SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 INTRODUCTION

Military Ocean Terminal Concord (MOTCO), formerly part of Naval Weapons Station Seal Beach Det Concord (NWSSBDC), is an active military installation located on the southern bank of the Sacramento River in Suisun Bay and approximately 5 miles north of the City of Concord, in Contra Costa County, California. This installation is subdivided by Port Chicago Hwy into two areas; the 115 acre Inland Area used primarily for administrative purposes and the 6,526 acre Tidal Area where all operational land uses occur. The acreage of the Tidal Area also includes 2,045 acres of offshore islands.

In 2008, MOTCO was subdivided from NWSSBDC and transferred from the Navy to the Army as part of the 2005 Defense Base Realignment and Closure (BRAC) program. The Tidal Area comprises the northern portion of the facility, which supports the receipt of munitions by either truck and/or rail; and then loaded (from three piers along the south bank of the Sacramento River) onto deep draft vessels for onward shipment. The land on the southern portion of the Tidal Area contains multiple transfer and storage pads, which are used for the transfer and/or staging of containerized munitions prior to their shipment. A significant portion of the Tidal Area is made up of wetlands while grassland hills provide a natural backdrop to the South.

As a result of the Base Realignment and Closure Commission's decision to close Oakland Army Base in 1995, the 834th Transportation Battalion moved its operation to this facility in October 1997. As such, this facility became the Department of Army's major ammunition transshipment port for the West Coast. The 834th is the sole operational port manager and maintains command of this installation. In addition to military munitions, the 834th is also responsible for coordinating the movement of Defense Transportation System general cargo through the commercial ports of Oakland, Port Hueneme, Los Angeles/Long Beach, and San Diego, California.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit the following items to the Contracting Officer:

Utility Outage Requests; G

Utility Connection Requests; G

Excavation Permits; G

Hot Work and Welding Permits; G

1.3 WORK COVERED BY CONTRACT DOCUMENTS

1.3.1 Project Description

The work includes the furnishing of all labor, materials, equipment, and incidental related work to complete the Replace/Upgrade Pier 2 project for container crane operations at Military Ocean Terminal Concord (MOTCO), Concord, California..

The work involves:

1. Demolish the existing Pier 2 Main Platform, West Trestle, Middle Trestle, and Pedestrian Trestle; and miscellaneous items onshore and on the East Trestle, and including removal and disposal of hazardous materials prior to demolition.

2. Remove timber piles and concrete piles;

3. Construct a new reinforced concrete West Trestle, and Main Platform to support two container cranes;

4. Construction includes installation of pre-stressed concrete piles; and appurtenant items for vessel berthing and for the container cranes, but not the cranes themselves.

5. Construct new utility services (electrical power, lighting, lightning protection, potable water, firewater, sewer, storm drainage, and communications/security);

6. Construct Operations Building on the Main Platform;

7. Strengthening and repair of the existing reinforced concrete East Trestle;

8. Construct an electrical substation including equipment foundations;

9. Construct miscellaneous improvements including the landside approach to the West Trestle, raise and repave portions of existing White Road, grading for the habitat restoration plan, the shoreline protection system, and the Port Chicago National Memorial White Road Crossing.

10. Discover and remove munitions and explosives of concern (MEC) from the construction footprint;

1.3.2 Location

The work shall be located at Pier 2, Military Ocean Terminal Concord, (MOTCO), Concord, California, approximately as indicated.

1.4 GENERAL REQUIREMENTS

1.4.1 Contractor Responsibility

In carrying out work under this contract, the Contractor shall provide all labor, supervision, services, materials, tools, equipment, facilities, and vehicles (as necessary) that are incidental to the work efforts described to provide construction services for the execution of the work.

Contractor shall review all Government furnished documents and requirements in the solicitation; accordingly adhere to these requirements; and complete a Government approved Work Plan for the construction of the proposed repairs. These documents shall address the following disciplines and specifications: structural, and environmental, UXO/MEC/hazardous materials and disposal; compliance with permits and Resource Agencies requirements; and any other incidental work in accordance with applicable standards and guidelines. Contractor shall comply with requirements stated in this summary of work; and this Specification.

