accordance with paragraph SUBMITTALS. The field summary report shall minimally contain energy transferred to the pile, calculated driving stresses, pile integrity and estimated pile capacity at the time of testing including CAPWAP analysis on selected piles as directed by the Contracting Officer. The report for the test piles and the monthly report for permanent piles shall include the pile driving record as an attachment and also address the items listed in paragraph "7.1.5 Dynamic Testing" of ASTM D 4945. In addition, the Contractor shall submit the raw data for all dynamic testing, in electronic format, within one week of the completion of each test conducted.

-- End of Section --

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SECTION 02482

DREDGING

03/29/2001

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SECTION 02482

Amendment #0004
DREDGING
03/29/2001

PART 1 GENERAL

1.1 SUMMARY

This section of the specifications describes the requirements for dredging at the project site as depicted in the drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 00800	SPECIAL CLAUSES
Section 01130	ENVIRONMENTAL PROTECTION
Section 01351	UNDERWATER SURVEY, RIVER MONITORING AND SCOUR REPAIR
Section 02464	METAL SHEET PILING
Section 02621	FOUNDATION DRAINAGE SYSTEM
Section 02722	SCREEDING

1.3 GENERAL DESCRIPTION

Dredging shall consist of satisfactorily removing and disposing of all riverbed materials necessary for the construction of the new dam. Dredging shall be performed as part of the preparation for the dam foundation system, preparation for bedding stone placement, to develop an access channel at the project site for delivery of the dam segments, and in extension of the marine skidway at the prefabrication facility.

1.4 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CORPS OF ENGINEERS (COE)

COE-DM-8	Ohio River. Locks and Dams 52 & 53 Replacement Project (Olmsted Locks & Dam). Design Memorandum No. 8. Dam Construction. Feature Design Memorandum. Main Report, June 1999
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1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving

authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Earthwork Plan; G AER

Submit an earthwork plan as required by Section 02200 EARTHWORK, FILL, AND STONE PROTECTION.

Dredging Demonstration Plan; G AER

Submit a dredging demonstration plan that meets the requirements of sub-paragraph 3.4.4.

1.6 PERMITS

The Contractor shall comply with conditions and requirements of the Corps of Engineers Permit and other State or Federal permits. The Contracting Officer will secure the permit for dredging and disposal of material as indicated.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Environmental Requirements

The Contractor must provide and maintain environmental protective measures during the life of the contract, i.e. provide environmental protective measures required to correct conditions, such as oil spills or debris, that occur during the dredging operations. The environmental protective measures must comply with Federal, State, and local regulations pertaining to water, air, and noise pollution.

Dredging activities in the Dam Area exhibits a potential for impact to one (1) species of endangered mussel, i.e. *Plethobasus cooperianus*, located in the Ohio River from ORM 966.0 to 969.2. Potential impacts arise from scouring and deposition of sediment. The area designated for disposal of dredged material shall be used throughout the construction phase. No open water disposal of materials will be allowed.

Queuing over the downstream mussel bed and along the Chestnut Hill Nature Preserve (between ORM 963.4 and the downstream property line of the Preserve) will not be permitted. The tying of floating equipment to any tree outside of the immediate construction area will not be allowed.

Further environmental requirements are listed in Section 01130 ENVIRONMENTAL PROTECTION.

1.7.2 Existing Conditions

The stratigraphy of the riverbed is made up from surficial soils consisting of recent alluvium overlying the so-called McNairy formation, which has been subdivided into two subunits designated McNairy I (the upper portion) and McNairy II (the lower portion). The stratigraphic profile across the

dam site can be found in COE-DM-8.

The alluvium layer ranges between Elevation 235 feet and Elevation 250 feet, and consists mainly of very loose to loose gravelly sandy soil.

Stratigraphic elevations and soil parameter values can be found in COE-DM-8.

The material to be removed to accomplish the work required in this section is anticipated to be primarily silt with sand and gravel combined, and may also include concrete rubble, logs and timbers, and other non-floatable debris. However, the Contractor is expected to examine the site of the work and decide the character of the material for himself. Local minor variations in the subsurface materials are to be expected, and, if encountered, will not be considered materially different within the purview of Section 00700 CONTRACT CLAUSES, Paragraph "DIFFERING SITE CONDITIONS."

1.7.3 Field Measurement

1.7.3.1 Screeding

The dredging operation involves dredging to depths as specified and shown on the drawings in areas which will subsequently be backfilled and screeding a leveling course, see Section 02722 SCREEDING.

The Contractor shall conduct the necessary field measurements, soundings, surveys and target dredging to remove high areas, and ensure that the dredged areas meet the requirements for backfilling and screeding, Section 02722 SCREEDING.

1.8 MAINTENANCE

1.8.1 Maintenance Dredging

The Contractor shall carry out maintenance dredging as required and directed by the Contracting Officer in fulfillment of the Construction Requirements. Maintenance dredging shall include dredging required for cleanup preparation of areas prior to placing shells and for areas with advance placement construction.

Maintenance dredging will consist of target- and area-dredging, and de-siltation of areas, in the area of the Dam (Tainter Gate Area, Right Boat Abutment, Navigable Pass Area, Left Boat Abutment, Fixed Weir, Isolation Joints, and areas within 1 mile upstream and 1 mile downstream of the dam). Maintenance dredging in approved areas will be performed at Government expense. This includes any maintenance dredging associated with cleanup of an area of the river bottom which is prepared in advance of the in-the-wet construction season in which the pipe piles and/or precast concrete elements are to be installed. For such advance river bottom preparation, the Contractor is permitted only to perform advance dredging/backfill, sheet pile/master pile installation, and vibro-compaction. For such cases these pre-prepared areas must be overbuilt with leveling course and protected with articulated concrete mats as specified in Section 02241 ARTICULATED CONCRETE MATS. Furthermore, the pre-prepared area must not obstruct subsequent stages of work, including

precast shell installation. It is not permitted to screed, drive pipe piles, or install precast concrete elements in advance.

See Section 01270 MEASUREMENT AND PAYMENT, regarding payment for maintenance dredging.

Refer to Paragraph 3.2.5 of Section 01710 EXECUTION REQUIREMENTS FOR CONSTRUCTION for additional details regarding removal of sediment.

PART 2 PRODUCTS

(Not Applicable.)

PART 3 EXECUTION

3.1 EXAMINATION

Prior to dredging the Contractor shall ensure that the riverbed is free of obstructions which may hamper his dredging activities, and that the conditions on the river are within tolerances for safe operation of his equipment. This may be ascertained by conducting a hydrographic and bathymetric survey prior to dredging.

3.2 PREPARATION

In the event that obstacles in the form of wrecks, rocks or other objects are evident on or beneath the riverbed, which will hamper the Contractors dredging tasks, the Contractor must salvage, remove or demolish such obstacles prior to commencement of the dredging activities. Blasting is not allowed in such salvage, or demolition operations.

Debris removed from the dredged area shall be removed from the water. Disposal shall be the responsibility of the Contractor and disposal shall be outside the limits of government property.

The Contractor should inspect and prepare the disposal facilities for storage of dredged materials and any salvaged materials, before undertaking any dredging activities.

3.2.1 Protection

It is noted that some dredging operations shall be performed after the cutoff walls and other portions of the work have been constructed. The Contractor shall take particular care when working near existing and new or temporary facilities and structures to prevent damage to those items of work.

3.2.1.1 Navigational Aids

During dredging activities the Contractor shall deploy and maintain navigational aids according to governing regulations and requirements.

Each night, between sunset and sunrise and during periods of restricted visibility, the Contractor shall provide lights for floating plants,

ranges, and markers. Also, provide lights for buoys that could endanger or obstruct navigation. When night work is in progress, maintain lights from sunset to sunrise for the observation of dredging operations. Lighting shall conform to United States Coast Guard requirements for visibility and color.

3.2.1.2 Interference With Navigation

The Contractor shall minimize interference with the use of channels and passages. The Contracting Officer will direct the shifting or moving of dredges or the interruption of dredging operations to accommodate the movement of vessels and floating equipment, if necessary.

3.3 DREDGING AND DISPOSAL OPERATIONS

All dredging shall be performed within the limits shown and as described in this Section of the Specifications. Dredging shall be performed in such manner that sediment shall not be present above the removal limits shown on the drawings within the tolerances listed in Section 02200 EARTHWORK, FILL, AND STONE PROTECTION and Section 02722 SCREEDING. It may be necessary to return to areas which were previously dredged to the removal limits in order to remove additional sediment redeposited by river flows or other means. Dredging and disposal operations shall be conducted in a manner so as to minimize increases in suspended solids and turbidity which may degrade water quality outside the immediate area of dredging operations. Equipment for handling and conveying dredged materials shall be designed and operated to prevent dumping or spilling the dredged material into the river.

3.3.1 Disposal of Excavated Material

The Contractor shall provide for safe transportation and disposal of dredged materials in the area designated for disposal of dredged material. The deposit of dredged materials in unauthorized places is forbidden.

3.3.2 Safety of Structures

The prosecution of work shall ensure the stability of piers, bulkheads, and other structures lying on or adjacent to the site of the work, insofar as structures may be jeopardized by dredging operations. Repair damage resulting from dredging operations, insofar as such damage may be caused by variation in locations or depth of dredging, or both, from that indicated or permitted under the contract.

3.3.3 Ranges, Gages, and Lines

The Contractor shall furnish, set, and maintain ranges, buoys, and markers needed to define the work and to facilitate inspection. Establish and maintain gages in locations observable from each part of the work so that the depth may be determined. Suspend dredging when the gages or ranges cannot be seen or followed.

3.4 DREDGING ACTIVITIES

The limits of dredging are shown on the drawings. Dredging shall be performed by a clamshell, or bucket, method in a manner that will minimize the introduction of silt and sediment into the river water (hydraulic dredging is not permitted in the open river). In this section, the dredging activities are sub-divided into the following areas:

Dam Area:

- Tainter Gate Area
- Right Boat Abutment
- Navigable Pass Area
- Left Boat Abutment
- Fixed Weir,
- Isolation Joints, and
- Areas upstream and downstream of the dam

Out-loading Area:

- Prefabrication Facility
- Marine Skidway

Access Areas:

- Access channel

***4**

***4**

3.4.1 Dam Area

The river bottom in the Dam Area shall be dredged to the elevations indicated in the plans.

Sufficient pre-dredging shall be performed to allow the indicated sheet pile walls to be driven. The sheet piles, together with master piles, have been designed to act in tension during construction with fill loads and water velocities acting in the downstream direction. The Contractors construction sequence must check or verify that there is not a reverse loading on the sheets.

The Contractor may coordinate with the Contracting Officer to arrange to have the Lock Chambers open to flow in order to reduce river water velocities and the associated sedimentation and scour.

Dredging of the river bottom beneath the footprint of the dam is prohibited between the periods of February 15 through June 15 of any year.

3.4.1.1 Upstream Area

The river bottom in the area upstream of the dam shall be dredged to the elevations indicated in the plans.

A sediment collection trench shall be maintained upstream of the upstream sheet pile cutoff wall while any work is being performed beneath the footprint of the dam.

3.4.1.2 Downstream Area

The river bottom in the area downstream of the dam shall be dredged riverward of the off-loading/outfitting site as shown on the drawings. A channel shall be dredged from the level area out into the navigation channel as shown.

3.4.2 Out-Loading Area

The river bottom in the Out-Loading Area shall be dredged to the elevations indicated in the plans.

Dredging activities incorporate dredging in the areas adjacent to the Out-Loading Area, Marine Skidway and Lock.

3.4.3 Access Areas

The river bottom in the Access Areas shall be dredged to the elevations indicated in the plans.

Dredging activities incorporate dredging the access channel running in extension of the Marine Skidway to the main course of the river.

3.4.4 Dredging Tolerances

The Contractor shall prepare a dredging demonstration plan that will prove to the Contracting Officer that the specified dredging tolerances can be met. The Contractor will execute the plan at least 60-days prior beginning dredging, if the Contractor fails to meet the specified dredging tolerances, then the test will be rerun, at no expense to the Government, until the Contractor demonstrates that the specified dredging tolerances can be achieved.

3.4.4.1 Depths

Initial dredging at the dam footprint and dredging for other areas shall be performed to the vertical tolerances as described in Section 02200 EARTHWORK, FILL, STONE PROTECTION, AND RIVER DIKES and Section 02722 SCREEDING. The contractor must demonstrate to the Contracting Officer that the results of quality control hydrographic surveys meet the tolerances specified. Should specific localized areas not meet the tolerance requirements, the contractor must dredge, backfill or re-screed those areas and re-survey the entire footprint to assure compliance with the specified tolerances.

3.4.4.2 Side Slopes

Side slopes shall not be steeper than that indicated or specified. Dredging on side slopes shall follow, as closely as practicable, the lines indicated or specified.

3.4.4.3 Excessive Dredging

No material dredged beyond the limits indicated for the specified template shall be considered for measurement or payment.

3.4.4.4 Shoaling

If shoaling or re-depositing of sediments from river flows or other means occurs under the footprint of the dam, rip rap areas, and river access areas, see payment for Maintenance Dredging in Section 01270 MEASUREMENT AND PAYMENT).

3.5 FIELD QUALITY CONTROL

The Contractor shall establish and maintain a quality control system for all dredging operations. Contractor's quality control is that system by which a Contractor regulates, tests, inspects his procedures, equipment, and personnel so that his operations will comply with the requirements of the project specifications. The Contractor shall perform all surveys and report all findings and any problems to the Contracting Officer.

The Contractor shall be required to furnish, on the request of the Contracting Officer the use of boats, boatmen, laborers, and/or material forming any part of the ordinary and usual equipment and crew of the dredging plant as may be reasonably necessary for inspection, supervision or surveying of the work. When required, provide transportation for the Contracting Officer and inspectors to and from the disposal area and between the dredging area and adjacent points on shore.

3.5.1 Inspection

Immediately before commencing any other work requiring dredging operations to be completed, the dredged area shall be thoroughly examined by the Contractor under the direction of the Contracting Officer by underwater survey techniques specified in Section 01351 UNDERWATER SURVEY AND RIVER MONITORING. The Contracting Officer or his authorized representative shall be notified when quality control hydrographic surveys are to be made, and shall be permitted to accompany the survey party.

The Contractor shall furnish the results of all dredging surveys to the Contracting Officer. If any points identified on the survey sections do not meet the specified contract template, the Contractor shall be required to remove additional material, and the area shall be re-surveyed. All survey information shall be submitted and the areas accepted by the Contracting Officer before commencing any other construction operations in the area which are dependent on the completion of the dredging operations.

-- End of Section --

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-- End of Section Table of Contents --

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SECTION 02821

FENCING
02/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 121	(1999) Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 153/A 153M	(1995) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 392	(1996) Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 491	(1996) Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 585	(1997) Aluminum-Coated Steel Barbed Wire
ASTM A 780	(1993; Rev. A) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 824	(1995) Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM F 1043	(1995) Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
ASTM F 1083	(1997) Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(1994) Industrial and Commercial Horizontal Slide Gates
ASTM F 626	(1996a) Fence Fittings

ASTM F 900 (1994) Industrial and Commercial Swing
Gates

1.2 MEASUREMENT AND PAYMENT

This work will not be measured or paid for separately, but shall be considered incidental to the contract.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Chain Link Fence; G, RE

Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

PART 2 PRODUCTS

2.1 FENCE FABRIC

Fence fabric shall conform to the following:

2.1.1 Chain Link Fence Fabric

ASTM A 392, Class 1, zinc-coated steel wire with minimum coating weight of 1.2 ounces of zinc per square foot of coated surface, or ASTM A 491, Type I, aluminum-coated steel wire. Fabric shall be fabricated of 9 gauge wire woven in 2 inch mesh. Fabric height shall be 7 feet as shown. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.2 GATES

ASTM F 900 and/or ASTM F 1184. Gate shall be the type and swing shown. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Gate frames shall conform to strength and coating requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A or Type B, nominal pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain link fabric. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be

permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

2.3 POSTS

2.3.1 Metal Posts for Chain Link Fence

ASTM F 1083, zinc-coated. Group IA, with external coating Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B and Group II, roll-formed steel sections, shall meet the strength and coating requirements of ASTM F 1043. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Gate post shall be for the gate type specified subject to the limitation specified in ASTM F 900 and/or ASTM F 1184.

2.4 BRACES AND RAILS

ASTM F 1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F 1043. Group II, formed steel sections, size 1-21/32 inch, conforming to ASTM F 1043, may be used as braces and rails if Group II line posts are furnished.

2.5 WIRE

2.5.1 Tension Wire

Tension wire shall be Type I or Type II, Class 2 coating, in accordance with ASTM A 824.

2.6 ACCESSORIES

ASTM F 626. Ferrous accessories shall be zinc or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment. Barbed wire shall be 2 strand, 12-1/2 gauge wire, zinc-coated, Class 3 in accordance with ASTM A 121 or aluminum coated Type I in accordance with ASTM A 585. Barbed wire shall be four-point barbed type steel wire. Barbed wire support arms shall be the single arm type and of the design required for the post furnished. Tie wire for attaching fabric to rails, braces, and posts shall be 9 gauge steel wire and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A 153/A 153M unless modified.

2.7 CONCRETE

ASTM C 94/C 94M, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 3000 psi at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

PART 3 EXECUTION

3.1 INSTALLATION

Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 500 feet. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a 2 inch clearance between the bottom of the fabric and finish grade.

3.3 POST INSTALLATION

3.3.1 Posts for Chain Link Fence

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts.

3.4 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished.

3.5 TENSION WIRES

Tension wires shall be installed along the top and bottom of the fence line and attached to the terminal posts of each stretch of the fence. Top tension wires shall be installed within the top 4 inches of the installed fabric. Bottom tension wire shall be installed within the bottom 6 inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.6 CHAIN LINK FABRIC

Chain link fabric shall be installed on the side of the post indicated. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15 inch intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 12 inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 1 plus or minus 1/2 inch above the ground.

3.7 BARBED WIRE SUPPORTING ARMS AND BARBED WIRE

3.7.1 General Requirements

Barbed wire supporting arms and barbed wire shall be installed as indicated and as recommended by the manufacturer. Supporting arms shall be anchored to the posts in a manner to prevent easy removal with hand tools. Barbed wire shall be pulled taut and attached to the arms with clips or other means that will prevent easy removal.

3.8 GATE INSTALLATION

Gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches, stops, and keepers shall be installed as required. Padlocks shall be attached to gates or gate posts with chains. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

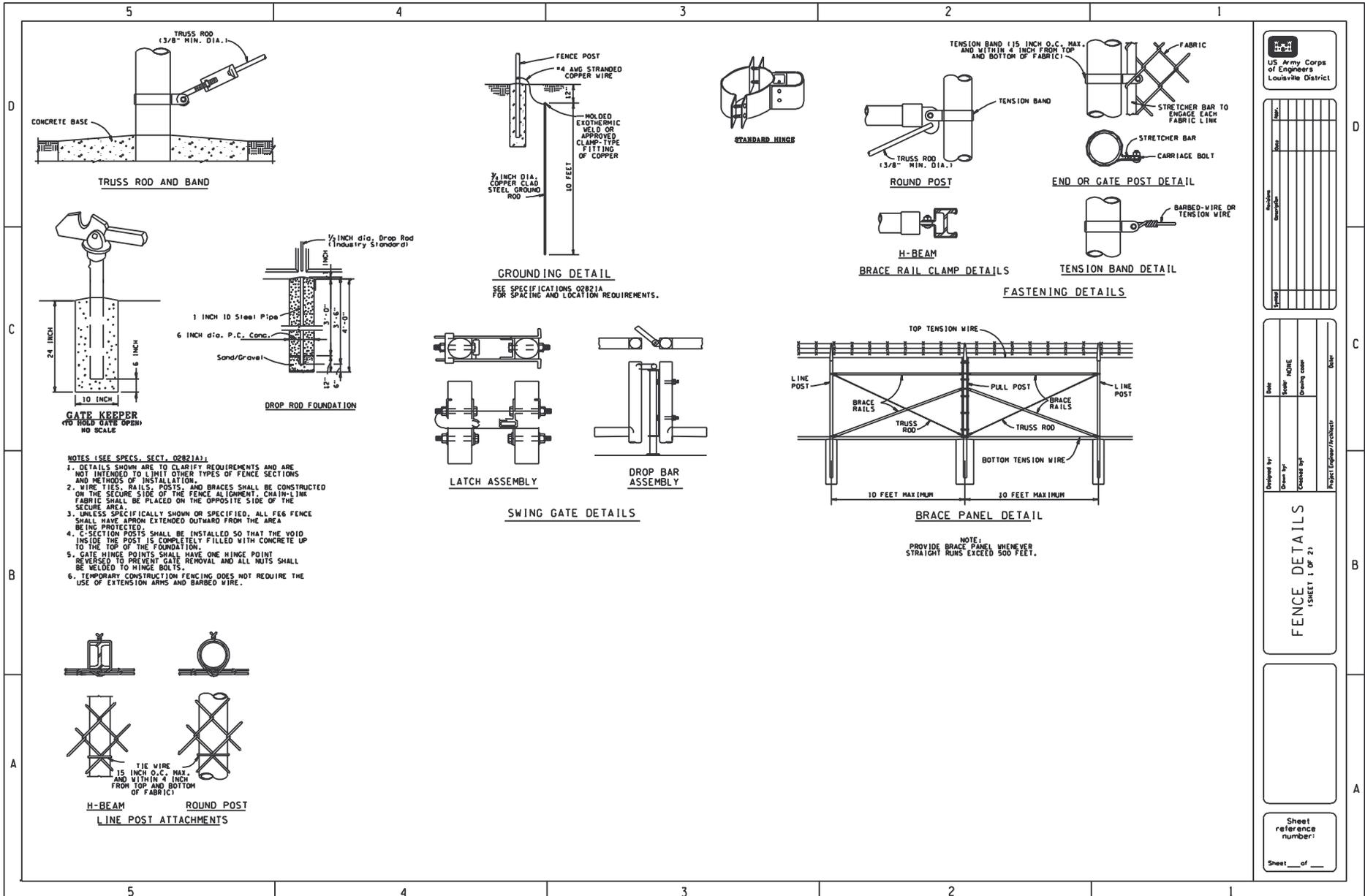
3.9 GROUNDING

Fences shall be grounded on each side of all gates, at each corner, at the closest approach to each building located within 50 feet of the fence, and where the fence alignment changes more than 15 degrees. Grounding locations shall not exceed 650 feet. Each gate panel shall be bonded with a flexible bond strap to its gate post. Fences crossed by powerlines of 600 volts or more shall be grounded at or near the point of crossing and at distances not exceeding 150 feet on each side of crossing. Ground conductor shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall be 3/4 inch by 10 foot long copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least 6 inches below the grade. Where driving is impracticable, electrodes shall be buried a minimum of 12 inches deep and radially from the fence. The top of the electrode shall be not less than 2 feet or more

than 8 feet from the fence. Ground conductor shall be clamped to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. After installation the total resistance of fence to ground shall not be greater than 25 ohms.

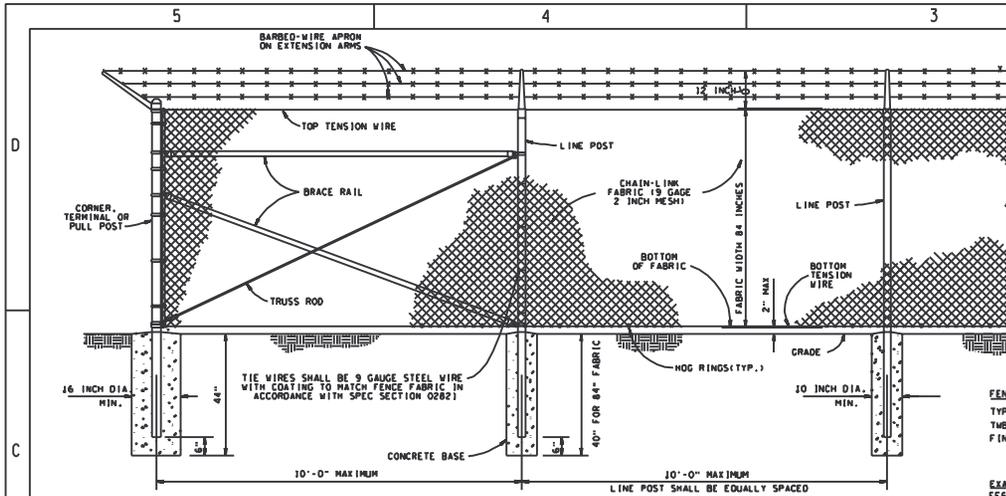
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*** SAFETY PAYS ***

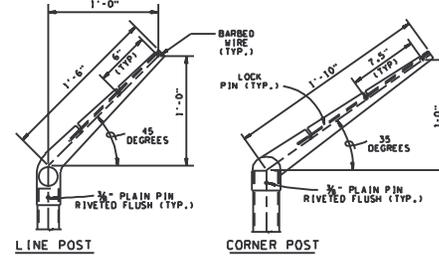


*** SUPPORT VALUE ENGINEERING - IT PAYS ***

*** SAFETY PAYS ***



CHAIN-LINK SECURITY FENCE DETAIL



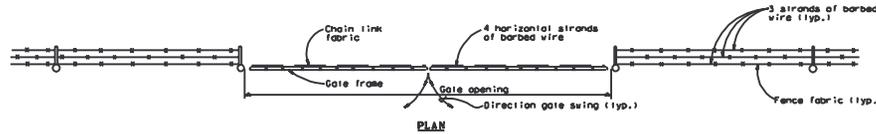
EXTENSION ARM DETAILS

FENCE LEGEND

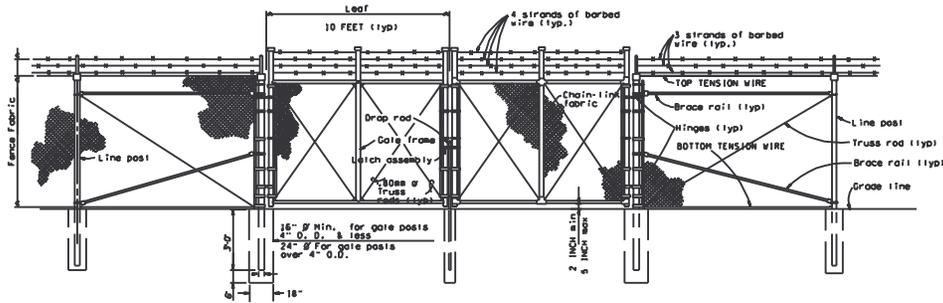
TYPE FE6 - CHAIN-LINK FENCE W/BARBED-WIRE ON SINGLE OUTRIGGER
 TMB - TENSION WIRE TOP AND BOTTOM
 FINAL NUMBER IS FABRIC WIDTH IN INCHES.

EXAMPLES

FE6-TMB-84 CHAIN-LINK SECURITY FENCE WITH BARBED-WIRE ON SINGLE OUTRIGGER, TENSION WIRE TOP AND BOTTOM, AND 84 INCH FABRIC WIDTH.



PLAN



ELEVATION
 DOUBLE SWING GATE (TYPE FE-6 FENCE)

USE AND SECTION	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)		
	FABRIC LESS THAN 72"	FABRIC 72" TO 96"	FABRIC OVER 96"
Corner, End & Pull Posts			
Tubular - Round	2.375" O.D.	2.875" O.D.	4.00" O.D.
Line Posts			
Tubular - Round	1.90" O.D.	2.375" O.D.	2.875" O.D.
Brace Rails			
Tubular - Round		1.66" O.D.	
Tubular - Square		1.50" O.D.	
H-Section		1.885" x 1.50"	
C-Section (Roll-Formed)		1.825" x 1.25"	



Design	
Check	
Approval	
Revision	
Date	

Designed by	
Drawn by	
Checked by	
Project Engineer/Architect	

FENCE DETAILS
 (SHEET 2 OF 2)

Sheet reference number:	
Sheet ___ of ___	

*** SUPPORT VALUE ENGINEERING - IT PAYS ***

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04/93

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SECTION 03201

STEEL BARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT
04/93

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 315 (1999) ACI Detailing Manual: Section
Details and Detailing of Concrete
Reinforcement

ACI 318/318R (1999) Building Code Requirements for
Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185 (2001) Standard Specification for Steel
Welded Wire Fabric, Reinforcement, for
Concrete

ASTM A 370 (2002) Standard Test Methods and
Definitions for Mechanical Testing of
Steel Products

ASTM A 615/A 615M (2001b) Standard Specification for
Deformed and Plain Billet-Steel Bars for
Concrete Reinforcement

ASTM A 706/A 706M (2001) Standard Specification for
Low-Alloy Steel Deformed and Plain Bars
for Concrete Reinforcement

ASTM A 970/A 970M (1998) Standard Specification for Welded
or Forged Headed Bars for Concrete
Reinforcement

ASTM E 94 (2000) Standard Guide for Radiographic
Examination

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4 (1998) Structural Welding Code -

Reinforcing Steel

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Materials; G R

A system of identification which shows the disposition of specific lots of approved materials in the work shall be established and submitted before completion of the contract.

SD-02 Shop Drawings

Fabrication and Placement; G AR

In accordance with Section 00800, Paragraph 1.86, Concrete Placement Drawings, subparagraph (d), prepare and submit reinforcement steel placement drawings. Each drawing will contain one lift. Drawings shall be submitted for shell lifts, should shells be fabricated in accordance with specification Section 03301.

SD-03 Product Data

Threaded Inserts; G AR

The Contractor shall submit the type of threaded inserts for reinforcing steel bars if this type of product is intended for use. Properties and analyses of steel bars and splicing materials shall be included in the submitted procedure. Physical properties of threaded inserts shall include length, inside and outside diameters, yield strengths developed and ultimate tensile strengths developed for each bar size that will be coupled using the insert.

SD-06 Test Reports

Tests, Inspections, and Verifications; G R

Certified tests reports of reinforcement steel showing that the steel complies with the applicable specifications shall be furnished for each steel shipment and identified with specific lots prior to placement. Three copies of the heat analyses shall be provided for each lot of steel furnished and the Contractor shall certify that the steel conforms to the heat analyses.

SD-07 Certificates

Qualification of Steel Bar Butt-Splacers

Certificates on the Qualifications of Steel Bar Butt-Splacers shall be submitted prior to commencing butt-splicing.

SD-08 Manufacturer's Instructions

Butt-Splices; G AR

The Contractor shall submit the proposed procedure for butt-splicing steel bars prior to making the test butt-splices for qualification of the procedure. Properties and analyses of steel bars and splicing materials shall be included in the submitted procedure. Physical properties of splicing sleeves shall include length, inside and outside diameters, and inside surface details.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the following requirements.

2.1.1 Steel Bars

Steel bars shall comply with the requirements of ASTM A 615/A 615M or ASTM A 706/A 706M, deformed, of the grades, sizes and lengths shown. Steel bars that are welded shall comply with the requirements of ASTM A 706/A 706M. The bars to be welded shall be plainly marked as such and shall be stored separately from bars that are not weldable.

2.1.2 Steel Welded Wire Fabric

Steel welded wire fabric shall comply with the requirements of ASTM A 185 wire sizes and spacings as shown. For wire with a specified yield strength (f_y) exceeding 60,000 psi, f_y shall be the stress corresponding to a strain of 0.35 percent.

2.1.3 Headed Bars

Headed bars shall conform to ASTM A 970/A 970M. Refer to the contract drawings for the size and length of the bars and whether one or both ends are headed and the size and shape of the head. If no head size or shape is noted on the drawings, it is the Contractor's choice.

2.1.4 Accessories

2.1.4.1 Bar Supports

Bar supports shall comply with the requirements of ACI 315. Supports for bars in concrete with formed surfaces exposed to view or to be painted shall be plastic throughout, stainless steel or precast concrete supports. Plastic coated ferrous supports will not be allowed. Precast concrete supports shall be wedged-shaped, not larger than 3-1/2 by 3-1/2 inches, of thickness equal to that indicated for concrete cover and have an embedded

hooked tie-wire for anchorage. Bar supports used in precast concrete with formed surfaces exposed to view shall be the same quality, texture and color as the finish surfaces.

2.1.4.2 Wire Ties

Wire ties shall be 16 gage or heavier black annealed wire.

2.1.4.3 Threaded Inserts

The use of threaded inserts or "form savers", conforming to the requirements of ACI 318/318R, to minimize form penetrations will be allowed, subject to the approval of the Contracting Officer. Threaded inserts shall develop 125 percent of the specified yield strength of the bars being threaded and a minimum of 90 percent of the bar ultimate tensile strength.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

The Contractor shall have materials tests required by applicable standards and specified performed by an approved laboratory and certified to demonstrate that the materials are in conformance with the specifications. Tests, inspections, and verifications shall be performed and certified at the Contractor's expense.

2.2.1 Reinforcement Steel Tests

Mechanical testing of steel shall be in accordance with ASTM A 370 except as otherwise specified or required by the material specifications. Tension tests shall be performed on full cross-section specimens using a gage length that spans the extremities of specimens with welds or sleeves included. Chemical analyses of steel heats shall show the percentages of carbon, phosphorous, manganese, sulphur and silicon present in the steel.

2.2.2 Qualification of Steel Bar Butt-Splacers

Steel bar butt-splacers shall be certified to have satisfactorily completed a course of instruction in the proposed method of butt-splicing or have satisfactorily performed such work within the preceding year.

2.2.3 Qualification of Butt-Splicing Procedure

As a condition of approval of the butt-splicing procedure, the Contractor, in the presence of the Contracting Officer, shall make three test butt-splices of steel bars of each size to be spliced using the proposed butt-splicing method. These test butt-splices and unspliced bars of the same size shall be tension tested to destruction with stress-strain curves plotted for each test. Test results must show that the butt-splices meet the specified strength and deformation requirements in order for the splicing procedure to be approved.

2.2.4 Radiographic Examination of Welds

Where bars are specifically shown on the drawings to be welded, one weld

for every 20 welds required by the drawings shall be tested by radiographic examination. Radiographic examination of welds shall be in accordance with ASTM E 94 and shall be performed and evaluated by an approved testing agency adequately equipped to perform such services. Radiographs of welds and evaluations of the radiographs submitted for approval shall become the property of the Government.

PART 3 EXECUTION

3.1 FABRICATION AND PLACEMENT

Reinforcement steel and accessories shall be fabricated and placed as specified and shown on approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown shall be in accordance with ACI 315 and ACI 318/318R or as directed. Steel shall be fabricated to shapes and dimensions shown, placed where indicated within specified tolerances and adequately supported and braced to maintain the reinforcing in the correct plane and in its proper position during fabrication, transportation and setting and concrete placement. Where reinforcing will be exposed to river currents and forces after shell placement, the reinforcing shall be braced to keep the bars in their proper position. At the time of concrete placement all steel shall be free from loose, flaky rust, scale (except tight mill scale), mud, oil, grease or any other coating that might reduce the bond with the concrete.

3.1.1 Hooks and Bends

Steel bars shall be mill or field-bent. All steel shall be bent cold unless authorized. No steel bars shall be bent after being partially embedded in concrete unless indicated or authorized. Bent bars that are shown to be adjacent to more than one formed surface may require bending to tighter tolerances than listed in ACI publications. The Contractor shall review his bar placement methods and procedures and determine which bent bars, if any, will require special bending tolerances.

3.1.2 Welding

Welding of steel bars will be permitted only where indicated as such on the contract drawings. Welding shall be performed in accordance with AWS D1.4 except where otherwise specified or indicated.

3.1.3 Placing Tolerances

3.1.3.1 Spacing

The spacing between adjacent bars and the distance between layers of bars may not vary from the indicated position by more than one bar diameter nor more than 1 inch.

3.1.3.2 Concrete Cover

The minimum concrete cover of main reinforcement steel bars shall be as shown on the contract drawings. The allowable variation for minimum cover shall be as follows:

<u>MINIMUM COVER</u>	<u>VARIATION</u>
6 inch (formed surfaces)	plus 1/2 inch
6 inch (unformed surfaces)	foundation tolerance
4 inch	plus 3/8 inch
3 inch	plus 3/8 inch
2 inch	plus 1/4 inch
1-1/2 inch	plus 1/4 inch
1 inch	plus 1/8 inch
3/4 inch	plus 1/8 inch

3.1.3.3 Special Requirements for Tremie Placement

The Contractor may shift the reinforcing steel in the concrete shells to accommodate the sleeve for the tremie pipe. In addition, subject to the approval of the Contracting Officer, adjustments may be made in the location of bars in the bottom reinforcing mat in the dam sills and stilling basins that will be encased in tremie concrete, to assure that the tremie pipe can be placed, initially, through the mat and on the foundation as specified in Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT.

3.1.4 Splicing

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Splices in steel bars shall be made only as required. Bars may be spliced at alternate or additional locations subject to approval. *4

3.1.4.1 Lap Splices

Lap splices shall be used only for bars smaller than size 14 and welded wire fabric unless otherwise shown on the contract drawings. Lapped bars may be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than 1/5 the required length of lap or 6 inches.

3.1.4.2 Butt-Splices

Butt-splices shall be used for splicing size 14 and 18 bars and for splicing #11 bars to larger bars except where otherwise shown or authorized. The Contractor may use mechanical butt splices for smaller bars when approved for use by the Contracting Officer. Butt-splices shall be made by a method which develops splices suitable for tension, compression and stress reversal applications. Butt-splices shall be made using approved mechanical couplers by personnel who have been properly trained to use the approved splicing procedure. Welded butt-splices will not be allowed. Butt-splices shall develop 90 percent of the specified minimum ultimate tensile strength of the smallest bar of each splice. Bars shall be cleaned of all oil, grease, dirt, rust, scale and other foreign substances and shall be flame dried before splicing. Adequate jigs and clamps or other devices shall be provided to support, align and hold the longitudinal centerline of the bars to be butt-spliced in a straight line.

Butt-splices shall be as follows:

Mechanical Butt-Splices - Mechanical butt-splices shall be an

approved threaded coupling, swaged sleeve or other positive connecting type. Bars to be spliced by a mechanical butt-splicing process may be sawed, sheared or flame cut provided the ends of sheared bars are reshaped after shearing and all slag is removed from the ends of flame cut bars by chipping and wire brushing prior to splicing. Surfaces to be enclosed within a splice sleeve or coupling shall be cleaned by wire brushing or other approved method prior to splicing. Splices shall be made using manufacturer's standard jigs, clamps, and other required accessories. In addition to the strength requirements specified paragraph BUTT-SPLICES the additional deformation of number 14 and smaller bars due to slippage or other movement within the splice sleeve shall not exceed 0.015 inches (unit strain 0.0015 inches/inch) beyond the elongation of an unspliced bar based upon a 10 inch gage length spanning the extremities of the sleeve at a stress of 30,000 psi. The additional deformation of number 18 bars shall not exceed 0.03 inches (unit strain 0.003 inches/inch) beyond the elongation of an unspliced bar based upon a 10 inch gage length spanning the extremities of the sleeve at a stress of 30,000 psi. The amount of the additional deformation shall be determined from the stress-strain curves of the unspliced and spliced bars tested as required paragraph QUALIFICATION OF BUTT-SPLICING PROCEDURE for qualification of the butt-splicing procedure. Splices of number 14 or smaller bar shall be staggered longitudinally a minimum of 5 feet or as otherwise indicated so that no more than half of the bars are spliced at any one section. Tension splices of number 18 bars shall be staggered longitudinally a minimum of 5 feet so that no more than 1/3 of the bars are spliced at any one section.

3.2 FIELD TESTS AND INSPECTIONS

3.2.1 Butt-Splices

3.2.1.1 Identification of Splices

The Contractor shall establish and maintain an approved method of identification of all field splices which will indicate the splicer and the number assigned each splice made by the splicer.