Contractor shall accomplish work in accordance with requirements stated on the attached drawings and specifications; DDESB Approval of Explosives Safety Submission (ESS), dated September 27, 2013 with attached Final Explosives Safety Submission Munitions and Explosives of Concern Removal Action, dated August 6, 2013; Publication Number: EM 385-1-97 Title: Explosives - Safety and Health Requirements Manual; EM 385-1-1 Safety and Health Requirement Manual, dated 30 November 2014; OSHA CFR 29 Part 1926-Safety & Health Regulations for Construction; and other applicable Federal, State, and local requirements.

The Contractor shall assure any and all program and/or project-related costing information (regardless of its stage in development) is secured, as directed by the Contracting Officer (KO); and be responsible for safeguarding proprietary, classified, and other sensitive information. The Contractor shall be immediately capable of addressing and interpreting all aspects of construction laws and regulations.

1.4.2 Direction

The Contractor shall accept directions only from the Sacramento District Contracting Officer (KO) or the duly authorized Administrative Contracting Officer (ACO). Any changes to this contract will only be authorized in writing by the Contracting Officer. The Sacramento District ACO for this work will be determined in advance of the award of this work and will be advised prior to commencement of this work. In the event the Contractor receives either direction or criteria considered to be beyond the work described in this contract, the Contractor is directed not to proceed without confirmation from the Contracting Officer. The Contractor shall (in writing) describe both the changes and impact on the effort within five calendar days. The Contractor shall not modify, add, delete, and/or change (in any way) the instructions stated within this Contract without obtaining a modification from the Contacting officer.

1.4.3 Coordination with Other Government Agencies

The Contractor shall coordinate with the ACO and the MOTCO Department of Public Works (DPW) (and/or their designated Project Staff) if interface with other government agencies is required. Coordination with U.S. Coast Guard is required for shipping and any navigation related work.

1.4.3.1 Regulatory Interface

The Contractor shall assist in the application of both general and site specific regulatory requirements that pertain to this project and maintain currency with changing Department of Defense (DOD), federal, state, and local statutes and regulations as follows:

"The Contractor is not an employee of the government and shall not represent the government in an official or unofficial capacity without the

express prior written permission from the KO. In the event that an unspecified regulatory representative approaches the Contractor with a stated intent to inspect the activities of the Contractor, the Contractor shall respectfully decline the inspection until the KO is properly notified and a duly appointed representative is present or other direction is issued by the KO. In the event that this is not possible (due to project constraints), the Contractor shall notify (at the earliest time possible following the inspection) the KO, Contracting Officer Representative (ACO), and the MOTCO DPW."

1.4.4 Identification/Change of Critical Contractor Personnel

The Contractor shall submit an organizational chart displaying key personnel involved in their effort. The Contractor shall immediately notify the ACO of any changes in critical Contractor personnel. The Contractor shall obtain ACO approval of any proposed changes in project personnel (along with the steps taken/proposed) to ensure there are no impacts to either schedule or cost. Prior to signing any contract or initiating any work, the Contractor shall identify all subcontractors and their qualifications to the ACO.

1.4.4.1 Site Access Badges

The Contractor and their subcontractors shall obtain security badges, passes, cards, and/or vehicle decals. The Contractor shall be responsible for presenting all identifiable credentials (i.e. driver's license, Date of Birth, and US Citizenship) and ensure their accuracy (with verification from the Social Security Administration http://www.ssa.gov/employer/ssnv.html, the FBI Criminal Justice Information Services, Identification & Investigative Services Section (304 625-5590), and the Form 1-9 Employment Eligibility Verification (http://www.bcis.gov/graphics/howdoi/fageev.htm). The installation will provide the Contractor with access badges, vehicle passes, and/or entry permits within ***ten (10)*** ~~seven (7)~~ days of written notification of personnel names, per Section 01 14 00 Work Restrictions. The Contractor shall ensure all information remains current and that all security badges or passes are returned to the base POC upon expiration of the badge, completion of the project, and/or when possession of the badge is no longer necessary (e.g., upon removal of contracted personnel from specific projects).