3.2.1.2 Examining, Testing, and Correcting

The Contractor shall perform the following during the butt-splicing operations as specified and as directed:

- a) Tension Tests - Tension tests to 90 percent of the minimum specified ultimate tensile strength of the spliced bars or to destruction shall be performed on one test specimen made in the field for every 25 splices made. Test specimens shall be made using "sister" bars, of sufficient lengths for testing, in lieu of bars in the actual reinforcing mats. Test specimens shall be made by the splicers engaged in the work, using the approved splicing procedure and the same size bars placed in the same relative position, and under the same conditions as those in the groups

represented by the specimens. Test specimens shall be representative of all splicers engaged in the work. Stress-strain curves shall be furnished for each butt-splice tested.

- b) Radiographic Examination - Where bars are required to be welded, not less than one weld of every 20 bar welds, selected at random by the Contracting Officer, shall be examined radiographically and evaluated for defects. The greatest dimension of any porosity (gas pocket or similar void) or fusion-type defect (slag inclusion, incomplete fusion or similar generally elongated defect in weld fusion) shall not exceed 1/4 inch. The minimum clearance between edges of porosity or fusion-type defects shall not be less than 1 inch.
- c) Correction of Deficiencies - No splice shall be embedded in concrete until satisfactory results of visual examination and the required tests or examinations have been obtained. All splices having visible defects shall be removed from the mat and shall be replaced. If any of the tension test specimens fail to meet the strength requirements or deformation limitations two production splices from the same lot represented by the test specimens which failed shall be cut out and tension tested by the Contractor. If both of the retests pass the strength requirements and deformation limitations all of the splices in the lot will be accepted. If one or both of the retests fail to meet the strength requirements or deformation limitations all of the splices in the lot will be rejected. All costs of removal, testing and resplicing of the additional production splices shall be borne by the Contractor. The bars of rejected splices shall be cut off outside the splice zone, coupling or sleeve. The cut ends shall be finished as specified and the joints shall be respliced and reinspected at no additional cost.
- d) Supplemental Examination - The Contracting Officer may require additional or supplemental radiographic examination and/or tension test of any completed splice.

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DIVISION 03 - CONCRETE

SECTION 03300

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Amendment #0004
SECTION 03300

GENERAL CONCRETE REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

This specification addresses general concrete requirements for the project or those areas of the concrete operations that are common to the various types of concrete. This includes but is not limited to: references, submittals, material sampling and mixture proportioning, construction tolerances, material quality and standards, batch plant requirements, and testing/inspection requirements. Specification requirements that are specific to the various types of concrete are contained in that respective concrete specification section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 03100	STRUCTURAL CONCRETE FORMWORK
Section 03201	STEEL BARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT
Section 03230	STEEL STRESSING TENDONS AND ACCESSORIES FOR PRECAST CONCRETE
Section 03240	SHELL JOINTS AND GROUT BAGS
Section 03301	CAST-IN-PLACE STRUCTURAL CONCRETE
Section 03410	PRECAST CONCRETE FOR SHELLS
Section 03413	PRECAST ARCHITECTURAL CONCRETE
Section 03414	PRECAST ROOF DECKING
Section 03800	TREMIE MASS CONCRETE AND UNDERWATER GROUT

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117/117R	(1990; R 2000) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991; R 1997) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214	(1977; R 1997) Recommended Practice for Evaluation of Strength Test Results of Concrete

ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)	
ASTM C 31/C 31M	(2000e1) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2002) Standard Specification for Concrete Aggregates
ASTM C 39/C 39M	(2001) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 40	(1999) Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
ASTM C 42/C 42M	(1999) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 87	(1983; R 1995e1) Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
ASTM C 88	(1999a) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 94/C 94M	(2000e2) Standard Specification for Ready-Mixed Concrete
ASTM C 117	(1995) Standard Test Method for Materials Finer Than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 123	(1998) Standard Test Method for Lightweight Particles in Aggregate
ASTM C 127	(2001) Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C 128	(2001) Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate
ASTM C 131	(2001) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2001) Standard Test Method for Sieve

Analysis of Fine and Coarse Aggregates

ASTM C 142	(1997) Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C 143/C 143M	(2000) Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C 150	(2002) Standard Specification for Portland Cement
ASTM C 171	(1997a) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	(1999) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 192/C 192M	(2000) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 204	(2000) Standard Test Method for Fineness of Hydraulic Cement by Air Permeability Apparatus
ASTM C 231	(1997e1) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2001) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 295	(1998) Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM C 309	(1998a) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494/C 494M	(1999ae1) Standard Specification for Chemical Admixtures for Concrete
ASTM C 535	(2001) Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 566	(1997) Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM C 597	(1997) Standard Test Method for Pulse Velocity Through Concrete

ASTM C 618	(2001) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 666	(1997) Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 803/C 803M	(1997e1) Standard Test Method for Penetration Resistance of Hardened Concrete
ASTM C 805	(1997) Standard Test Method for Rebound Number of Hardened Concrete
ASTM C 881	(1999) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 928	(2000) Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs
ASTM C 937	(1997) Standard Specification for Grout Fluidifier for Preplaced-Aggregate Concrete
ASTM C 989	(1999) Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1059	(1999) Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete
ASTM C 1064/C 1064M	(2001) Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(2002) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(2002) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 1260	(2001) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM D 75	(1997) Standard Practice for Sampling Aggregates
ASTM D 4791	(1999) Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse

Aggregate

ASTM E 11 (2001) Standard Specification for
Wire-Cloth and Sieves for Testing Purposes

CORPS OF ENGINEERS (COE)

COE CRD-C 55 (1992) Test Method for Within-Batch
Uniformity of Freshly Mixed Concrete

COE CRD-C 100 (1975) Method of Sampling Concrete
Aggregate and Aggregate Sources, and
Selection of Material for Testing

COE CRD-C 104 (1980) Method of Calculation of the
Fineness Modulus of Aggregate

COE CRD-C 114 (1997) Test Method for Soundness of
Aggregates by Freezing and Thawing of
Concrete Specimens

COE CRD-C 130 (1989) Standard Recommended Practice for
Estimating Scratch Hardness of Coarse
Aggregate Particles

COE CRD-C 143 (1962) Specifications for Meters for
Automatic Indication of Moisture in Fine
Aggregate

COE CRD-C 318 (1979) Federal Specification for Cloth,
Burlap, Jute (or Kenaf)

COE CRD-C 400 (1963) Requirements for Water for Use in
Mixing or Curing Concrete

COE CRD-C 521 (1981) Standard Test Method for Frequency
and Amplitude of Vibrators for Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44 (2001) NIST Handbook 44: Specifications,
Tolerances, and Other Technical
Requirements for Weighing and Measuring
Devices

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100 (1996) Concrete Plant Standards

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Plant Layout Drawings; G R

Drawings, in triplicate, showing the layout of the plant the Contractor proposes to use on the work shall be submitted by the Contractor for review. The drawings shall show the locations of the principal components of the construction plant; offices; shop and storage buildings; housing facilities, if any; and storage areas and yards which the Contractor proposes to construct at the site of the work and elsewhere. The Contractor shall also furnish for review drawings, in triplicate, showing the general features of his aggregate processing plant; aggregate transporting; storage and reclaiming facilities; aggregate rinsing and dewatering plant, if required; coarse aggregate rescreening plant, if required; concrete batching and mixing plant(s); concrete conveying and placing plant; and when precooling of concrete is required, the cooling plant. The drawing shall appropriately show the capacity of each major feature of the plant including the rated capacity of the aggregate production plant in tons (2000 lb) per hour of fine and coarse aggregates; rated capacity of the aggregate transporting, storage and reclaiming facilities; volume of aggregate storage; capacity of cement and pozzolan storage; rated capacity of the concrete batching and mixing plant(s) in cubic yards per hour; rated capacity of the concrete transporting and placing plant in cubic yards per hour; and when used rated capacity of plant for precooling of concrete. Drawings in triplicate showing any changes in plant made during design and erection or after the plant is in operation shall be submitted for review. Two sets of the drawings will be retained and one set will be returned to the Contractor with comments.

SD-03 Product Data

Batch Plant(s) and Mixers; G R

Details and data, including detailed layout drawings, on the concrete plant(s) shall be submitted within 60 days prior to assembly for review by the Contracting Officer for conformance with the requirements of paragraph EQUIPMENT. The make, type, capacity, and number of the concrete mixers proposed for use shall be submitted 60 days prior to installation for approval by the Contracting Officer for conformance with the requirements of paragraph EQUIPMENT in this specification.

Conveying Equipment; G AR

The methods and description of the equipment proposed for transporting, handling, and depositing the concrete shall be submitted for review 60 days before concrete placement begins for each type or classification of concrete. The data submitted shall include site drawings or sketches with locations of equipment and placement site. The data will be reviewed for conformance with paragraphs CAPACITY and CONVEYING EQUIPMENT.

Placing Equipment and Methods; G AR

All placing equipment and methods shall be submitted for review by the Contracting Officer for conformance with paragraph CAPACITY.

SD-04 Samples

Aggregates; G R

Samples of materials for government testing and approval shall be submitted as required in paragraph PRECONSTRUCTION TESTING.

SD-05 Design Data

Concrete Mixture Proportioning; G AR

Concrete mixture proportions, for all concrete except tremie mass concrete, shall be determined by the Contractor, in accordance with the requirements in paragraph CONCRETE MIXTURE PROPORTIONING, and submitted for approval. The concrete mixture quantities of all ingredients per cubic yard and nominal maximum coarse aggregate size that will be used in the manufacture of each quality of concrete shall be stated. Proportions shall indicate the mass of cement, pozzolan and ground granulated blast-furnace (GGBF) slag when used, and water; the mass of aggregates in a saturated surface-dry condition; and the quantities of admixtures. The submission shall be accompanied by test reports from a laboratory complying with ASTM C 1077 which show that proportions thus selected will produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the quality of the new materials and concrete are satisfactory.

SD-06 Test Reports

Aggregate Quality; G R

Aggregate quality tests shall be submitted in accordance with paragraph QUALITY OF AGGREGATES.

Uniformity of Concrete Mixing

The results of the initial mixer uniformity tests as required in paragraph MIXER UNIFORMITY shall be submitted at least 30 days prior to the initiation of placing.

Tests and Inspections

Test results and inspection reports shall be submitted daily and weekly as required in paragraph REPORTS.

SD-07 Certificates

Aggregate Production and Handling; G R

Details and data on the aggregate handling shall be submitted not later than 120 days after Notice to Proceed for review by the Contracting Officer for conformance with the requirements of this Section. Final acceptance of any piece of plant is subject to satisfactory performance during initial operations. The following items shall be addressed:

- a) Aggregate source;
- b) Aggregate plant, layout, equipment, and production rates;
- c) Aggregate transportation from source to site; and
- d) Aggregate stockpiling and handling systems.

Testing Technicians; G R

Concrete Transportation Construction Inspector (CTCI); G R

The Contractor shall submit statements that the concrete testing technicians and the concrete inspectors meet the requirements of paragraph TESTS AND INSPECTIONS.

Cementitious Materials; G R

Cementitious Materials, including Cement and Pozzolan, Ground Granulated Blast-Furnace Slag and all materials specified in Section 03800 TREMIE MASS CONCRETE will be accepted on the basis of the manufacturer's certification of compliance, accompanied by mill test reports that materials meet the requirements of the specification under which they are furnished. Certification and mill test reports shall be from samples taken from the particular lot furnished. No cementitious materials shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious materials will be subject to check testing from samples obtained at the source, at transfer points, or at the project site, as scheduled by the Contracting Officer, and such sampling will be by or under the supervision of the Government at its expense. Material not meeting specifications shall be promptly removed from the site of work.

Air-Entraining Admixture

Air-Entraining Admixture shall be certified for compliance with all specification requirements.

Other Chemical Admixtures

Other Chemical Admixtures shall be certified for compliance with all specification requirements.

Sheet Curing

If sheet curing is used, a manufacturer's certificate shall be furnished certifying that the materials complies with the requirements of ASTM C 171.

Nonshrink Grout; G AR

Descriptive literature of the grout proposed for use containing certified laboratory test results showing that it meets ASTM C 1107 shall be submitted 60 days prior to its use together with a certificate from the manufacturer stating that the grout is suitable for the application or exposure for which it is being considered. In addition, a detailed plan shall be submitted for review, showing equipment and procedures for use in mixing and placing the grout.

Bonding Agents; G AR

Descriptive literature and certification shall be submitted in advance of their use showing that the following materials meet the specified standards:

Latex Bonding Agent	ASTM C 1059
Epoxy Resin	ASTM C 881 Type V

Expansive Admixture

Manufacturer's descriptive literature for fluidifier to be used as expansive admixture in block-out concrete with certificate stating that the material meets the requirements of ASTM C 937 shall be submitted 60 days prior to its use.

Membrane-Forming Curing Compound

Membrane-Forming Curing Compound shall be certified for compliance with all specification requirements.

1.5 GOVERNMENT TESTING AND SAMPLING

The Government will sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. The Contractor shall provide steel, 55-gallon barrels to transport the aggregate samples. Concrete will be sampled in accordance with ASTM C 172.

1.5.1 Preconstruction Testing

1.5.1.1 Aggregates

No listing of aggregate sources nor information on aggregate quality in regional quarries are included in this section. The Contractor shall be responsible for selecting an aggregate source capable of producing materials of a quality required for this project. Samples from any source selected consisting of not less than 1500 pounds of each size of coarse aggregate and 750 pounds of fine aggregate, taken under the supervision of the Contracting Officer in accordance with COE CRD-C 100, shall be delivered to Engineer Research and Design Center, Corps of Engineers, Waterways Experiment Station, Geotechnical and Structures Laboratory, 3909 Halls Ferry Rd., Vicksburg, Mississippi 39180-6199 within 60 days after

Notice to Proceed. Sampling and shipment of samples shall be at the Contractor's expense. One hundred and eighty days will be required to complete evaluation of the aggregates. The Contractor, at his own risk, may elect to perform aggregate quality testing and mixture proportioning concurrently. Any additional testing of aggregate or Tremie Mass concrete proportioning by the Government resulting from material failing quality testing will be at the Contractor's expense and will be deducted from payments due the Contractor. Testing will be performed by the Government in accordance with the applicable COE CRD-C or ASTM test methods. Tests to which aggregate will be subjected are listed in paragraph AGGREGATES. The material from the proposed source shall meet the quality requirements of this specification. Quality assurance testing of aggregates by the Government does not relieve the Contractor of quality control requirements.

Information on regional aggregate sources is available for review in the Louisville District Office in the project Design Memorandum (DM) No. 4, entitled "Concrete Materials" dated October 1990. Contact David Kiefer at (502) 315-6445 for an in-office review of the DM. No guarantee is given or implied that any of the sources in the DM are currently capable of producing aggregates that meet the quality requirements of this section or of paragraph 2.1.5.

1.5.1.2 Cementitious Materials, Admixtures, and Curing Materials

The Contractor shall notify the Contracting Officer of the source of all materials (other than aggregates) to be used in the manufacture and curing of the concrete at least 60 days in advance of mixture proportioning studies. The Contractor shall submit along with the brand name, type, test data, and quantity to be used in the manufacture and/or curing of the concrete a Certificate of Compliance certifying that the materials meet the requirements described in Section 2.1 MATERIALS. The Contractor shall assist the Contracting Officer in obtaining samples of each material. Sampling and testing as determined appropriate will be performed by and at the expense of the Government. If cement or pozzolan are to be obtained from more than one source, the notification shall state the estimated amount of cement or pozzolan to be obtained from each source and the proposed schedule of shipments. When pozzolan other than fly ash is used, it shall be from one source. The Contracting Officer shall notify the Contractor within this 60 day period whether the proposed source is approved, disapproved or if additional data is required.

1.5.1.3 Mixing and Curing Water

The Contractor shall also furnish samples of his proposed mixing and curing water for preconstruction testing. A minimum of 275 gallons of both mixing and curing water shall be delivered to Engineer Research and Design Center, Corps of Engineers, Waterways Experiment Station, Geotechnical and Structures Laboratory, 3909 Halls Ferry Rd., Vicksburg, Mississippi 39180-6199 within 60 days after Notice to Proceed. Sampling and shipment of samples shall be at the Contractor's expense.

1.5.2 Construction Testing by the Government

1.5.2.1 General

The Government will sample and test cementitious materials, admixtures, aggregates, and concrete during construction as considered appropriate to determine compliance with the specifications. The Contractor shall provide facilities containers, and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with COE CRD-C 100. Slump and air content will be determined in accordance with ASTM C 143/C 143M and ASTM C 231, respectively, except the point of sampling will be as delivered to the point of placement. Compression test specimens will be made and laboratory cured in accordance with ASTM C 31/C 31M and will be tested in accordance with ASTM C 39/C 39M.

1.5.2.2 Testing Aggregates

Testing performed by the Government will not relieve the Contractor of his responsibility for testing as appropriate for quality control. During construction, aggregates will be sampled for acceptance testing as delivered to the mixer to determine compliance with specification provisions. The Contractor shall provide necessary facilities and labor for the ready procurement of representative samples under Contracting Officer supervision. The Government will test such samples at its expense using appropriate COE CRD-C and ASTM methods.

1.5.2.3 Cementitious Materials

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Cement and pozzolan will be sampled at the mill, shipping point, or site of the work by the Contracting Office. If tests prove that a material which has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cementitious materials that have not been used within 6 months after being tested will be retested by the Government. *4

1.5.2.4 Cement Sources

Cement will be sampled and tested by or under the supervision of the Contracting Officer and at the Government's expense. The cement shall be tested for conformance with ASTM C 150 and the requirements specified herein. The cement will also be evaluated in accordance with USACE ER 1110-1-2002 ENGINEERING AND DESIGN - CEMENT, SLAG, and POZZOLAN ACCEPTANCE TESTING (30 Sep 98). The cement will be tested under the guidelines used to establish a qualified cement source as outlined in Appendix A, Cement Quality Management System. The cement producer will be required to submit samples for physical and chemical testing, as well as historic quality control data. ER 1110-1-2002 can be found on the USACE TECHINFO homepage at www.hnd.usace.army.mil/techinfo. No cement shall be used until notice has been given by the Contracting Officer that test results for chemical and physical requirements as well as acceptance testing requirements are satisfactory. In the event of failure, the cement may be resampled and tested at the request of the Contractor and at the Contractor's expense. When the point of sampling is other than at the site of the work, the fill gate or gates of the sampled bin will be sealed and kept sealed until shipment from the bin has been completed. The fill gate or gates of conveyances used in shipment will be sealed by or under the supervision of the Contracting Officer. Conveyances will not be accepted at the site of

the work unless received with all seals intact. If tested cement is rehandled at transfer points, the extra cost of inspection will be at the Contractor's expense. The cost of testing cement in excess of project requirements will also be at the Contractor's expense and will be deducted from payments due the Contractor at a rate of \$5,000 dollars per test.

1.5.2.5 Pozzolan Sources

Pozzolan will be sampled and tested by or under the supervision of the Contracting Officer and at the Government's expense. The pozzolan shall be tested for conformance with ASTM C 618 and the requirements specified herein. The pozzolan will also be evaluated in accordance with USACE ER 1110-1-2002 ENGINEERING AND DESIGN - CEMENT, SLAG, AND POZZOLAN ACCEPTANCE TESTING (30 Sep 98). The pozzolan will be tested under the guidelines used to establish a qualified cement source as outlined in Appendix A, Cement Quality Management System. The pozzolan producer will be required to submit samples for physical and chemical testing, as well as historic quality control data. ER 1110-1-2002 can be found on the USACE TECHINFO homepage at www.hnd.usace.army.mil/techinfo. No pozzolan shall be used until notice has been given by the Contracting Officer that test results for chemical and physical requirements as well as acceptance testing requirements are satisfactory. Release for shipment and approval for use may be contingent on continuing compliance with the other requirements of the specifications as allowed by the Contracting Officer. The Government will supervise or perform the unsealing and resealing of bins and shipping conveyances. If tested pozzolan is rehandled at transfer points, the extra cost of inspection will be at the Contractor's expense. The cost of testing pozzolan in excess of project requirements will be at the Contractor's expense at a rate of \$5,000 dollars per test. The amount will be deducted from payments to the Contractor.