Any Contractor employee unable to obtain a security access badge due to background check or other rationale will not be allowed access to the site.

1.4.5 Health Risks

The Contractor shall immediately report to both the KO and the ACO (either by telephone or e-mail) any issues or incidents, which may indicate potential imminent risk/s to contractor, federal, or local personnel, the public at large, or the environment. A written notification (w/supporting documentation to include photographic documentation (see Specification 01 14 00, Paragraph 1.4.2 for restrictions on photographs and requirements for camera passes) whenever appropriate) shall be prepared and delivered within three (3) working days to the KO. Upon request of the KO (or their ACO), the Contractor shall provide (via facsimile) pertinent raw laboratory data immediately (not to exceed 15 calendar days) and then provide (via standard mail) the final results (w/laboratory quality data) as soon as possible.

1.4.5.1 Safety Requirements

The Contractor shall be responsible for complying with Occupational Safety and Health Administration (OSHA) regulations, National Fire Protection Association (NFPA), and Base Safety office requirements, which includes the health and safety of their employees and personnel on-site; preventing damage to property, materials, supplies, and equipment; avoiding work interruptions. Contractor shall follow requirements stated in Specification Section 01 35 26 Governmental Safety Requirements. In addition, the Contractor shall perform all operations in a prudent, conscientious, safe, and professional manner. Furthermore, the Contractor shall maintain documentation (training records and Health and Safety Plans) on site and available for both workers and/or regulatory review. Finally, the Contractor shall provide (upon request) the KO copies of any OSHA report(s) regarding a project site.

The Contractor shall record and promptly report within 1 hour (by telephone, facsimile, or other direct means) to the KO or ACO, the MOTCO DPW, and to the Military Installation's Safety Office; all available facts relating to each instance of damage to Government property or injury to personnel (either Contractor or Government). In the event of an accident/mishap, the Contractor shall take reasonable and prudent action to establish control of the accident/mishap scene, prevent further damage to persons or property, preserve evidence (until released by the accident/mishap investigative authority through the KO), and immediately report (by dialing (925) 246-3911) the incident to the Installation Fire Department. If the government elects to perform an investigation of the accident/mishap, the Contractor shall cooperate fully through assisting government personnel until the investigation is completed.

While on federal property, the Contractor agrees that his personnel, project related documents, and equipment are subject to safety/security inspections by government personnel.

1.4.5.2 Fire Prevention and Protection

The Contractor and his employees shall comply with the Installation's regulations and the Department of Army's Occupational and Environmental Safety, Fire Prevention and Health Program, as applicable. A copy of these regulations will be made available by the MOTCO DPW at the post-award conference. As required, the Contractor shall coordinate hot work and welding permits (for welding or open flame operations) with the Installation's Fire Department by calling (925) 246-4075.

1.4.6 Work-Site Maintenance

The Contractor is responsible for maintaining safety for all individuals within the vicinity of the work site areas and to prevent the release of any contamination to the environment. The work site shall be well marked and access monitored/controlled to prevent inadvertent entry into all work areas. Work zones and access points shall be established and maintained as the site conditions warrant.

As required, the Contractor shall ensure compliance with any federal, state, and local regulations, QA/QC protocols, and procedures for decontaminating tools, equipment, or other materials. At all times, the Contractor shall keep the work area free from accumulation of waste and non-essential hazardous materials. The work-site shall be maintained to present an orderly appearance and to maximize work efficiency. When not in

use, the Contractor shall remove non-essential equipment from the work site. Prior to completion of work, the Contractor shall properly remove any rubbish, tools, equipment, and materials (that are not the property of the government) from the premises. The Contractor shall properly dispose of all investigation derived wastes and construction debris. Upon completing the work, the Contractor shall leave the area clean, neat, orderly, and return the work site(s) to an appropriate condition.

1.4.6.1 Storage

The MOTCO DPW and their designated staff member/s will arrange for a designated storage site(s) for the Contractor to store their material and equipment. The Contractor shall be responsible for securing and weatherproofing all material/equipment within the site(s). Upon final completion of work or at direction of the KO/ACO, the Contractor shall remove all temporary fences/structures (used to protect materials and equipment) from the installation. The Contractor shall clean all storage areas of all debris and material and if necessary, perform repairs as required to return the site to its pre-existing condition. The Contractor shall be responsible for safeguarding all government property provided for Contractor use. The Contractor shall maintain an inventory of government property, a copy of government property control procedures at the site, and dispose of government property as directed by the ACO. All hazardous materials shall be handled, stored, labeled, and transferred in accordance with OSHA regulations.

1.4.7 Requirements Prior to Excavation

Prior to any excavation within the Munitions Response Site (MRS), the Contractor shall be responsible for the following items:

1.4.7.1 UXO/MEC Safety Support

The Contractor shall follow the Construction Support Procedures as outlined within the Final Explosive Safety Submission "Munitions and Explosives of Concern Removal Action" document for Military Ocean Terminal Concord (MOTCO) dated August 6, 2013, which was prepared by the USACE, Engineering and Support Center, Huntsville. Pier 2 is located within the Port Chicago Water Explosion Area Munitions Response Site (MRS). Therefore, before any intrusive operation, an UXO/MEC explosive hazard clearance of the construction footprint is required based upon the PA Risk Rating of "moderate" to "high". Specifically, Section 3.3 "Construction Support" shall be followed during construction activities. This support shall be UXO-qualified (per DDESB Technical Paper 18 for definitions) in accordance with the procedures in USACE EP 385-1-97, "Explosives Safety and Health Requirements Manual, dated 15 September 2008. The Contractor shall provide a Government approved MEC Support Work Plan to perform munitions and explosives of concern Construction Support Activities in accordance with above referenced Safety Submission and coordinated with the USACE Designated Ordnance and Explosive Safety Specialist (DOESS), prior to the commencement of any MEC-UXO work:

The DOESS is:

Michael L. Wheeler
Ordnance and Explosive Safety Specialist
1325 J Street CESPK-SO
Sacramento CA, 95814
(916) 557-5369

(916) 307-9048 BB
michael.l.wheeler@usace.army.mil

1.5 PROJECT ENVIRONMENTAL GOALS

Contractor shall distribute copies of the Environmental Goals to each subcontractor and the Contracting Officer. The overall goal for design, construction, and operation is to construct the project as indicated that meets the functional program needs and incorporates the principles of sustainability. Specifically:

a. Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion. Minimize offsite environmental impact.

b. Use the minimum amount of energy, water, and materials feasible to meet the design intent. Select energy and water efficient equipment and strategies.

c. Use environmentally preferable products and decrease toxicity level of materials used.

d. Use renewable energy and material resources.

e. Optimize operational performance (through commissioning efforts) in order to ensure energy efficient equipment operates as intended. Consider the durability, maintainability, and flexibility of building systems.

f. Manage construction site and storage of materials to ensure no negative impact on the indoor environmental quality of the building.

g. Reduce construction waste through reuse, recycling, and supplier take-back.

1.6 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

a. Do not remove or alter existing work in such a manner as to cause injury or damage to any portions of the existing work which remain.

b. Do repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.7 ON-SITE PERMITS

1.7.1 Utility Outage Requests and Utility Connection Requests

Notify the Contracting Officer, Safety Officer, and the DPW at MOTCO, at least 15 calendar days prior to starting work that requires any utility outage. Contractor is responsible for marking and verifying all utilities not marked.

The Contractor shall verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be

removed, but indicated in locations to be transversed by piping, ducts, and other work to be installed.

Work shall be scheduled to hold outages to a minimum.