1.5.2.6 Ground Granulated Blast-Furnace Slag

Ground granulated blast-furnace slag will be sampled and tested at the mill or shipping point by and at the expense of the Government to determine that the material meets the requirements as specified herein. The ground granulated blast-furnace slag will also be evaluated in accordance with USACE ER 1110-1-2002 ENGINEERING AND DESIGN - CEMENT, SLAG, AND POZZOLAN ACCEPTANCE TESTING (30 Sep 98). The ground granulated blast-furnace slag will be tested under the guidelines used to establish a qualified cement source as outlined in Appendix A, Cement Quality Management System. The slag producer will be required to submit samples for physical and chemical testing, as well as historic quality control data. ER 1110-1-2002 can be found on the USACE TECHINFO homepage at www.hnd.usace.army.mil/techinfo. No ground granulated blast-furnace slag shall be used until notice of acceptance has been given by the Contracting Officer. Ground granulated blast-furnace slag will be subject to check testing from samples obtained at the project site, and such sampling will be by or under the supervision of the Contracting Officer and at Government expense. Material not meeting specifications shall be promptly removed from the site of work.

1.5.2.7 Other Chemical Admixtures

*4

The Contractor shall provide satisfactory facilities for ready procurement

of adequate test samples. All sampling and testing of a chemical admixture will be by and at the expense of the Government. Tests will be conducted using samples of materials proposed for the project. Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be retested when directed by the Contracting Officer and shall be rejected if test results are not satisfactory. Chemical admixtures will be accepted based on compliance with the requirements of paragraph CHEMICAL ADMIXTURES. *4

1.5.3 Concrete Strength

Compressive strength test specimens will be made by the Government and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including nondestructive testing, taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

- a) Investigation of Low-Strength Test Results - When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. Nondestructive testing in accordance with ASTM C 597, ASTM C 803/C 803M, or ASTM C 805 may be permitted by the Contracting Officer to estimate the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests shall not be used as a basis for acceptance or rejection.
- b) Testing of Cores - When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42/C 42M. The minimum diameter of the concrete cores shall be three inches. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the performance of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement.
- c) Load Tests - If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318/318R. Concrete work evaluated by structural analysis or by results of a

load test shall be corrected in a manner satisfactory to the Contacting Officer. All investigations, testing, load tests, and correction of deficiencies will be performed and approved by the Contracting Officer at the expense of the Contractor, except that if all concrete is in compliance with the plans and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

1.6 CONSTRUCTION TOLERANCES

1.6.1 General

Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing. When forms or shoring are used, the measurements shall be made prior to removal. Tolerances are not cumulative. The most restrictive tolerance controls. Tolerances shall not extend the structure beyond legal boundaries. Except as specified otherwise, plus tolerance increases the amount or dimension to which it applies, or raises a level alignment and minus tolerance decreases the amount or dimension to which it applied, or lowers a level alignment. A tolerance without sign means plus or minus. Where only one signed tolerance is specified, there is no limit in the other direction.

The definitions of the terms used in the following tabulations are used as defined and used in ACI 117/117R.

TOLERANCES FOR CAST-IN-PLACE AND PRECAST REINFORCED CONCRETE

(1) Vertical alignment

Lines, surfaces, and arrises 3/8 in.

Outside corner of exposed corner columns
and control joint grooves in concrete
exposed to view 1/4 in.

(2) Lateral alignment

Members 1/2 in.

In slabs, centerline location of openings
12 in. or smaller and edge
location of larger openings 1/2 in.

(3) Level alignment

Top of slabs

Elevation of slabs 3/8 in.

Elevation of top surfaces of formed slabs
before removal of supporting shores 3/8 in.

Elevation of formed surfaces before removal

The maximum allowable offset between concrete surfaces at any given or checked elevation/location for the following classes of surface:

Class A	1/8 in.
Class B.....	1/4 in.
Class C	1/4 in.
Class D	1/2 in.

(9) Gradual variation

Surface finish tolerances as measured by placing a freestanding (unleveled), 5-ft straightedge for plane surface or curved template for curved surface anywhere on the surface and allowing it to rest upon two high spots within 72 hrs after concrete placement. The gap at any point between the straightedge or template and the surface shall not exceed:

Class A	1/8 in.
Class B	1/4 in.
Class C	1/2 in.
Class D	1 in.

TOLERANCES FOR ACCESS BRIDGE

(1) Vertical alignment:

Exposed surfaces	3/4 in.
Concealed surfaces	1-1/2 in.

(2) Lateral alignment:

Centerline alignment	1 in.
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(3) Level alignment:

Profile grade	1 in.
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Top of other concrete surfaces and horizontal grooves

Exposed	3/4 in.
Concealed	1-1/2 in.

Bridge deck surface in longitudinal direction, the gap below 10 ft unleveled straightedge resting on highspots shall not exceed 1/8 in.

Bridge deck surface in transverse direction, the gap below a 10 ft unleveled straightedge resting on highspots shall not exceed 1/4 in.

Ramps, sidewalks, and intersections, in any direction, the gap below a 10 ft unleveled straightedge resting on highspots shall not exceed 1/4 in.

(4) Cross-sectional dimensions

Bridge element thicknesses +1/4 in.
..... -1/8 in.

Openings through concrete members 1/2 in.

(5) Relative alignment

Location of openings through concrete members 1/2 in.

Formed surface slope with respect to the specified plane

Watertight joints 1/8 in. in 10 ft
Other exposed surfaces 1/2 in. in 10 ft
Concealed surfaces 1 in. in 10 ft

Unformed exposed surfaces slopes with respect to the
specified plane 1/4 in. in 10 ft
..... 3/8 in. in 20 ft

TOLERANCE FOR POST TENSIONING

(1) Position of tendon groups

Theoretical centerline location 1/4 in.

TOLERANCES FOR ALL OTHER CONCRETE

(1) Vertical alignment

Visible surfaces..... 1/2 in.
Concealed surfaces 1/2 in.

(2) Lateral alignment

Visible surfaces 1/2 in.
Concealed surfaces 1/2 in.

(3) Level alignment

Visible flatwork and formed surfaces 1/2 in.
Concealed flatwork and formed surfaces..... 1/2 in.

1.6.2 Tolerance for Floors by Straightedge Measurement

Floor finish tolerances shall be measured by placing a free-standing (unleveled) 10 foot straightedge anywhere on the slab and allowing it to rest upon two high spots. The measurements shall be taken within 72 hours after slab concrete placement. The gap at any point between the straightedge and the floor shall not exceed:

Flat surface ----- 3/16 inch

1.7 MATERIAL DELIVERY, STORAGE, AND HANDLING

1.7.1 Cementitious Materials

1.7.1.1 Transportation

When bulk cement, pozzolan, silica fume, or ground granulated blast-furnace slag are not unloaded from primary carriers directly into weather-tight hoppers at the batching plant, transportation from the railhead, mill, or intermediate storage to the batching plant shall be accomplished in adequately designed weather-tight trucks, conveyors, or other means that will protect the material from exposure to moisture. Transportation facilities for dry bulk silica fume shall be approved in advance.

1.7.1.2 Storage

Cementitious materials shall be furnished in bulk except that cement used for finishing and patching may be packaged. Immediately upon receipt at the site of the work, all cementitious materials, shall be stored in separate dry, weather-tight, and properly ventilated structures. If silica fume is supplied or used in slurry form, storage tanks shall be of the paddle-type or shall provide a dependable system for circulating the slurry. All storage facilities shall permit easy access for inspection and identification. Sufficient materials shall be in storage to complete any lift of concrete started. In order that cement may not become unduly aged after delivery, the Contractor shall use any cement that has been stored at the site for 60 days or more before using cement of lesser age.

1.7.1.3 Separation of Materials

Separate facilities shall be provided for unloading, transporting, and handling each cementitious material. Separate appropriate storage facilities shall be provided for each type of cement and each source of pozzolan or slag. The contents of each storage facility shall be plainly marked with a large permanent sign posted near the loading port.

1.7.2 Aggregates Storage

Fine aggregate and each size of coarse aggregate shall be stored in separate size groups adjacent to the batch plant(s) and in such a manner as to prevent the intermingling of size groups or the inclusion of foreign materials in the concrete. Sufficient fine and coarse aggregate shall be maintained at the site at all times to permit continuous placement and completion of any lift of concrete started.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cementitious materials shall be portland cement in combination with pozzolan or GGBF slag and shall conform to appropriate specifications listed below.

2.1.1.1 Portland Cement

Portland cement for all concrete except tremie mass concrete shall conform to ASTM C 150, Type I or Type II, low alkali, including the false set requirements. The maximum amount of C3A in Type I cement shall be less than 15 percent. Portland cement for tremie concrete, as specified in Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT, shall be Type II, low alkali, including the false set requirements. The heat of hydration at 7 days shall be no greater than 70 calories per gram.

2.1.1.2 Pozzolan

Pozzolan shall conform to ASTM C 618, Class C or F, and, in addition, limits in Table 2, Supplementary Optional Physical Requirements for multiple factor, drying shrinkage and uniformity. Class F and Class C shall not be used in combination in the same concrete mix. Pozzolan shall be provided in all mixes as indicated in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA.

2.1.1.3 Ground Granulated Blast-Furnace Slag

Ground granulated blast-furnace slag shall conform to ASTM C 989, Grade 80. The maximum surface area shall be 5000 sq. cm./g as tested in accordance with ASTM C 204. The GGBFS shall also meet the requirements of all tables in ASTM C 989.

2.1.1.4 Temperature of Cementitious Materials

The temperature of the cementitious materials as delivered to the site shall not exceed 150 degrees F.

2.1.2 Other Chemical Admixtures

Chemical admixtures to be used, when required or permitted, shall conform to the appropriate specification listed. All chemical admixtures furnished as liquids shall be in a solution of suitable viscosity for field use as determined by the Contracting Officer. Admixture compatibility shall be confirmed by the manufacturer. Admixtures from different manufacturers shall not be used in the same concrete unless compatibility is verified by mixture proportioning.

2.1.2.1 Air-Entraining Admixtures

The air-entraining admixture shall conform to ASTM C 260 and shall consistently entrain air in the specified ranges under field conditions.

2.1.2.2 Accelerating Admixture

The use of accelerators will not be allowed.

2.1.2.3 Retarding Admixture

A retarding admixture shall meet the requirements of ASTM C 494/C 494M, Type B, or D, except that the 6-month and 1-year compressive strength tests are waived. The admixture may be added to the concrete mixture only when approved by the Contracting Officer.

2.1.2.4 Water-Reducing Admixture

A water-reducing admixture shall meet the requirements of ASTM C 494/C 494M, Type A or D, except that the 6-month and 1-year compressive strength tests are waived. The admixture may be added to the concrete mixture only when its use is approved or directed by the Contracting Officer and after mixture proportioning studies.

2.1.2.5 High-Range Water-Reducing Admixture (HRWRA)

High-range water-reducing admixture shall meet the requirements of ASTM C 494/C 494M, Type F or G, except the 6-month and 1-year strength requirements shall be waived. The admixture may be used only after mixture proportioning studies and when approved by the Contracting Officer. The Contractor shall provide the services of a manufacturer's technical representative experienced in mixture proportioning and placement procedures of concrete containing HRWRA. The technical representative shall be available for consultation during mixture proportioning and shall be on-site for the first placement of concrete containing HRWRA.

2.1.2.6 Expansive Admixture

Expansive admixture used in block-out concrete shall conform to ASTM C 937.

2.1.3 Curing Materials

2.1.3.1 Sheet Curing Materials

Sheet curing materials shall conform to ASTM C 171, type optional, except polyethylene sheet shall not be used.

2.1.3.2 Membrane-Forming Curing Compound

Membrane-forming curing compound shall conform to ASTM C 309, Type 1D or 2.

2.1.3.3 Burlap

Burlap for curing purposes shall conform to COE CRD-C 318.

2.1.4 Water

Water for washing aggregates and for mixing and curing concrete shall be free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances and shall comply with COE CRD-C 400.

2.1.5 Aggregates

2.1.5.1 General

Concrete aggregates may be furnished from any source capable of meeting the quality requirements as stated in paragraph AGGREGATE QUALITY. Information on regional aggregate sources is available for review in the Louisville District Office in the project Design Memorandum (DM) No. 4, entitled "Concrete Materials" dated October 1990. Contact David Kiefer at (502) 315-6445 for an in-office review of the DM. No guarantee is given or implied that any of the sources in the DM are currently capable of producing aggregates that meet the quality requirements of this section. Design Memorandums cannot be sent to bidders. The test results and conclusions shall be considered valid only for the sample tested and shall not be taken as an indication of the quality of all material from a source nor for the amount of processing required. All coarse and fine aggregate shall be tested for quality requirements prior to mixture proportioning and at the QC and QA intervals as specified herein. Coarse aggregate shall be crushed limestone and fine aggregate shall be natural sand. Aggregate shall be stored at the site of the batching and mixing plant to avoid breakage, segregation, or contamination by foreign materials. Each size of aggregate from each source shall be stored separately in free-draining stockpiles. Fine aggregate and the smallest size coarse aggregate shall remain in free-draining storage for at least 24 hours immediately prior to use. Sufficient aggregate shall be maintained at the site at all times to permit continuous uninterrupted operation of the mixing plant at the time concrete is being placed. Manufactured fine aggregate will not be allowed. The nominal maximum size shall be as listed in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section.

2.1.5.2 Concrete Aggregate Sources

Selection of Source - After award of the contract, the Contractor shall designate in writing only one source or combination of sources from which he proposes to furnish aggregates. Samples for acceptance testing shall be provided as required by paragraph GOVERNMENT TESTING AND SAMPLING.

2.1.5.3 Fine Aggregate

Fine aggregate shall consist of natural sand. Fine aggregate shall conform to the quality and gradation requirements listed in paragraphs AGGREGATE QUALITY and AGGREGATE GRADATIONS, respectively.

2.1.5.4 Coarse Aggregate

Coarse aggregate shall consist of crushed limestone. Coarse aggregate shall conform to the quality requirements listed in paragraph AGGREGATE QUALITY and AGGREGATE GRADATIONS, respectively.

2.1.5.5 Aggregate Quality

Aggregates delivered to the mixer shall meet the following requirements:

<u>PROPERTY</u>	<u>TEST LIMITS</u>		<u>TESTS</u>
	<u>FINE AGGREGATE</u>	<u>COARSE AGGREGATE</u>	
Specific Gravity	>2.55	>2.6	ASTM C 127 ASTM C 128
Absorption	<3%	<3%	ASTM C 127 ASTM C 128
Alkali Silica Reactivity	<0.10%	<0.10%	ASTM C 1260
Freeze/Thaw Durability Factor (Procedure A)	N/A	>60	COE CRD-C 114 ASTM C 666
Clay Lumps and Friable Particles	<1%	N/A	ASTM C 142
Organic Impurities	No. 3 max. Not less than 95 Percent	N/A	ASTM C 40 ASTM C 87
L.A. Abrasion	N/A	<35%	ASTM C 131 ASTM C 535
Soundness (Magnesium Sulfate)	<10%	<10%	ASTM C 88
Percent Fines Passing No. 200 Sieve	N/A	<1%	ASTM C 117
Chert, less than 2.40 specific gravity	N/A	<1%	ASTM C 123
Coal and Lignite, less than 2.00 specific gravity	<1%	N/A	ASTM C 123
Shaley Argillaceous Material	N/A	<3%	ASTM C 295
Petrographic Examination	Classify and quantify deleterious materials as described below (Fine and Coarse Aggregate)		ASTM C 295

A petrographic examination shall be conducted on the fine and coarse aggregates to determine the quantity of deleterious material in the sample.

The material shall not consist of more than 2% per constituent, except that the chert content may be 5%. The total of all deleterious material shall not be more than 5% including the chert content. Deleterious materials are described below.

Shale is often defined as a fine-grained thinly laminated or fissile sedimentary rock. It is commonly composed of clay or silt or both. It has been indurated by compaction or by cementation, but not so much as to become slate.

Clay Ironstone is defined as an impure variety of iron carbonate, iron oxide, hydrous iron oxide, or combinations thereof, commonly mixed with clay, silt, or sand. It commonly occurs as dull, earthy particles, homogeneous concretionary masses, or as hard-shell particles with soft interiors. Other names used for clay ironstone are "chocolate bars" and limonite concretions.

Chert is defined as a rock composed of quartz, chalcedony, opal, or any mixture of these forms of silica. It is variable in color. The texture is so fine that the individual mineral grains are too small to be distinguished by the unaided eye. Its hardness is such that it scratches glass, but is not scratched by a knife blade. It may contain impurities such as clay, carbonates, iron oxides, and other minerals. Other names commonly applied to chert include flint, jasper, agate, onyx, hornstone, porcellanite, novaculite, sard, carnelian, plasma, bloodstone, touchstone, chrysoprase, heliotrope, and petrified wood. Cherty stone is defined as any type of rock (generally limestone) that contains chert as lenses and nodules, or irregular masses partially or completely replacing the original stone.

Claystone or Mudstone is defined as a massive fine grained sedimentary rock that consists predominantly of indurated clay or silt without laminations or fissility. It may be indurated either by compaction or by cementation.

Shaley Limestone is defined as limestone in which shale occurs as one or more thin beds or laminae. These laminae may be regular or very irregular and may be spaced from a few inches down to minute fractions of an inch.

2.1.5.6 Particle Shape

The quantity of flat and elongated particles in the separate size groups of coarse aggregate, as determined by ASTM D 4791, using a value of 3 for width-thickness ratio and length-width ratio shall not exceed 3 percent in any size group.

2.1.5.7 Moisture Content

The fine aggregate shall not be placed in bins at the batch plant until it is in a stable state of moisture content. A stable moisture content shall be reached when the variation in the percent of total moisture tested in accordance with ASTM C 566 and when sampled at the same location will not be more than 0.5 percent during 1 hour of the 2 hours prior to placing the material in the batch plant bins and the variation in moisture content when sampled at the same location shall not be more than 2.0 percent during the last 8 hour period that the aggregate remains in the stockpile. The fine aggregate stockpile shall be covered when not in use. The coarse aggregate shall be delivered to the mixers with the least amount of free moisture and the least variation in free moisture practicable under the job conditions. Under no conditions shall the coarse aggregate be delivered to the mixer

"dripping wet".

2.1.6 Aggregate Gradation

2.1.6.1 Fine Aggregate

The grading of the fine aggregate as delivered to the mixers shall be such that the individual percent retained on any sieve shall not vary more than 3 percent from the percent retained on that sieve in a fixed grading selected by the Contractor with the approval of the Contracting Officer. The fixed grading may be selected at the start of concrete placement and based upon 30 days fine aggregate production or selected after the first 30 days of concrete placement. The minimum individual percent retained on the No. 8 (2.36 mm) sieve shall be 5 percent and on all smaller sieves, except the No. 200 (75 μ m), shall be 10 percent. In addition to the grading limits, the fine aggregate, as delivered to the mixer, shall have a fineness modulus of not less than 2.3 nor more than 3.1. The grading of the fine aggregate shall also be controlled so that the fineness moduli groups (average of the current test and the previous two tests) of the fine aggregate as delivered to the mixer shall not vary more than 0.10 from the target fineness modulus of the fixed grading selected by the Contractor and approved by the Contracting Officer. The range of each group shall not exceed 0.20. The fineness modulus shall be determined in accordance with ASTM C 136 and COE CRD-C 104. The selected fixed grading shall be within the following limits, except any individual test result may be outside these limits if within the allowable 3 percent variation from the selected grading.

U.S. STANDARD SIEVE DESIGNATION	PERMISSIBLE LIMITS PERCENT BY WEIGHT, PASSING
3/8-in. (9.5-mm)	100
No. 4 (4.75-mm)	95 - 100
No. 8 (2.36-mm)	80 - 100
No. 16 (1.18-mm)	50 - 85
No. 30 (600- μ m)	25 - 60
No. 50 (300- μ m)	5 - 30
No. 100 (150- μ m)	0 - 10

2.1.6.2 Coarse Aggregate

The coarse aggregate shall be washed and rescreened just prior to delivery to the concrete batch plant bins. The grading of the coarse aggregate shall be ASTM C 33 size #57 and #67, except ASTM C 33 size #8 shall be used where listed in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section.