1.8 LOCATION OF UNDERGROUND UTILITIES

Obtain excavation permits prior to start of excavation by contacting the Contracting Officer and Robert Kennedy at MOTCO, (925) 246-4179 15 calendar days in advance. Scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities,and any type of underground obstruction not indicated to be removed but indicated or discovered during scanning in locations to be traversed by piping, ducts, and other work to be conducted or installed.

1.8.1 Notification Prior to Excavation

Notify the Contracting Officer and Robert Kennedy at MOTCO, at least 15 days prior to starting excavation work.

1.9 SALVAGE MATERIAL AND EQUIPMENT

Items indicated and/or designated by the Contracting Officer to be salvaged shall remain the property of the Government.

The salvaged property shall be segregated, itemized, delivered, and off-loaded at the MOTCO storage area located within 5 miles of the construction site.

Contractor shall maintain property control records for material or equipment designated as salvage. Contractor's system of property control may be used if approved by the Contracting Officer. Contractor shall be responsible for storage and protection of salvaged materials and equipment until completion of contract.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 35 59 13.13

PRESTRESSED CONCRETE FENDER PILING

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 within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005; R 2012) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 212.3R	(2016) Chemical Admixtures for Concrete
ACI 214R	(2011) Evaluation of Strength Test Results of Concrete
ACI 318M	(2014; ERTA 2015) Building Code Requirements for Structural Concrete & Commentary
ACI SP-66	(2004) ACI Detailing Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2016b) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A416/A416M	(2016) Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
ASTM A615/A615M	(2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	(2016) Standard Specification for

	Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C1202	(2012) Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM C1218/C1218M	(1999; R 2008) Standard Specification for Water-Soluble Chloride in Mortar and Concrete
ASTM C1240	(2014) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143/C143M	(2015) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2016; E 2016) Standard Specification for Portland Cement
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C171	(2016) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2014a) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2015a; E 2016) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C311/C311M	(2013) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2016b) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C494/C494M	(2016) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2016) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C989/C989M	(2014) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1894	(2014) Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
ASTM D2240	(2015) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D256	(2010; E 2015) Determining the Izod Pendulum Impact Resistance of Plastics
ASTM D4020	(2011) Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D792	(2013) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM F593	(2013a; E 2016) Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F594	(2009; E 2015) Standard Specification for Stainless Steel Nuts
ASTM F844	(2007a; R 2013) Washers, Steel, Plain (Flat), Unhardened for General Use

PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI MNL-116	(1999) Manual for Quality Control for Plants and Production of Structural Precast Concrete Products, 4th Edition

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Piles; G

Driving helmets, capblocks, and pile cushions; G

SD-05 Design Data

Concrete mix design; G

Submit a concrete mix design before concrete is placed, for each type of concrete used for the piles.

SD-06 Test Reports

Aggregates; G

Fly ash and Pozzolan

Ground Slag

Silica fume

Concrete

Submit concrete cylinder compressive strength test results.

SD-07 Certificates

Precasting manufacturer's quality control procedures; G

Suitability of pile driving equipment

Curing of piles

Silica fume manufacturer's representative

Prestressing steel

Portland cement

Concrete mix design

Reinforcing steel

Rubbing surface; G

Bolts, nuts, and washers

1.3 REQUIREMENTS

1.3.1 Piling Lengths and Quantity

Provide prestressed pretensioned concrete piles. Base bids upon the number, size, and length of piles as indicated. Adjustments in the contract price will not be made for cutting off piles or for broken, damaged, or rejected piles.

1.3.2 Piles

Prepare in accordance with ACI SP-66. Indicate placement of reinforcement including tendons. Indicate location of special embedded or attached lifting devices, employment of pick-up points, support points other than pick-up points, and any other methods of pick-up.

1.3.3 Driving Helmets, Capblocks, and Pile Cushions

Show details of driving helmets, capblocks, and pile cushions. Submit 2 weeks prior to pile installation.