2.1.7 Nonshrink Grout

Nonshrink grout for use in setting base plates and machinery shall conform to ASTM C 1107, Grade A, B, or C, and shall be a commercial formulation suitable for the application proposed to include depth required without aggregate extension. Nonshrink grouts shall not contain aluminum or metallic aggregates. Minimum strength shall be 6000 psi at 28 days.

2.1.8 Packaged Dry Repair Materials

Packaged dry rapid-hardening cementitious materials for concrete repairs shall be a commercial formulation conforming to ASTM C 928 requiring only the addition of water.

2.1.9 Bonding Agents

Bonding agents shall meet the following requirements.

2.1.9.1 Latex Bonding Agent

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059, Type II.

2.1.9.2 Epoxy Resin

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade I or II.

2.2 CONCRETE MIXTURE PROPORTIONING

The Government will determine the initial mixture proportions for the tremie mass concrete in accordance with Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT. The Contractor shall assist the Government as specified in Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT. All other concrete mixes will be proportioned by the Contractor as specified herein.

2.2.1 Quality of Mixture

For each portion of the structure, mixture proportions shall be selected so that the strength and W/C requirements listed in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section are met.

2.2.2 Nominal Maximum-Size Coarse Aggregate

Nominal maximum-size coarse aggregate shall be as noted in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section.

2.2.3 Air Content

Air content as delivered to the forms and as determined by ASTM C 231 shall be as noted in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section.

2.2.4 Slump

The slump shall be determined in accordance with ASTM C 143/C 143M and shall be within the range noted in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section. Slump shall be measured at the point of placement. Where placement by pump is approved, the slump shall not exceed 6 inches.

2.2.5 Concrete Proportioning

Trial batches and testing requirements for various qualities of concrete specified shall be the responsibility of the Contractor. Samples of aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by the manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios, which will produce a range of strength encompassing those required for the work. The maximum water-cement ratios required in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section will be converted to a weight ratio of water to cement plus pozzolan by mass, or GGBF slag by mass equivalency as described in ACI 211.1. In the case where GGBF slag is used, the weight of the slag shall be included in the equations for the term P, which is used to denote the mass of pozzolan. Pozzolan shall be used in the concrete mixture where shown in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section. Trial mixtures shall be proportioned for maximum permitted slump and air content with due consideration to the approved conveying and placement method. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M. They shall be tested at 7 days and at the design age specified in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section in accordance with ASTM C 39/C 39M. From these test results, a curve will be plotted showing the relationship between water-cement ratio and strength. Test cylinders shall be broken at 3, 7 & 28 days for concrete mixes specified as requiring 28 day strengths and at 3, 28, 56 & 90 days for concrete mixes requiring 90 day strengths. Three test cylinders shall be made for each test age.

2.2.6 Required Average Compressive Strength

In meeting the strength requirements specified in Table 1 CONCRETE MIXTURE PROPORTIONING CRITERIA at the end of this section, the selected mixture proportion shall produce a required average compressive strength f'_{cr} exceeding the specified strength f'_c by the amount indicated below.

2.2.6.1 Average Compressive Strength from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214.

Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected, shall represent concrete produced to meet a specified strength or strengths (f'_c) within 1,000 psi of that specified for proposed work, and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at another test age designated for determination of f'_c .

Required average compressive strength f'_{cr} used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

$$f'_{cr} = f'_c + 1.34S$$
$$f'_{cr} = f'_c + 2.33S - 500$$

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

<u>NUMBER OF TESTS*</u>	<u>MODIFICATION FACTOR FOR STANDARD DEVIATION</u>
15	1.16
20	1.08
25	1.03
30 or more	1.00

2.2.6.2 Average Compressive Strength without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f_{cr} shall be determined as follows:

If the specified compressive strength f'_c is less than 3,000 psi,

$$f'_{cr} = f'_c + 1,000$$

If the specified compressive strength f'_c is 3,000 to 5,000 psi,

$$f'_{cr} = f'_c + 1,200$$

If the specified compressive strength f'_c is over 5,000 psi,

$$f'_{cr} = f'_c + 1,400$$

PART 3 EXECUTION

3.1 EQUIPMENT

3.1.1 General

This specification covers the execution requirements for all concrete except as specified in Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT. The batch plant shall meet the following requirements.

3.1.2 Capacity

The batching, mixing, conveying, and placing systems shall have a capacity

of at least 150 cubic yards per hour for the production of tremie concrete.

Additional batch plant requirements for the production of tremie concrete are contained in Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT. The Contractor may provide, at his option, additional land based batch plant capacity to facilitate the production of concrete for shells. All batch plants shall conform to the requirements herein.

3.1.3 Batch Plant

Batch plants shall conform to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required. The batch plant shall be automatic or semi-automatic. Dust collectors shall not be redirected into the mixing drum.

3.1.3.1 Location

The concrete plant shall be located at the site of the work in the general area indicated on the drawings. Alternate on-site locations may be submitted by the Contractor and are subject to approval of the Contracting Officer. The Contractor may provide concrete from an off-site ready-mix plant for all concrete mixes, except tremie mass concrete, provided that the plant meets all requirements contained herein and provided that the concrete produced at the off-site location can be placed in the forms no later than 60 minutes after batching.

3.1.3.2 Bins and Silos

Separate bins, compartments, or silos shall be provided for each size or classification of aggregate, limestone powder and for each of the cementitious materials. The compartments shall be of ample size and so constructed that the various materials will be maintained separately under all working conditions. All compartments containing bulk cement, pozzolan, ground granulated blast-furnace slag shall be separated from each other by a free-draining air space. All filling ports shall be clearly marked with a permanent sign stating the contents.

3.1.3.3 Batching Equipment

- a) Batchers - Aggregate shall be weighed in separate weigh batchers with individual scales. Bulk cement and/or other cementitious materials shall each be weighed on a separate scale in a separate weigh batcher. Water shall be measured by weight or by volume. If measured by weight, it shall not be weighed cumulatively with another ingredient. Ice, if used, shall be measured separately by weight. Admixtures shall be batched separately and shall be batched by weight or by volume in accordance with the manufacturer's recommendations.
- b) Water Batchers - A suitable water-measuring and batching device shall be provided that will be capable of measuring and batching the mixing water within the specified tolerances for each batch. The mechanism for delivering water to the mixers shall be free from leakage when the valves are closed. The filling and discharge valves for the water batcher shall be so interlocked

that the discharge valve cannot be opened before the filling valve is fully closed. When a water meter is used, a suitable strainer shall be provided ahead of the metering device.

- c) Admixture Dispensers - Admixtures shall be stored in a controlled environment that protects the admixtures from extreme temperatures and detrimental conditions. Admixture storage tanks shall be of the paddle-type or shall provide a dependable system for circulating the admixture. A separate batcher or dispenser shall be provided for each admixture. Each plant shall be equipped with the necessary calibration devices that will permit convenient checking of the accuracy of the dispensed volume of the particular admixture. The batching or dispensing devices shall be capable of repetitively controlling the batching of the admixtures to the accuracy specified. Piping for liquid admixtures shall be free from leaks and properly valved to prevent backflow or siphoning. The dispensing system shall include a device or devices that will detect and indicate the presence or absence of the admixture or provide a convenient means of visually observing the admixture in the process of being batched or discharged. Each system shall be capable of ready adjustment to permit varying the quantity of admixture to be batched. Each dispenser shall be interlocked with the batching and discharge operations so that each admixture is added separately to the batch in solution in a separate portion of the mixing water or in fine aggregate in a manner to ensure uniform distribution of the admixtures throughout the batch during the required mixing period. Storage and handling of admixtures shall be in accordance with the manufacturers recommendations.

- d) Moisture Control - The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched. A moisture meter complying with the provisions of COE CRD-C 143 shall be provided for measurement of moisture in the fine aggregate. The moisture meter shall only be used as an indicator of relative aggregate moisture and shall not be directly linked to the plant water batcher. The sensing element shall be arranged so that the measurement is made near the batcher charging gate of the fine aggregate bin or in the fine aggregate batcher.

- e) Scales - Adequate facilities shall be provided for the accurate measurement and control of each of the materials entering each batch of concrete. The weighing equipment and controls shall conform to the applicable requirements of NIST HB 44, except that the accuracy shall be within 0.2 percent of the scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring device. Tests shall be made at the frequency required in paragraph TESTS AND INSPECTIONS, and in the presence of a Government quality assurance representative. Each weighing unit shall include a visible indicator that shall indicate the scale load at all stages of the weighing operation and shall show the scale in balance at zero load. The weighing equipment shall be arranged so that the

concrete plant operator can conveniently observe the indicators.

- f) Operation and Accuracy - The weighing operation of each material shall start automatically when actuated by a single starter switch and shall end automatically when the designated amount of each material has been reached. These requirements can be met by providing an automatic batching system as defined in NRMCA CPMB 100.

There shall be equipment to permit the selection of 20 preset mixes each by the movement of not more than two switches or other control devices. Cumulative weighing will not be permitted. The weigh batchers shall be so constructed and arranged that the sequence and timing of batcher discharge gates can be controlled to produce a ribboning and mixing of the aggregates, water, admixtures, and cementitious materials as the materials pass through the charging hopper into the mixer. The plant shall include provisions to facilitate the inspection of all operations at all times. Delivery of materials from the batching equipment shall be within the following limits of accuracy:

MATERIAL	PERCENT
Cementitious materials	0 to +1
Water	± 1
Aggregate	± 2
Chemical admixtures	± 3

- g) Interlocks - Batchers and mixers shall be interlocked so that:
 - (1) The charging device of each batcher cannot be actuated until all scales have returned to zero balance within ± 0.2 percent of the scale capacity and each volumetric device has reset to start or has signaled empty.
 - (2) The charging device of each batcher cannot be actuated if the discharge device is open.
 - (3) The discharge device of each batcher cannot be actuated if the charging device is open.
 - (4) The discharge device of each batcher cannot be actuated until the indicated material is within the allowable tolerances.
 - (5) One admixture is batched automatically with the water.
 - (6) Each additional admixture is batched automatically with a separate portion of the water or with the fine aggregate.
 - (7) The mixers cannot be discharged until the required mixing time has elapsed.
- h) Recorder - An accurate recorder or recorders shall be provided and

shall conform to the following detailed requirements:

- (1) The recorder shall produce a graphical or digital record in electronic form of the weight or volume of each material in the batchers at the conclusion of the batching cycle. The record shall be produced prior to delivery of the materials to the mixer. After the batchers have been discharged, the recorder shall show the return to empty condition.
 - (2) A graphical recording or digital data unit shall be completely housed in a single cabinet that shall be capable of being locked.
 - (3) The electronic data shall be so marked that each batch may be permanently identified and so that variations in batch weights of each type of batch can be readily observed. The data shall be easily interpreted in increments not exceeding 0.5 percent of each batch weight.
 - (4) The electronic data shall show time of day at intervals of not more than 15 minutes.
 - (5) The recorder electronic data shall be furnished to the Government daily when the plant is operating and shall become the property of the Government.
 - (6) The recorder shall be placed in a position convenient for observation by the concrete plant operator and the Government inspector.
 - (7) The recorded weights or volumes when compared to the weights or volumes actually batched shall be accurate within ± 2 percent.
 - (8) The recorder shall produce an automatic batch ticket that includes design weights, actual weights of all materials dispensed, accuracy of the materials dispensed, moisture contents of all aggregates, adjustments for moisture, batching water and any other plant settings or controls that may affect the quality and/or the strength of the concrete.
- i) Batch Counters - The plant shall include devices for automatically counting the total number of batches of all concrete batched and the number of batches of each preset mixture.
 - j) Washing Plant - All coarse aggregates shall be washed immediately prior to entering the rescreening plant. The rewashing plant shall contain adequate water nozzles and vibrating screens to remove foreign materials and coatings from aggregate particles. Water used for washing shall meet the requirements of paragraph WATER.
 - k) Trial Operation - Not less than 60 days prior to commencement of concrete placing, a test of the batching and mixing plant shall be made in the presence of the Contracting Officer to check

operational adequacy. The number of full-scale concrete batches required to be produced in trial runs shall be as directed, will not exceed 50, and shall include the full range of mixes to be used. All concrete produced in these tests shall be wasted or used for purposes other than inclusion in structures covered by this specification. All deficiencies found in plant operation shall be corrected prior to the start of concrete placing operations. No separate payment will be made to the Contractor for labor or materials required by provisions of this paragraph. The Contractor shall notify the Contracting Officer of the trial operation not less than 7 days prior to the start of the trial operation.

- 1) Protection - The weighing, indicating, recording, and control equipment shall be protected against exposure to dust, moisture, and vibration so that there is no interference with proper operation of the equipment.

3.1.3.4 Laboratory Areas

A room shall be provided in the plant to house the moisture and grading testing equipment for aggregate and to provide working space. Another room shall be provided for testing fresh concrete and for fabricating and initial curing of concrete test specimens in accordance with ASTM C 31/C 31M.

The size, arrangement, and location of these rooms will be subject to approval. The Contractor shall provide electricity, air conditioning, heat, and water as required for use in these laboratory areas.

3.1.4 Batch Plant(s) and Mixers

Mixers shall be stationary mixers of the tilting drum type. Each mixer shall combine the materials into a uniform mixture and discharge this mixture without segregation. Mixers shall not be charged in excess of the capacity recommended by the manufacturer on the nameplate. Excessive over-mixing requiring introduction of additional water will not be permitted. The mixers shall be maintained in satisfactory operating condition, and mixer drums shall be kept free of hardened concrete. Mixer blades or paddles shall be replaced when worn down more than 10 percent of their depth when compared with the manufacturer's dimension for new blades.

Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired or replaced.

3.1.4.1 Stationary Mixer Uniformity Requirements

The size of the batch, the mixing time, the charging sequence, and other factors identified by the Contractor shall be adjusted to provide concrete that meets the uniformity limits specified herein. All testing shall be performed in accordance with COE CRD-C 55. Tests shall be conducted on all types of mixes, conventional and tremie mass concrete, that the mixer is used to produce. When regular testing is performed, the concrete shall meet the limits of any five of the six uniformity requirements. When abbreviated testing is performed, the concrete shall meet only those requirements listed for abbreviated testing. The initial mixer evaluation test shall be a regular test and shall be performed prior to the start of

concrete placement. The concrete proportions used for the evaluation shall contain the largest size aggregate on the project and shall be as directed.

Regular testing shall consist of performing all six tests on three batches of concrete. The range for regular testing shall be the average of the ranges of the three batches. Abbreviated testing shall consist of performing the three required tests on a single batch of concrete. The range for abbreviated testing shall be the range for one batch. If more than one mixer is used and all are identical in terms of make, type, capacity, condition, speed of rotation, etc., the results of tests on one of the mixers shall apply to the others, subject to approval. Mixer evaluations shall be performed by the Contractor in accordance with paragraph MIXER UNIFORMITY.

PARAMETER	REGULAR TESTS ALLOWABLE MAXIMUM RANGE FOR AVERAGE OF 3 BATCHES	ABBREVIATED TESTS ALLOWABLE MAXIMUM RANGE FOR 1 BATCH
Unit weight of air-free mortar, lb/cu ft	2.0	2.0
Air content, percent	1.0	---
Slump, inches	1.0	---
Coarse aggregate, percent	6.0	6.0
Compressive strength at 7 days, percent	10.0	10.0
Water content, percent	1.5	---

3.1.4.2 Truck Mixers

Truck mixers shall only be allowed for production and placement of Tremie Mass Concrete. Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of COE CRD-C 55. Truck mixers may be used to transport central mixed concrete. Each truck shall be equipped with two counters from which it shall be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed.

3.1.5 Conveying Equipment

The conveying equipment shall conform to the following requirements.

3.1.5.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least five times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension

of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.1.5.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and have conical-shaped discharge features.

The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.1.5.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Nonagitating equipment may be used for transporting plant-mixed concrete over a smooth road when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.1.5.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.1.5.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant trunk that is long enough to extend through the reinforcing bars.

3.1.5.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of

the pipe shall be at least three times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.1.6 Vibrators

Vibrators of the proper size, frequency, and amplitude shall be used for the type of work being performed in conformance with the following requirements:

APPLICATION	HEAD DIAMETER INCHES	FREQUENCY VPM	AMPLITUDE INCHES
Thin walls, beams, etc.	1-1/4 to 2-1/2	9,000 to 13,500	0.02 to 0.04
General construction	2 to 3-1/2	8,000 to 12,000	0.025 to 0.05

The frequency and amplitude shall be determined in accordance with COE CRD-C 521.

3.1.7 Sampling Facilities

3.1.7.1 Concrete

The Contractor shall provide suitable facilities and labor for obtaining representative samples of concrete in accordance with ASTM C 172 for Contractor quality control (QC) and Government quality control (QA) testing.

3.1.7.2 Coarse Aggregate

Suitable facilities shall be provided for readily obtaining representative samples of coarse aggregate for test purposes immediately prior to the material entering the mixer. The facilities shall include automatic equipment capable of obtaining, sieving, and weighing samples of the coarse aggregate as follows:

ASTM C-33 AGGREGATE SIZE	APPROXIMATE SIZE OF SAMPLE
#8 and #57	500 lb
#67	500 lb

The equipment shall be capable of running a complete sieving, of any required sample, without the necessity of intermittent loading. To accomplish this, adequate areas of individual sieves and controlled feeding of samples shall be provided. The assembly shall be designed to permit selection, screening, and weighing of any individual sample in 10 minutes or less. The equipment shall be designed by a company engaged in the design and manufacture of aggregate sieving devices. The Contractor shall have complete responsibility for providing equipment that will accomplish the desired purpose. Sieves shall meet the applicable requirements of ASTM E 11, except for the frame size requirements. The equipment shall be arranged so that all controls will be enclosed and operable from a single position commanding a view of the screen device and the scale or scales. Communication shall be provided from the batch plant operation to this

control area. The Contractor shall be responsible for charging of the assembly as directed, disposal of waste material, and proper service and maintenance of the assembly. Each sieve shall be provided with individual controls for frequency and angle. The Contractor shall run correlation tests with equipment as used for ASTM C 136 before concrete placement begins and at least every 60 days while concrete is being placed. The correlation test will determine the optimum angle, volume of feed, and the frequency for each sieve.

3.2 TESTS AND INSPECTIONS

3.2.1 General

The Contractor shall perform the following inspections and tests as described, and, based upon the results of these inspections and tests, he shall take the action required and submit reports as required. All Quality Control testing performed by the Contractor shall be provided to the Contracting Officer on a daily basis. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall cease. The laboratory performing the tests shall conform with the requirements given in ASTM C 1077. The individuals who sample and test concrete or the constituents of concrete as required in this specification shall hold a current certification as ACI Concrete Laboratory Testing Technician, Grade 1 and ACI Concrete Field Testing Technicians, Grade I. Individuals who are performing inspections shall be certified as ACI Concrete Transportation Construction Inspectors. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once every two years thereafter for conformance with ASTM C 1077. The individual who performs the inspection of the QC lab shall have completed the requirements for certification as ACI Concrete Field Testing Technicians, Grade I.

3.2.2 Testing and Inspection Requirements

3.2.2.1 Fine Aggregate

- a) Grading - At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The percent of fines shall be determined weekly in accordance with ASTM C 117. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. The results shall be recorded on a sheet on which are also shown the specification limits applicable to the project.
- b) Fineness Modulus Control Chart - Results for fineness modulus shall be grouped in sets of three consecutive tests, and the average and range of each group shall be plotted on a control chart. The upper and lower control limits for average shall be drawn 0.10 units above and below the target fineness modulus, and

the upper control limit for range shall be 0.20 units above the target fineness modulus.

- c) Corrective Action for Fine Aggregate Grading - When the amount passing any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure for any sieve, the fact shall immediately be reported. Whenever a point on the fineness modulus control chart, either for average or range, is beyond one of the control limits, the frequency of testing shall be doubled. If two consecutive points are beyond the control limits, the process shall be considered out of control and concreting shall be stopped. The Contractor shall notify the Contracting Officer, and take immediate steps to rectify the situation. After two consecutive points have fallen within the control limits, testing at the normal frequency may be resumed.
- d) Moisture Content Testing - At least four times during each 8-hour shift when the concrete plant is operating, tests for moisture content in accordance with ASTM C 566 shall be performed. ASTM C 566 moisture content testing shall be used to check and/or calibrate the moisture probe during production. The times for the tests shall be two prior to starting concrete placement, and two selected randomly within the 8-hour period. Additional tests shall be made whenever the slump is shown to be out of control or excessive variation in workability is reported by the placing foreman. The results of tests for moisture content shall be used to adjust the added water in the control of the batch plant.
- e) Moisture Content Corrective Action - Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine-aggregate batcher and water batcher shall be adjusted (directly or by means of a moisture compensation device).

3.2.2.2 Coarse Aggregate

- a) Grading - At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The percent of fines shall be determined weekly in accordance with ASTM C 117. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When facilities are available to test samples five times as large as those required in ASTM C 136, no averaging shall be done.
- b) Corrective Action for Grading - When the amount passing any sieve

is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported. Where two consecutive averages of five tests (or two consecutive tests where large samples are used) are outside specification limits, the operation shall be considered out of control, and that fact shall be reported, concreting shall be stopped, and immediate steps shall be taken to correct the grading.

- c) Coarse Aggregate Moisture Content - A test for moisture content of each size group of coarse aggregate shall be made at least once a shift. When two consecutive readings for smallest size coarse aggregate differ by more than 1.0 percent, frequency of testing shall be increased to that specified previously for fine aggregate.
- d) Coarse Aggregate Moisture Corrective Action - Whenever the moisture content of any size of coarse aggregate changes by 0.5 percent or more, the scale setting for the coarse aggregate batcher and the water batcher shall be adjusted to compensate for this.
- e) Particle Shape Testing - When in the opinion of the Contracting Officer, a problem exists in connection with aggregate particle shape, tests shall be made in accordance with ASTM D 4791. Testing frequency shall be not less than one per day, when directed.
- f) Particle Shape Corrective Action - When testing for particle shape is required, two consecutive failures in the same sieve size shall be immediately reported to the Contracting Officer, who shall determine what corrective action is needed.

3.2.2.3 Quality of Aggregates

- a) Frequency of Quality Tests - Along with submitting samples for preconstruction testing and 30 days prior to the start of concrete placement, the Contractor shall perform the tests for aggregate quality in the following list. In addition, after the start of concrete placement, the Contractor shall perform tests for aggregate quality in accordance with the following frequency schedule. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

PROPERTY	FREQUENCY		TEST
	FINE AGGREGATE	COARSE AGGREGATE	
Specific Gravity	Every 3 months	Every 3 months	ASTM C 127
			ASTM C 128
Absorption	Every 3 months	Every 3 months	ASTM C 127
			ASTM C 128
Durability Factor using	Every 12 months	Every 12 months	COE CRD-C 114

PROPERTY (Procedure A)	FREQUENCY		TEST
	FINE AGGREGATE	COARSE AGGREGATE	
Alkali Silica Reactivity	Every 12 months	Every 12 months	ASTM C 1260
Clay Lumps and Friable Particles	Every 3 months	Every 3 months	ASTM C 142
Organic Impurities	Every 3 months	Not applicable	ASTM C 40
L.A. Abrasion	Not applicable	Every 6 months	ASTM C 131 ASTM C 535
Soft and Friable (Scratch Hardness)	Not applicable	Every 6 months	COE CRD-C 130
Chert, less than 2.40 specific gravity	Every 6 months	Every 6 months	ASTM C 123
Coal and Lignite, less than 2.00 specific gravity	Every 6 months	Every 6 months	ASTM C 123
Petrographic Examination	Every 12 months	Every 12 months	ASTM C 295

Test limits shall be in accordance with the requirements of Paragraph 2.1.5.5 Aggregate Quality.

Corrective Action for Aggregate Quality - If the result of a quality test fails to meet the requirements for quality during submittal of samples for preconstruction testing or immediately prior to start of concrete placement, production procedures or materials shall be changed and additional tests shall be performed until the material meets the quality requirements prior to proceeding with either preconstruction testing or starting concrete placement. After concrete placement commences, whenever the result of a test for quality fails the requirements, the test shall be rerun immediately. If the second test fails the quality requirement, the fact shall be reported and immediate steps taken to rectify the situation.

3.2.2.4 Scales

- a) Weighing Accuracy - The accuracy of the scales shall be checked by test weights at least once a month for conformance with the applicable requirements of paragraph EQUIPMENT. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors.
- b) Batching and Recording Accuracy - Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. The Contractor shall confirm that the calibration devices described in paragraph EQUIPMENT for checking the accuracy of dispensed admixtures, are operating properly.
- c) Scales Corrective Action - When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.2.2.5 Batch-Plant Control

The measurement of all constituent materials including cementitious materials, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during plant operation.

3.2.2.6 Concrete

- a) Air Content - At least two tests for air content shall be made on randomly selected batches of each concrete mixture produced during each 8 hour period of concrete production and on two randomly selected batches during each period. Tests shall also be made whenever test cylinders are made. Additional tests shall be made when excessive variation in workability is reported. Tests shall be made in accordance with ASTM C 231. The average of each set of two tests for each mixture shall be plotted on control charts on which the average percent and upper and lower limits are set in accordance with paragraph CONCRETE MIXTURE PROPORTIONING for each NMSA. The range between two consecutive tests for each mixture shall be plotted on a control chart on which the upper control limit is 3.0 percent. Samples for air content shall normally be taken at the mixer, however the Contractor is responsible for delivering the concrete to the forms at the proper air content. Samples shall be taken at the placement site as often as required,

depending on the Contractor's delivery method, to determine any air loss.

- b) Air Content Corrective Action - Whenever points on the control chart approach the upper or lower control limits, an adjustment should be made in the amount of air-entraining admixture batched. If a single test result is outside the specification limit, immediate adjustment is mandatory. As soon as practical after each adjustment, another test shall be made to verify the correction of the adjustment. Whenever a point falls above the upper control for range, the dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility. Whenever two consecutive points either for average or range are outside the control limits, the Contracting Officer shall be notified.

- c) Slump Testing - At least two slump tests shall be made in accordance with ASTM C 143/C 143M on each concrete mixture produced during each 8-hour period or less of concrete production each day and on two randomly selected batches during each period. Tests shall also be made whenever test cylinders are made. Additional tests shall be made when excessive variation in workability is reported. The result of each test for each mixture shall be plotted on a control chart on which the upper and lower limits are set as specified in paragraph CONCRETE MIXTURE PROPORTIONING. The range shall be plotted on a control chart on which the upper control limit is 2 inches. Samples for slump shall be taken at the mixer, however the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, samples shall be taken at the placement site as often as required by the Contracting Officer.

- d) Slump Corrective Action - Whenever points on the control chart approach the upper or lower control limits, an adjustment shall be made in the batch weights of water and fine aggregate. If the concrete contains a water reducing admixture, this dosage shall be adjusted first. The adjustments are to be made so that the total water content does not exceed that amount specified in the mixture proportions provided based on the free water available with the aggregates and that amount of water batched. If the adjustments to the batch weights of water and aggregates do not satisfactorily produce the required slump, the Contracting Officer may adjust the mixture proportions if the fine-aggregate moisture content is stable and within the required limits. When a single slump is outside the control limits, such adjustment is mandatory. As soon as practical after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range above the upper control limits, the slump shall be considered to be out of control, the concreting operation halted, and the additional testing for aggregate moisture content

required shall be undertaken, and action taken immediately to correct the problem.

- e) Temperature - The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064/C 1064M. The temperature shall be reported along with the compressive strength data.
- f) Compression Test Cylinders - At least one set of test cylinders shall be made each shift on each different concrete mixture placed during the shift. Additional sets of test cylinders shall be made, as directed, when the mixture proportions are changed or when low strengths have been detected. A random sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to start of construction. The plan shall assure that sampling is done in a completely random and unbiased, not just haphazard, manner. A set of test cylinders for all site produced concrete except that specified in Section 03800 TREMIE MASS CONCRETE AND UNDERWATER GROUT, shall consist of seven cylinders, two to be tested at 7 days, two at 28 days, two at 90 days, and one held for future testing. All test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. All compressive strength tests shall be reported immediately. Quality control charts shall be kept for individual strength tests, moving average for strength and moving average for range for each mixture. The charts shall be similar to those found in ACI 214.

3.2.2.7 Inspection Before Placing

Reinforcing, forms, and embedded items shall be inspected by the Contractor in sufficient time prior to each concrete placement in order to certify that they are ready to receive concrete. The results of each inspection shall be reported in writing.

3.2.2.8 Concrete Placement

- a) Placing Inspection - The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, yardage placed, and method of placement.
- b) Placing Corrective Action - The placing foreman shall not permit placing to begin until he has verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.2.2.9 Vibrators

- a) Vibrator Testing and Use - The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing.
- b) Vibrator Corrective Action - Any vibrator not meeting the requirements of paragraph EQUIPMENT shall be immediately removed from service and repaired or replaced.

3.2.2.10 Curing

- a) Moist Curing Inspections - At least twice each shift, and twice per day on nonwork days an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.
- b) Moist Curing Corrective Action - When a daily inspection report lists an area of inadequate moistness, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by one (1) day.
- c) Membrane Curing Inspection - No curing compound shall be applied until the Contractor's authorized representative has verified that the compound is properly mixed and ready for spraying. At the end of each operation, he shall estimate the quantity of compound used by measurement of the container and the area of concrete surface covered and compute the rate of coverage in square feet per gallon. He shall note whether or not coverage is uniform.
- d) Membrane Curing Corrective Action - When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.
- e) Sheet Curing Inspection - At least once each shift and once per day on nonwork days, an inspection shall be made of all areas being cured using sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.
- f) Sheet Curing Corrective Action - When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by one (1) day.

3.2.2.11 Cold Weather Protection and Sealed Insulation Curing

At least once each shift and once per day on nonwork days an inspection shall be made of all areas subject to cold weather protection. The protection system shall be inspected for holes, tears, unsealed joints, or other incongruities which could result in damage to the concrete. Special attention shall be taken at edges, corners, and thin sections. Any deficiencies shall be noted, corrected, and reported.

3.2.2.12 Cold Weather Protection Corrective Action

When a daily inspection report lists any holes, tears, unsealed joints, or other incongruities, the deficiency shall be corrected immediately and the period of protection extended for one (1) day.

3.2.2.13 Mixer Uniformity

- a) Stationary Mixers - Prior to the start of concrete placing and once every 3 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the longest time interval, uniformity of concrete mixing shall be determined in accordance with paragraph EQUIPMENT. Tests shall be conducted on all types of mixes, conventional and tremie mass concrete, that the mixer is used to produce. The initial and every fourth set of tests shall be regular tests performed on three batches of concrete. Intermediate uniformity tests shall be abbreviated tests performed on a single batch of concrete. If the mixer fails the abbreviated test, a regular test shall be immediately performed. Whenever adjustments in a mixer or increased mixing time are required because of failure of a uniformity test, the mixer shall be reevaluated by a regular test after the adjustments have been completed. If the Contractor proposes to reduce a mixing time, a regular test shall be performed to evaluate the proposed time. Additional testing shall be performed when directed when there is visible evidence of possible improper mixer performance. Results of all uniformity tests shall be reported in writing.
- b) Truck Mixers - Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94/C 94M. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory. Results of tests shall be reported in writing.

3.2.2.14 Mixer Uniformity Corrective Action

When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.2.3 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all Contractor quality control records.

-- End of Section --

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Amendment #0004
SECTION 03800

TREMIE MASS CONCRETE AND UNDERWATER GROUT

PART 1 GENERAL

1.1 SUMMARY

This section addresses the basic requirements for mass tremie concrete which is to be placed underwater by the tremie method and grout to be placed underwater in order to seal and plug the tremie holes in the precast dam shells, including the precast elements for the tainter gate sill, stilling basin, navigable pass, and boat abutment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 01130	ENVIRONMENTAL PROTECTION
Section 01720	UNDERWATER CONCRETE FIELD DEMONSTRATIONS
Section 03201	STEEL BARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT
Section 03300	GENERAL CONCRETE REQUIREMENTS
Section 13500	INSTRUMENTATION PROGRAM
Section 13517	THERMISTER
Section 13530	INSTRUMENTATION CABLE, SPLICES, AND CONDUITS
Section 13854	UNDERWATER CORING
Section 13855	SOUNDING EQUIPMENT FOR TREMIE PLACEMENT

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 1997) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214.3R	(1997) Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(2000e1) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 39	(1996) Compressive Strength of Cylindrical

Concrete Specimens

ASTM C 78	(2002) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 94/C 94M	(2000e2) Standard Specification for Ready-Mixed Concrete
ASTM C 117	(1995) Standard Test Method for Materials Finer Than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(2001) Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C 128	(2001) Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate
ASTM C 138	(1992) Unit Weight, Yield, and Air-Content (Gravimetric) of Concrete
ASTM C 143	(1990a) Slump of Hydraulic Cement Concrete
ASTM C 172	(1999) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 232	(1999) Standard Test Methods for Bleeding of Concrete
ASTM C 289	(1994) Potential Alkali-Silica Reactivity of Aggregates
ASTM C 295	(1998) Standard Guide for Petrographic Examination of Aggregates for Concrete
ASTM C 403	(1999) Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM C 942	(1999) Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
ASTM C 1064	(1986; R 1993) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(2002) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM C 1240 (2001) Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout

CORPS OF ENGINEERS CONCRETE AND CEMENT HANDBOOK (COE CRD-C)

CRD C61-89A (1989) Test Method for Determining the Resistance of Freshly Mixed Concrete to Washing Out in Water

CRD-C 100 (1975) Method of Sampling Concrete Aggregate and Aggregate Sources, and Selection of Material for Testing

EC 1110-2-6052 (2001) Structural Design of Precast and Prestressed Concrete for Offsite Prefabricated Construction of Hydraulic Structures

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA TMMB-01 (1992) Truck Mixer Agitator and Front Discharge Concrete Carrier Standards of the Truck Mixer Manufacturers Bureau

NRMCA CPMB 100 (1996) Concrete Plant Standards

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the approving authority who will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concreting Plan; G ARE

A plan shall be submitted to the Contracting Officer for comment and approval at least 60 days prior to the start of placement of any tremie concrete. The plan shall describe the equipment and methods proposed for each area of placement, including, but not limited to:

- 1) Tremie Mass Concrete within the Tainter gate sill segments;
- 2) Tremie Mass Concrete within the stilling basin segments;
- 3) Tremie Mass Concrete within the wicket gate dam segments;
- 4) Tremie Mass Concrete within the pier wall segments;

- 5) Tremie Mass Concrete within the fixed crest weir.

A single plan for all areas of placement may be submitted or a separate plan may be submitted for each placement. The content of the plan(s) shall show and describe the equipment and methods proposed and shall include, but not be limited to, the following:

- 1) Preparation of foundations and construction joints prior to tremie concrete placement.
- 2) Concrete production plan (batching and mixing), including the timing and sequence of the introduction of the concrete constituents, and temperature and moisture control of the concrete constituents, mixing speed and duration.
- 3) Transportation and conveyance from the mixer to the point of placement.
- 4) Sampling and testing of concrete.
- 5) Placement procedure, sequence, schedule, and monitoring of tremie placement progress, including the sounding method and frequency, and diving inspection plan.
- 6) A contingency plan for dealing with unanticipated interruption to concrete placements.
- 7) Means and methods for removal of the tremie work platform and finish of any exposed tremie concrete surface.
- 8) Protection of fresh concrete.
- 9) Identification of defective concrete (NDT Testing).
- 10) Repair of defective concrete, if any.

The timing and sequence of the various steps shall also be described in the plan. The plan shall be of sufficient detail to demonstrate that equipment and methods are appropriate for the tremie concrete of structural grade, and that the work conforms to the general requirements of Division 3 - CONCRETE, and the specific requirements specified herein. The plan will be subject to review and approval by the Contracting Officer. Once approved, the Contractor shall follow all procedures set forth in the plan. Any revisions to the plan shall be submitted to the Contracting Officer for approval.

SD-02 Shop Drawings

Work Platform Drawings; G AR

The Contractor shall furnish and install a tremie work platform for each shell from which tremie concrete operations will be conducted. The tremie

work platform may be the same as the lift frame as shown on the plans. The Contractor shall develop a complete tabulation of expected load cases and structural analyses for review by the Contracting Officer. Drawings shall identify all necessary materials for construction of the platform and shall indicate the weight of these materials. The extent of the work platforms as shown may be expanded during the progress of the work to accommodate the various construction operations. Additions/revisions to the work platform during later phases of the work shall also be supported with detailed drawings and computations. If the Contractor select to use tremie work platforms that are the lift frames, the Contractor shall submit detailed drawings and supporting structural calculations for these platforms.

Batch Plant and Concrete Delivery System Layout; G AER

The Contractor shall prepare and submit complete drawings that show the layout of the batch plant, concrete delivery system, and details of the equipment. These drawings shall be submitted along with the Concreting Plan.

SD-03 Product Data

Batch Plant; G AER

The Contractor shall submit the design, details, and manufacturer's data on the batch plant to the Government for review and approval. These data shall be submitted along with the Concreting Plan. The batch plant shall conform with the requirements of paragraph "Batch Plant, Mixer And Delivery System".

Mixers; G AER

The make, type, capacity, and number of the concrete mixer(s) proposed for use shall be submitted with the Concreting Plan. The mixer(s) shall conform with the requirements of paragraph "Batch Plant, Mixer And Delivery System".

Conveying Equipment; G AER

The methods and description of the equipment proposed for transporting, handling, and depositing the concrete shall be submitted for review 60 days before concrete placement begins. The data submitted shall include site drawings or sketches with locations of equipment and placement site.

SD-06 Test Reports

Inspections and Tests

Inspection and test of daily concrete production shall be reported daily, and shall include test results and control charts.

SD-07 Certificates

Qualifications; G R

Written documentations on qualification of the Contractor's Quality Control Manager and superintendents who will oversee the concrete production and placement operations. The qualification statements shall meet the general requirements in Section 03300 GENERAL CONCRETE REQUIREMENTS, and shall include recent project experience related to underwater concrete construction and marine operations.

1.5 GENERAL REQUIREMENTS FOR TREMIE MASS CONCRETE

1.5.1 Tolerance

Except as otherwise specified herein, tolerances for concrete batching and mixture properties as well as definition of terms and application practices shall be in accordance with Section 03300 GENERAL CONCRETE REQUIREMENTS and NRMCA CPMB 100.

1.5.2 Strength Requirements

Specified compressive strength (f'c) of the tremie concrete shall be 5000 psi in 90-day.

Compressive strength of tremie concrete shall be determined in accordance with ASTM C 39 and the test procedure shall conform with the requirements as specified in Section 03300 GENERAL CONCRETE REQUIREMENTS. Investigation of low-strength compressive test results and load tests shall follow the procedures as specified in Section 03300 GENERAL CONCRETE REQUIREMENTS.

1.5.3 Water-Cement Ratio

Maximum water-cementitious materials ratio (w/c) for the tremie concrete shall be 0.38. The w/c may cause higher compressive strength than that as specified in Paragraph "Strength Requirements". The maximum w/c required will be the equivalent w/c as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag or fly ash is used, the weight of the silica fume, GGBF slag, and fly ash shall be included in the equations of ACI 211.1 for the term P which is used to denote the weight of pozzolan. The total weight of water shall be used to calculate w/c, and shall include the water batched, ice, aggregate moisture, and the water in admixtures and silica fume slurry, if used.

1.5.4 Slump and Slump Flow

Slump of the tremie concrete, as delivered to the point of placement, shall be within the limits of 8 to 10 inches. Slump shall be determined in accordance with ASTM C 143.

Slump flow of the concrete, as delivered to the point of placement, shall be within the limits 16 to 20 inches. Slump flow of the concrete shall be determined as follows: After performing the slump test, the diameter of the concrete spread is measured in the direction of maximum spread and in the direction perpendicular to the maximum spread to an accuracy of 0.25 inch. The average value of the two measurements is reported as the slump

flow. If an anti-washout admixture is used in the concrete, the measurements should be taken approximately 30 seconds after removal of the slump cone.

1.5.5 Slump and Slump Flow Retention

Adequate slump and slump flow shall be maintained over time to accommodate the potential time delay in mixing, transport, and placement of the concrete. As a minimum, the tremie concrete shall retain 7 inches slump and 14 inches slump flow within 60 minutes after mixing.

1.5.6 Washout

Washout of the tremie concrete shall be tested in accordance with CRD C61-89A. The acceptable test results for the concrete mixture is five (5) percent washout by mass or less.

1.5.7 Bleed Water

Bleeding of concrete placed underwater shall be tested in accordance with ASTM C 232, Method A. Bleed water for the tremie concrete shall be restricted to a maximum of 0.5 percent when tested over a period of 8-hours.

1.5.8 Time of Set

Setting of concrete placed underwater shall be tested in accordance with ASTM C 403. Initial time of set for tremie mass concrete shall be restricted to a range of 6 hours to 24 hours. Final set shall be achieved in less than 30 hours. In addition, the time of set shall be appropriate to accommodate mixing, transport, and placement of the concrete.

1.5.9 Concrete Temperature

The temperature of the concrete as delivered to the point of placement shall be between 40 degrees F and 65 degrees F, when tested in accordance with ASTM C 1064.

1.5.10 Technical Service for Specialized Concrete

The services of a factory trained technical representative shall be obtained to oversee batching and mixing of the tremie concrete containing an anti-washout admixture and/or silica fume. The technical representative from the manufacturer of the admixtures shall be on the job full time until the Contracting Officer is satisfied that field controls indicate concrete of specified quality is consistently furnished and that the Contractor's crews are capable of performing satisfactory work on their own.

1.6 GENERAL REQUIREMENTS FOR GROUT

The Contractor shall be responsible of proportioning the grout mix that meets the specified requirements. Proportions of the grout shall be based on trial batch tests to meet the requirements specified hereafter. The Contractor shall be responsible for adjusting the grout mix on site to meet the requirements specified hereafter.

The compressive strength of grout samples per ASTM C 942 shall attain 7,000 psi at 28 days.

The water-to-cement ratio shall not exceed 0.36.

The grout mixture shall contain at least 8% silica fume and Type F - fly ash in the range of 10 to 25 percent by weight of the cementitious materials.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

Materials for the tremie concrete shall comply with Section 03300 GENERAL CONCRETE REQUIREMENTS and the requirements specified in this section.

2.1.2 Aggregates

The minimum saturated surface dry bulk specific gravity of coarse aggregates shall not be less than 2.6, and the maximum absorption shall be exceed 2.0 percent per ASTM C 127.

The minimum saturated surface dry bulk specific gravity of fine aggregates shall not be less than 2.6, and the maximum absorption shall be exceed 2.0 percent per ASTM C 128.

2.1.3 Limestone Powder

Limestone powder in the concrete shall contain at least 75% calcium carbonate by mass. The clay content of the limestone shall not be more than 1.2% by mass. The organics in the limestone shall not exceed 0.2% by mass. Limestone powder shall contain less than 3% dolomite ($MgCO_3$). If the limestone powder has no previous record for use in concrete mixtures, the Contractor shall conduct petrographic analysis in accordance with ASTM C 295 and alkali reactivity analysis in accordance with ASTM C 289. Limestone powder may be obtained from Mississippi Lime, Co. P.O. Box 2247, Alton IL.

2.1.4 Silica Fume

Silica fume shall conform to ASTM C 1240. Available alkalies in silica fume shall conform to the optional limit as defined in Table 2, "Optional Chemical Requirements", of ASTM C 1240. The specific surface area, uniformity requirements, and reactivity with cement alkalies shall conform to the optional limits as defined in Table 4, "Optional Physical Requirements", of ASTM C 1240.

2.1.5 Anti-Washout Admixture

Anti-washout admixture shall be effective in prevention of cement washout and laitance formation when concrete containing the admixture is placed

underwater by the tremie method. When the admixture is used at the manufacturer's recommended dosage, the concrete shall meet the washout test requirement as specified in this Section.

2.2 CONCRETE MIXTURE PROPORTIONS

The Government will provide the tremie concrete mixture proportions. The Contractor shall be responsible for all the necessary field adjustments of the mixture to account for various field factors such as changes in moisture content of the aggregates or ambient temperatures in order to meet the requirements as specified in this section. The Contractor shall also make necessary field adjustments as directed by the Contracting Officer.

2.2.1 Concrete Mixture

Concretes shall be composed of cementitious materials, limestone powder, fine and coarse aggregate, and chemical admixtures. Estimated mix proportions for the tremie concrete are shown in Table 1. The estimated concrete mixture proportions are based on preliminary mixture design and initial trial batch testing. The mixture proportions are for information only. The tremie concrete mixture used in construction will be provided to the Contractor by the Government after the Contractor identifies the concrete material sources, sends representative material samples to Government, and receives Government's approval for these materials. During concrete production, no substitution shall be made in the source or type of materials without additional testing and approval.

2.2.2 Field Trial Batching

After all material sources have been approved and the mixture proportions have been developed by the Government, the Contractor shall conduct two (2) field demonstration tests of tremie concrete placement as described in Section 01720, UNDERWATER CONCRETE FIELD DEMONSTRATIONS. The mixture proportions provided by the study are the concrete mixture designs. The purpose of the field demonstration test is to verify that the mixture proportions complies with the specification requirements under the field conditions with the same materials and equipment as planned for construction. Test placements of tremie concrete shall be examined for bond to the precast concrete top slabs and side walls, amount of voids and laitance present, quality of the concrete in general and especially at the extreme end of the concrete flow, and concrete flow around embedded items. Cores shall be taken to test the compressive strength of the underwater concrete and the bond strength between the underwater concrete and the precast concrete forms. The Contractor shall follow the Contracting Officer's direction and make as many adjustments as necessary to ensure the final mixture proportions complying with the specifications before the field tests. All of the test results from the field demonstrations shall be submitted to the Contracting Officer. The Contracting Officer will review any and all adjustments to the final mixture prior to implementation.

2.2.3 MATERIALS FOR MIXTURE PROPORTIONING STUDY

The sources of concrete constitute materials proposed by the Contractor shall be submitted to the Contracting Officer for acceptance. Within 2

months after the Contractor receives the Notice to Proceed, samples of materials proposed by the Contractor for this project shall be delivered at the Contractor's expense to:

U.S. Army Corps of Engineers
Engineering Research Development Center (WES)
Structural Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Samples of materials shall be representative of those proposed for the project. It is the contractor's responsibility to select aggregates that meet the quality requirements of the specifications. The Contractor shall submit to the Government relevant material certifications, test reports and manufacturer literature to demonstrate that the selected sources have been capable of meeting the required specifications in the past and are anticipated to conform with the specified quality requirements.

Aggregates shall be taken under the supervision of the Contracting Officer in accordance with CRD-C 100. All other materials shall be obtained directly from the proposed sources. Quantities of materials required shall be as follows:

Coarse Aggregate, Size Designation #67	15,000 pounds
Fine Aggregate	15,000 pounds
Cement	2,000 pounds
fly ash	1,000 pounds
GGBFS	5,000 pounds
Limestone Powder	3,000 pounds
Silica Fume	800 pounds
Chemical Admixtures (per Table 1).....	7 gallons (Each)

If materials approval testing shows that a material used in the mixture proportioning study has failed to meet the requirements of the specifications, the Contractor shall resubmit a different source. Additional materials approval testing shall be performed at the contractor's expense. The Contractor shall submit different material to replace the material that was not approved for additional material approval testing.

PART 3 EXECUTION

3.1 CONCRETE REQUIREMENTS

3.1.1 Tremie Concrete Requirements

The tremie mass concrete as placed in the dam segments shall be a highly flowable, non-segregating and self-compacting mixture. The concrete shall be placed by a gravity feed system and shall possess the ability to flow readily through the tremie pipe, and flow laterally through and around steel reinforcement, pile heads and other embedded items. Pumping the concrete to a tremie hopper may be used. Pumping the concrete directly into water will not be permitted.

3.1.2 Additional Concrete Criteria

The slump, slump flow, bleed water, washout, set time, and temperature requirements for tremie concrete at the point of placement shall be in compliance with the specifications in this section. Contractor shall be responsible for all the necessary field adjustments of the mixture to account for various field factors such as changes in moisture content of the aggregates and ambient temperatures. Any Contractor's field adjustment to the tremie concrete mixture shall be approved or directed by the Contracting Officer.

3.2 PRODUCTION OF CONCRETE

3.2.1 General

Production of tremie concrete shall be in accordance with Section 03300 GENERAL CONCRETE REQUIREMENTS except for the requirements as specified in this section.

The Contractor may select to use a floating batch plant. Alternatively, The Contractor may select to use transit mixers to produce tremie concrete on barge near the placement site. However, delivery of the tremie mass concrete that is mixed onshore and transported to the dam site for placement through either transit mixer(s) or pumpline(s) will not be permitted.

The Contractor shall develop and submit for the Government approval a concrete production plan for the production method selected. The proposed production plan shall include proper means and methods for preventing loss of cementitious materials, such as installation of dust seals, and for controlling the effects of moisture variations in aggregates. At least 120 days prior to the actual concrete production, the Contractor shall conduct a trial run using the concrete production method and equipment to prove that the concrete meets all the requirements specified in this section.

The batching sequence and required minimum mixing time for tremie concrete shall be established in the field demonstration tests and uniformity tests, and approved by the Contracting Officer. The Contractor shall anticipate an increase in the required mixing time for production of tremie concrete containing an Anti-washout admixture.

3.2.2 Storage and Delivery of Aggregates

Fine aggregates and coarse aggregates shall be stored separately and in such a manner as to prevent degradation, intrusion of foreign materials, and to control moisture.

All aggregates shall be thoroughly washed on shore prior to being delivered to the supply barge or to transit mixers. No washing of aggregates will be permitted on barge. The cleanliness of the aggregates shall be determined by tests in accordance with ASTM C 117. The amount of fine materials passing No. 200 sieve on surfaces of the aggregates by washing shall be less than 1 percent per ASTM C 117.

During concrete production, aggregates shall be sampled and tested by the Contractor as delivered to the mixer in accordance with Section 03300 GENERAL CONCRETE REQUIREMENTS. In addition, surface cleanliness shall be tested per ASTM C 117 at the start of the production and once every week.

3.2.3 Batch Plant, Mixer And Delivery System

Concrete shall be batched using an automatic or semi-automatic concrete batch plant. The batch plant shall conform to NRMCA CPMB 100, the requirements in Section 03300 GENERAL CONCRETE REQUIREMENTS, and as specified herein.

The capacity of the batching and mixing equipment shall be sufficient for completion of tremie concrete placement within each dam shell in one continuous operation. As a minimum, the batching, mixing, conveying and placing system shall have a peak production capacity of 150 cubic yards per hour. If the Contractor uses multiple crews, the plant capacity shall be increased accordingly.

3.2.4 Time Interval Between Mixing and Placing

Tremie concrete shall be placed within 60 minutes after introduction of the cement to water. The concrete shall be discharged to tremie pipes within 30 minutes after mixing or agitating has ceased.

3.2.5 Requirements for Floating Batch Plant

If the Contractor selects to use a floating batch plant, the plant shall conform to the requirements in Section 03300 GENERAL CONCRETE REQUIREMENTS, and the requirements as specified herein.

***3**

The plant shall be capable of ready adjustment of mixing water to compensate for the varying moisture contents of the aggregates, and to change the weights of the materials being batched. The plant shall also have a minimum drum size of 10 cubic yards. The floating plant shall be arranged so as to facilitate the inspection of all operations. Suitable facilities shall be provided for obtaining representative samples of aggregates from each bin or compartment for inspection or testing.

Automatic sampling and gradation testing of the aggregate will not be required for the floating batch plant, manual sampling and testing is acceptable.

***3**

The plant shall be equipped with a weight compensator to accurately compensate for the effects of list and trim of the barge on which the batch plant is being mounted. The weighing equipment and controls shall conform to the applicable CPMB Concrete Plant Standard requirements in NRMCA CPMB 100, except that the accuracy shall be within 0.2 percent of the scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. Tests shall be made in the presence of a Government inspector. Each weighing unit shall include a visible indicator that shall indicate the scale load at all stages of the weighing operation and shall show the scale in balance at zero load. The weighing equipment shall be arranged so that the concrete plant operator can conveniently

observe the indicators.

Fine aggregates, coarse aggregates, cement, GGBF slag, and silica fume shall be stored separately and in such a manner as to prevent degradation, intrusion of foreign materials, and to control moisture and temperature. These bins shall have a dust seal between the bin and the weight hopper. Power-operated gates shall be used to charge the cementitious materials and have a suitable "dribble" control to obtain the desired weighing accuracy.

***3**

Fine and coarse aggregates shall be weighed either in separate weigh batchers with individual scales or cumulatively in one weigh batcher on one scale. Aggregates shall not be weighed in the batcher with cement, fly ash, GGBF slag, and silica fume. Cement, fly ash, and GGBF slag may be batched cumulatively provided that cement is batched first. Water shall be batched separately from other concrete ingredients. **Silica fume shall also be batched separately from all other concrete ingredients.** *3

An accurate mechanical device for measuring and dispensing each chemical admixture shall be provided. Each dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharged automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Admixtures shall not be combined prior to introduction to the mixers.

3.2.6 Requirements for Use of Transit Mixers

The Contractor may select to dry-batch materials on shore and deliver the materials to one or more mixers on barge near the point of placement. The Contractor shall not mix the concrete on shore and use transit mixers or other conveyance equipment to deliver it to the dam site for placement. Mixing of the concrete must be performed near the point of tremie placement.

If the Contractor selects to use transit mixers to produce the tremie concrete, the materials, equipment, and procedure shall conform with the requirements of ASTM C 94/C 94M and as specified herein. Each transit mixer shall conform to NRMCA TMMB-01 and shall have a minimum drum size of 10 cubic yards.

At the Contractor's discretion, all concrete ingredients except for cementitious materials (Portland cement, GGBF slag, fly ash, and silica fume), chemical admixtures, and water may be delivered to the dam site by transit mixers. Portland cement, GGBF slag, and fly ash shall be stored in separate bins or compartments on barge near the mixers. These bins shall have a dust seal between the bin and the weight hopper. Power-operated gates shall be used to charge the cementitious materials and have a suitable "dribble" control to obtain the desired weighing accuracy. Cement, fly ash, and GGBF slag may be batched cumulatively provided that cement is batched first. Water shall be batched separately from other concrete ingredients.

Cementitious materials, admixtures, and water shall be introduced to the mixers immediately prior to mixing operations. The time period between completion of concrete mixing and placing shall conform with the requirements in Paragraph "Time Interval Between Mixing and Placing".

Tolerance limits for measuring materials for concrete production shall conform to Section 03300 GENERAL CONCRETE REQUIREMENTS and ASTM C 94/C 94M, except that the requirements for "Total Water" shall be revised from plus-or-minus 3.0 percent to plus-or-minus 2.0 percent. Water batcher filling and discharging valves shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. Water batcher shall be checked and calibrated at least once per every 8-hour shift.

The required minimum mixing time shall be established in accordance with the paragraph 3.2.1 "General". The Contractor shall anticipate a possible increase in the required mixing time due to difference in mixing efficiency between transit mixers and a stationary mixer for production of mass tremie concrete.

An accurate mechanical device for measuring and dispensing each chemical admixture shall be provided. Each dispenser for chemical admixtures shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharged automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Admixtures shall be added into the stream of mixing water being batched into the mix. Admixtures shall not be combined prior to introduction to the mixers.

3.2.7 Trial Production

At least 120 days prior to concrete production, a test of the batching plant and mixing and delivery systems shall be made in the presence of the Contracting Officer to check the adequacy of the systems and operating procedures. At least 12 cubic yards of concrete shall be produced and delivered to the dam site under conditions and in time periods similar to those expected during the tremie placement construction. The slump and slump flow of the concrete mixture shall be measured at the point where the tremie placement will take place in construction. The concrete produced in the test shall be either wasted or, after approved by the Contracting Officer, used for the field demonstration test as described in Section 01720 UNDERWATER CONCRETE FIELD DEMONSTRATIONS. All deficiencies found in plant operation, mixing operation, and delivery operation shall be corrected prior to the start of concrete placing operations. No separate payment will be made to the Contractor for labor or materials required by provisions of this paragraph. The Contractor shall notify the Contracting Officer of the trial operation not less than 7 days prior to the start of the trial operation.

3.2.8 Laboratory Area

The Contractor shall establish a on-site test laboratory on a barge for testing fresh tremie concrete and for fabricating and initial curing of concrete test specimens at the point of placement. The Contractor shall also establish a test laboratory on barge to house the moisture testing equipment for aggregates and to provide working space. The size, arrangement, and location of these rooms will be subject to approval. The Contractor shall provide electricity, air conditioning, heat, and water as

required for use in these laboratory areas.

3.2.9 Environmental Protection

The Contractor shall establish and maintain quality control for prevention of environmental pollution as the result of concrete production and placement operations. The Contractor shall not discharge into the river fuels, oils, bitumens, garbage, or other waste materials that may be harmful to plants, fish and wildlife. All aggregates used for production of concrete shall be washed on shore. No washing of aggregates or other concrete materials will be permitted on barge. Water used to wash and clean equipment used to mix, contain, produce and convey tremie concrete at the work areas shall not be discharged overboard or to the river, nor shall the equipment be washed in locations which would permit wash water to flow overboard or into the river. Wash water contaminated by cement, concrete, oil, or other pollutants shall be retained in suitable containers, transported off the work area and discharged to the designated disposal area. In addition, the concreting operations shall comply with the requirements in Section 01130ENVIRONMENTAL PROTECTION.

3.3 TRANSPORT OF CONCRETE

3.3.1 General

Tremie concrete shall be conveyed from the batch plant to the point of placement by methods that will prevent segregation or loss of concrete, excessive delay, loss of concrete workability, and excessive temperature change. When a transit mixer is used for mixing and transporting concrete, concrete shall be discharged to tremie pipes within 60 minutes after the cement is in contact with mixing water or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the cement to the mixing water. In addition, concrete shall be placed within 30 minutes after it has been discharged from a mixer to a non-agitating container. Conveying equipment shall be thoroughly cleaned after each operation and prior to initiation of a operation.

3.3.2 Transporting by Buckets or Hoppers

The tremie concrete may be delivered to other conveying devices by means of a bucket or a gated hopper. Concrete shall not be held in a non-agitating transfer hoppers or bucket for more than 30 minutes.

3.3.3 Transporting by Belt Conveyor

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Transportation of mass tremie concrete by belt conveyor from the Illinois bank to river placements will not be permitted. Local use of short conveyors or telescoping conveyors at the placement site will be allowed provided they do not exceed a 20 degree incline and do not cause segregation, and do not cause any degradation of fresh concrete properties.

***1**

3.3.4 Transporting by Pump

The tremie concrete may be delivered to a hopper over a tremie pipe by

pumping. Pumping concrete directly down into water will not be permitted. Pump lines for delivery of concrete shall be insulated and, in hot climate, painted with reflective paint.

3.4 REINFORCEMENT AND EMBEDDED ITEMS

Steel reinforcement and other embedded items shall be in accordance with the applicable requirements of Section 03201 STEEL BARS AND WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT. Steel and embedded items shall be installed as indicated on the drawings.

3.5 EQUIPMENT

3.5.1 Work Platforms

Work platforms for placement of tremie concrete will generally be the lift frames and be configured as shown on the contract drawings. These platforms shall be erected on each dam shell at the outfitting location prior to transport of the shell to the project site. Alternatively, the Contractor may select to design tremie work platforms other than the lift frames. The alternative design shall be submitted to the Contracting Officer for approval. The platform shall be designed to support all loads imposed by the tremie equipment and all other load conditions expected during construction. The Contractor shall develop a complete tabulation of expected loads and analyses for review by the Contracting Officer. The Contractor shall also select all necessary materials for construction of the platform. A complete set of detailed drawings of the work platform shall be submitted for the Contracting Officer's review. The extent and configuration of the platform may be expanded during the progress of the work to accommodate the construction. Additions/revisions to the work platform during later phases of the work shall also be supported with detailed drawings and computations and be approved by the Contracting Officer.

3.5.2 Tremie Equipment

The tremie pipe shall be of heavy-gauge steel pipe (minimum 1/2 inch thick) with an inside diameter greater than eight (8) times the nominal maximum aggregates size or 8 inches, whichever is larger. The tremie shall have a uniform diameter and smooth internal wall surface. All splices and joints shall be flush on the inside. Joints between tremie pipe sections shall be gasketed and bolted or by other method as approved by the Contracting Officer so as to be watertight throughout the tremie placement. Under no circumstance shall the tremie pipe be sharply bent to accommodate concrete placement. Aluminum pipe or equipment shall not be used for placing concrete.

Funnel-shaped hoppers at the top of all tremie pipes shall be of sufficient size and not be less than 2 cubic yards. Hoppers shall be of a size capable of receiving and passing the concrete into the tremie pipe at the capacity rate of the batching, mixing, and conveying equipment.

Each section of tremie pipe shall be suitably secured together and a gasket used at each joint to prevent leakage. The tremie pipe shall be marked to

allow quick determination of the distance from the surface of the water to the mouth of the tremie.

Tremie pipes shall be spaced and arranged as shown on the contract drawings. The tremie pipes and hoppers shall be supported on a stable frame or platform to keep its vertical position and to prevent horizontal movement during concrete placement. The platform shall be capable of supporting the tremie pipe while sections are being removed from the upper end of the tremie.

A power hoist shall be provided to raise the tremie pipe in a controlled manner. Hoisting equipment for raising and lowering tremie pipes as the concrete is placed and tools for connecting the pipe sections shall be continuously available and on hand.

A crane or other lift equipment shall be available at the site for complete removal of tremie pipes for the purpose of re-sealing or relocation.

3.5.3 Pumps

The pumping equipment shall be piston or squeeze-pressure positive displacement type. Pneumatic placing equipment shall not be used, unless otherwise approved. The pipeline shall be rigid-steel pipe or heavy-duty flexible hose. Aluminum pipe shall not be used. The inside diameter of the pipe shall be at least four (4) times the nominal maximum size of the coarse aggregate and not less than 4 inches. The nominal maximum size coarse aggregates shall not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned. Flushing water shall be wasted in one or more holding containers without spilling to the barge deck, the river, or the concrete that has already been placed.

3.5.4 Hoppers and Buckets

Hoppers on the top of tremie pipes shall have a size of at least 2 cubic yards capacity, and the interior hopper slope shall not be less than 58 degrees from the horizontal. The bucket gates shall be essentially grout tight when closed and shall be hydraulically operated in order to provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position. The minimum dimension of the clear gate opening shall be at least five times the nominal maximum size aggregate and the area of the gate opening shall not be less than two square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension.

3.5.5 Chutes

When concrete can not be placed in hoppers directly from a transporting vehicles, chutes attached to this equipment may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying

concrete.

3.6 PREPARATION FOR PLACEMENTS

The Contractor shall ensure that the bottom reinforcing steel does not obstruct the bottom of the tremie concrete placement pipe from resting on the geotextile fabric beneath the bottom reinforcing steel. All platforms, tremie pipes, ramps and walkways, as required, shall be completed prior to any tremie placement in order to allow safe and expeditious access for concrete and workmen. Snow, ice, flowing water, loose particles, debris and foreign matter shall have been removed. Reinforcement shall be secured in place; anchors and other embedded items shall have been positioned and anchored. The entire preparation shall be accepted by the Contracting Officer prior to preceding to tremie concrete placement. Concrete placements shall commence immediately after final inspection of the area of placement, reinforcing steel and embedded items.

3.7 PLACING REQUIREMENTS

3.7.1 General

Underwater concrete shall be placed by gravity feed using the tremie method. All procedures for placement of tremie concrete shall be included in the Contractor's Concreting Plan. The proposed concrete placement method will be subject to review and approval of the Contracting Officer. Concrete placements will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper transport and placement.

The tremie concrete placement shall ensure that the concrete flows out in a continuous and smooth manner that ensures against detrimental turbulence, water dilution, and segregation of the concrete. The tremie concrete shall be placed in a continuous operation until the concrete completely fills each dam shell and laitance on the top surface of the concrete flows out of the shell through vent holes.

The tremie concrete shall be conveyed from the mixer to the placing equipment as rapidly as practicable and by methods which prevent segregation or loss of concrete. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of horizontal cold joints while concrete is being placed.

Throughout tremie placement, the tip of the tremie pipe shall remain embedded in the fresh concrete at all times. At no time shall concrete be allowed to fall through water. The tremie pipe shall not be moved horizontally. To relocate, the tremie shall be lifted from the water, resealed, relocated and restarted. If the tremie pipe loses the seal during concrete placement, the placement shall be halted immediately, the tremie pipe be removed, resealed, and the placement restarted.

Sampling of fresh concrete shall be performed at the point of placement or as directed by the Contracting Officer.

3.7.2 Prerequisite of Work

Coordination meetings will be held prior to all major phases of the work during construction of dam segments. A pre-construction meeting with the Contracting Officer will be required at least 14 days prior to beginning the tremie concrete placement. The Contractor shall be responsible for calling the meeting; the Contractor's management staff, superintendent(s), and active quality control and installation personnel shall be present.

Weekly progress meetings with the Contracting Officer will be required as the tremie concrete placement progresses. The Contractor shall be responsible for calling the meeting; the Project Engineer, Concrete Superintendent and active installation personnel shall be present.

3.7.3 Concrete Placement Temperatures

Tremie concrete at the point of placement shall have a temperature of neither less than 40 degrees F nor more than 65 degrees F. Heating of the mixing water or aggregates shall not be permitted until the temperature of the concrete has decreased to 45 degrees F, and the heated concrete temperature shall not exceed 60 degrees F. The materials shall be free from ice, snow, and frozen lumps before entering the mixer. All placing equipment and methods shall be subject to review and inspection by the Contracting Officer. The temperature of concrete shall not exceed 65 degrees F. In hot weather, cooling of the mixing water and aggregates, and adding ice or Nitrogen may be required to obtain an adequate placing temperature. The Contractor shall make provisions with the concrete equipment to accommodate the temperature-control cooling method as planned to use.

3.7.4 Concrete Workability at the Point of Placement

The point of placement is defined as the location of the tremie hopper. If the concrete at the point of placement does not have the required slump and slump flow, the concrete will be rejected at no cost to the Government. Retempering of the concrete with water to achieve the required slump will not be permitted. Addition of water-reducing admixture for re-mixing concrete at the point of placement may be permitted upon approval of the Contracting Officer.

3.7.5 Initiation of Tremie Concrete Placement

Before initiation of tremie concrete placement, the prepared foundation bottom directly beneath the tremie hole on the precast dam shell shall be sounded and any obstruction shall be removed to accommodate insertion of a tremie pipe. The tremie pipe shall be a "dry" pipe and have an end plate at its tip with gaskets to completely seal the pipe and prevent water from running into the pipe. If there is no concrete at the location of the tremie pipe, the pipe shall be inserted through the tremie holes and seated onto the prepared foundation. Then, the dry pipe shall be filled with concrete up to 60 percent of the water depth. The pipe shall then be raised 6 to 8 to inches to allow concrete to flow out of the pipe. Meantime, concrete shall be continuously fed into the hopper above the tremie pipe at the placement rate as specified in the paragraph 3.7.8 "Placement Sequence and Rate".

If there is fresh concrete beneath the tremie pipe insertion, a dry tremie pipe with an end plate shall be inserted through the tremie pipe into the fresh concrete to a depth of at least 5 feet and no more than 10 feet. The tremie pipe shall then be supported on a tremie frame and concrete shall be continuously fed into the pipe. Go-devils or similar devices will not be permitted.

3.7.6 Weather Conditions for Placements

Concrete placement shall not be permitted when weather conditions prevent proper placement and consolidation, or when conditions will adversely affect the quality of the concrete. Unless otherwise specified or approved, the ambient temperature of the placement area shall be above 32 degrees F and the water temperature shall be above 36 degrees F.

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be responsible of taking special hot weather concrete placement measures to control the concrete temperature within the limit as specified in the paragraph 3.7.3 "Concrete Placement Temperature". Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. Nitrogen may be used to control concrete placing temperature. If necessary, conveying and placing equipment shall be cooled to maintain proper concrete placing temperature.

The Contractor shall include in his/her Concreting Plan submittal the means and methods for controlling the concrete placing temperature in hot weather. If ice will be used to control the concrete temperature in hot weather, the Contractor shall demonstrate that his/her ability to produce and provide ice to the mix in a consistent and reliable manner. If Nitrogen is used to control the concrete temperature, the mixer shall be equipped with Nitrogen injection ports.

3.7.7 Consolidation

Tremie concretes shall be self-compacting by gravity without segregation or excessive bleeding and laitance.

3.7.8 Placement Sequence and Rate

The Contractor shall place tremie mass concrete to completely fill each dam shell following the general sequences as required in the contract drawings.

These placing sequences have been checked for each precast dam shell for its structural strength and its stability against lateral and uplift movements under hydrostatic pressure of tremie concrete and other loads simultaneously acting upon it. The Contractor may propose alternative placing sequences for Government approval. The Contractor-proposed alternative placing sequences shall be supported with engineering calculations for all the critical load cases throughout the placement process. The calculation methods shall be in accordance with EC 1110-2-6052.

The calculations shall show that each precast dam shell will have adequate strength and, after set-down, adequate stability against lateral and uplift movement under expected load combinations.

Tremie concrete placement within each shell shall be continuous, but divided into a series of stages as defined in the contract drawings. Concrete will be fed into tremie pipes in different locations in different stages. The tremie placement is allowed to proceed to an adjacent tremie pipe only after the adjacent tremie pipe has immersed in concrete by at least 2 feet.

The rate of tremie concrete placement shall be controlled within the range of 0.50 to 1.5 foot of concrete rise per hour. The placement rate shall be controlled by the rate of concrete delivered to the tremie hopper. The rate of delivering concrete to each individual tremie pipe shall not exceed 90 cubic yards per hour. The Contractor may select use of multiple pumps to deliver concrete to several tremie pipes.

3.7.9 Placement Operations

Throughout placement, the tip of the tremie pipe shall remain embedded in the fresh concrete at least 2 feet at all times. At no time shall concrete be allowed to fall through the water.

During the placement, the tremie shall be relocated in accordance with the placement plan and on the basis of the concrete flow as indicated by soundings. When soundings dictate that the concrete has arisen to the required elevation as shown on the contract drawings, or when good quality concrete flows out of adjacent vent holes, the tremie concrete placement may proceed to the next stage. The tremie pipes shall be withdrawn from the lift frame, resealed with end plates and gaskets, and relocated to new locations for the next stage of tremie placement.

Restarting the tremie placement shall follow the standard procedure for initiation of the tremie placement as specified in paragraph 3.7.5 "Initiation of Tremie Concrete Placement".

3.7.10 Preparation of Cold Joints

Tremie placement shall continue uninterrupted until the entire portion of each placement is completed. If tremie concrete placement is interrupted, the interruption of placement shall not exceed 30 minutes without removal of the tremie pipe and carrying out the restarting procedure. If the concrete placement is halted for a period more than 3 hours, the entire placement shall be suspended. The Contractor shall wait until the concrete sets, prepare a construction joint with high pressure underwater jetting, and then re-initiate the tremie placement. The Contractor shall development the contingency procedures for preparation of cold joints underwater in the Concreting Plan. The Contracting Officer will review and approve all proposed procedures for making construction joints.

3.7.11 Completion of Placement and Finishing

Immediately after withdrawal of the tremie pipes, the Contractor shall proceed with bailing out the concrete left in the lift frame legs. During the tremie concrete placement, concrete in the lift frame legs shall never be allowed to be more than 3 feet above the top surface of the precast dam

shell, as measured with a +/- 2-foot tolerance. Concrete in the lift frame legs shall be completely bailed out before it sets.

The concrete surfaces at the tremie holes shall be constructed to smooth and dense surfaces, flush with the surrounding concrete surfaces, by means of precast concrete plugs and grout in accordance with the contract drawings and the procedure specified herein. Before the lift frame is removed from the precast shell, the tremie concrete inside the tremie hole shall be removed to a depth of eight (8) inches or more with a bailing tool. The space in the tremie hole shall be filled with neat cement grout. The cement grout shall be placed to displace water in the hole without dilution. The grout mixture shall conform to the requirements as specified Paragraph 1.6 of this section. A 11-1/4" diameter precast concrete plug, with two dowel bars, shall be pushed into the grout filled hole as shown on sheet S-357.

3.8 CONTINGENCY PLAN

3.8.1 Contingency Planning and Reaction

The Contractor shall prepare a Contingency Plan for tremie placement operations. The plan shall be submitted for review by the Contracting Officer. The plan shall be followed during all underwater concrete placements. As a minimum, the plan shall address the following minimum potential interruptions with proposed actions:

- 1) Breakdown of Batch Plant and/or Concrete Materials Supplies.
- 2) Breakdown of Tremie Equipment.
- 3) Plugging of the Tremie Pipe.
- 4) Breakdown of Concrete Conveying Systems.

3.8.2 Void Detection Between Top Slab and Tremie Mass Concrete

The Contractor shall use sonic or other approved non-destructive testing methods to detect voids or anomalies between the tremie mass concrete and the top slab of the precast dam segments in the Tainter gate bays. Any voids or anomalies detected shall be repaired using pressure grouting or other approved methods. Maximum pressure for pressure grouting or other similar methods shall be set to assure that no damage results to the dam shell or tremie mass concrete. Detection and repair methods shall be included in the concreting plan for tremie mass concrete, and shall be subject to approval by the Contracting Officer. Testing shall be conducted when the top slab is exposed after dewatering of individual Tainter Gate bay, but no sooner than 28 days following placement of the tremie mass concrete. As directed by the Contracting Officer, the Contractor shall conduct underwater coring in accordance with the requirements specified in Section 13854 UNDERWATER CORING.

3.9 QUALITY CONTROL

3.9.1 CONTRACTOR QUALITY CONTROL, TESTING AND INSPECTIONS

The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and shall submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall halt and the operation shall be corrected. The laboratory performing the tests shall be on site and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer's site, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and may also inspect them during the construction for conformance with ASTM C 1077.

3.9.1.1 Concrete Mixture

- a) Slump and Slump Flow Testing. Slump and slump flow tests in accordance with ASTM C 143 shall be made when strength test specimens are fabricated. At least three slump and slump flow tests shall be made on randomly selected batches for concrete produced during each 8-hour shift. Also, additional tests shall be made when excessive variation in workability/flowability is reported by the placing foreman or inspector. Concrete for the tests shall be sampled in accordance with ASTM C 172. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single slump or slump flow test reaches or goes beyond either the upper or lower limit as specified in this section, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the slump/slump flow of the batch to plot on both the control charts for slump/slump flow and the chart for range, and for determining need for any remedial action. Limits shall be set on separate control charts for slump/slump flow for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump/slump flow specified in paragraph "Slump" in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps/slump flows, respectively, as specified in the same paragraph. The range between each consecutive slump and slump flow test for the mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Samples for slump and slump flow shall be taken at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump and slump flow. If the Contractor's materials or transportation methods cause slump and slump flow loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the slump and slump flow at the mixer controlled as directed.
- b) Slump/Slump Flow Corrective Action. Whenever points on the control charts for slump or slump flow reach the upper or lower

warning limit, an adjustment shall immediately be made in the admixture doses. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified in this section. If the adjustments to the admixture doses do not satisfactorily produce the required slump/slump flow, the Contracting Officer may require adjustment of the mixture proportions if the fine-aggregate moisture content is stable and within the required limits. When a single slump or slump flow reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another slump/slump flow test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump or slump flow tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper, or below the lower action limit, the Contractor shall immediately take appropriate steps to bring the slump under control. Additional slump and slump flow tests shall be made as directed.

- c) Temperature. The temperature of the concrete shall be measured in accordance with ASTM C 1064 when concrete specimens for strength tests are fabricated. Additional tests shall be made when excessive variation in workability/flowability is reported by the placing foreman or inspector or as directed by the Contracting Officer. The temperature shall be reported along with the compressive strength data.
- d) Strength Specimens. At least one set of test specimens shall be made for compressive strengths for every 300 cubic yards of tremie concrete produced. At least three sets of test specimens shall be made on randomly selected batches for concrete produced during each 8-hour shift. Additional sets of test specimens shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when property variations have been detected. Concrete for the tests shall be sampled in accordance with ASTM C 172. A truly random (not haphazard) sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens shall consist of seven (7) specimens, two tested at 7 days, two at 28 days, two at 90 days, and one held in reserve. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39 for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph "Strength Requirements" in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214.3R.
- e) Unit Weight Testing. The unit weight of the concrete shall be

measured in accordance with ASTM C 138 when strength test specimens are fabricated.

- f) Bleed Water Testing. The amount of bleed water in the tremie concrete shall be tested in accordance with ASTM C 232, Method A at least once per 5 work days. Additional test may be required as directed by the Contracting Officer.
- g) Bleed Water Corrective Action. Whenever the amount of bleed water is determined to be in excess of the maximum limit of 1 percent, mixture proportions shall be immediately adjusted to reduce the amount of bleed water by increasing the amount of limestone powder, silica fume, and/or anti-washout admixture. Any changes to the concrete mixture design shall be approved by the Contracting Officer.
- h) Set Time Testing. The set time of the concrete shall be tested in accordance with ASTM C 403 at least once per 8-hour shift. Additional test may be required as directed by the Contracting Officer.
- i) Set Time Corrective Action. Whenever the set times are out of compliance with the required range required for the concrete as specified in this section, the mixture proportions shall be adjusted to bring the set times into compliance. Any changes to the concrete mixture design shall be approved by the Contracting Officer.
- j) Washout Testing. The amount of concrete lost due to washout shall be tested for the first batch of concrete produced on each shift and, afterwards, at a frequency of at least one test for every 600 cubic yards of tremie concrete produced. Additional tests shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when property variations have been detected. The Contractor shall conduct the test in accordance with CRD C61-89A. Only with the Contracting Officer's approval, the Contractor may conduct the test in accordance with CRD C61-89A with the following modifications: the mass of the concrete sample is not weighed and recorded between the three consecutive drops through the washout tube; and the concrete sample container is held still above water for only 15 seconds between the three consecutive drops rather than 2 minutes specified in CRD C61-89A.
- k) Washout Corrective Action. Whenever the amount of washout is determined to be in excess of the maximum limit of five (5) percent as required in the specifications, mixture proportions shall be adjusted to reduce the amount of washout by increasing the amount of anti-washout admixture, silica fume, and/or limestone powder. Any changes to the concrete mixture design shall be approved by the Contracting Officer.

3.9.2 GOVERNMENT QUALITY ASSURANCE, INSPECTION AND TESTING

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The Government will sample and test concrete during construction as

considered appropriate to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Representative test samples may be sent to a private laboratory, by the Contractor, for testing. Samples may be taken at the mixer or at the point of placement in accordance with ASTM C 31/C 31M. ***4**

TABLE 1: CONCRETE MIXTURE PROPORTIONS

Material	Proportions per cubic yard (SSD weight)
Type II Cement	128 lb
Class F Fly Ash	86 lb
GGBF Slag	438 lb
Silica Fume	37 lb
Fine Aggregate	1273 lb
Coarse Aggregate	1530 lb
Limestone Powder	202 lb
HRWRA (Sikament 300)	0.43 gal
WRA (Plastiment)	0.11 gal
Antiwashout (Sikament 100SC)	0.75 gal
Total Yield	3988 lb

NOTE: The estimated concrete mixture proportions presented in the table are based on preliminary mixture design and initial trial batch testing. The mixture proportions are information only for estimating the bid price of the contract. The actual tremie concrete design will be provided to the Contractor by the Government based on materials selected for the project and a subsequent mixture proportioning study.

-- End of Section --