1.4 QUALITY CONTROL

1.4.1 Quality Control Procedures

Submit four copies of precasting manufacturer's quality control procedures established in accordance with PCI MNL-116.

1.4.1.1 Curing of Piles

Submit proposed materials and methods.

1.4.2 Silica Fume Manufacturer's Representative

Provide statement that the manufacturer's representative will be present at plant to ensure proper mix, including high range water reducer (HRWR), and batching methods.

1.4.3 Aggregates

Prior to pile fabrication, submit certified test reports for the following tests specified in ASTM C33/C33M:

a. Grading

b. Amount of material finer than No. 200 sieve

c. Organic impurities

d. Soundness

e. Clay lumps and friable particles

f. Coal and lignite

g. Weight of slag

h. Abrasion of coarse aggregate

i. Fineness modulus

j. Reactive aggregates

k. Freezing and thawing

1.4.4 Fly Ash and Pozzolan

Furnish fly ash and pozzolan test results performed within 6 months of

submittal date. Sampling and testing shall be in accordance with ASTM C311/C311M.

1.4.5 Silica Fume

Furnish silica fume test results performed within 6 months of submittal date. Sampling and testing shall be in accordance with ASTM C311/C311M.

1.4.6 Portland Cement

Certification identifying cement; brand name, type, mill location, quantity to be used, size of lot represented by quality control sample, lot number, and destination of shipment.

1.4.7 Concrete Mix Design

Certify, using a Government-approved independent commercial testing laboratory, that proportioning of mix is in accordance with ACI 211.1 or ACI 318M for specified strength and is based on aggregate data which has been determined by laboratory tests during last 12 months.

1.5 DELIVERY, STORAGE, AND HANDLING

Piles shall be stored, handled, and transported in accordance with PCI MNL-116 except as follows. Methods used for handling and storage of piles shall be such that the piles are not subjected to excessive bending stress, cracking, spalling, or other damage.

1.5.1 Damaged Piles

The Contractor shall inspect each pile for sweep and structural damage such as cracking and spalling before transporting them to the project site and immediately prior to placement in the driving leads. Any unusual cracks (cracks other than crazing, surface drying, shrinkage cracks and end cracks) shall be brought to the attention of the Contracting Officer. Piles which are damaged during delivery, storage, or handling to the extent they are rendered unsuitable for the work, in the opinion of the Contracting Officer, shall be rejected and removed from the project site, or may be repaired, if approved, at no cost to the Government.

1.5.1.1 Repairable Cracks

Piles with cracks equal to or greater than 0.006 inches but less than 0.06 inches shall be rejected or repaired. As an alternate to pile rejection, the Contractor may submit a proposal to repair deficient piles, which shall be restored prior to driving to provide its required design capacity, perform its intended function in the structure, and take into consideration long term durability in corrosive environment.

1.5.1.2 Non-Repairable Cracks

Piles with cracks equal to or greater than 0.06 inches shall be rejected.

1.5.2 Pile Sweep

Sweep shall be limited to 1/8 inch per 10 feet over the length of the pile. Piles having excessive sweep shall be rejected.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cementitious materials shall be portland cement, blended cement or portland cement in combination with natural pozzolan or fly ash or ground granulated blast furnace slag and conforms to appropriate specifications listed below.

2.1.1.1 Cement

ASTM C150/C150M, Type II with a maximum alkali content of 0.40 percent; or ASTM C595/C595M, Type IP(MS) or IS(MS) blended cement except as modified herein. The blended cement shall consist of a mixture of ASTM C150/C150M cement (with alkali content not exceeding 0.40 percent) and one of the following materials: ASTM C618 pozzolan or fly ash, or ASTM C989/C989M ground iron blast-furnace slag, or ASTM C1240 silica fume. If no satisfactory test results are available (made within the past six months) to prove that the cement alkali content is less than 0.40 percent, then cement with a maximum of 0.60 percent alkali shall be used. Cement certificates shall include test results in accordance with ASTM C150/C150M, including equivalent alkalies indicated in the optional chemical requirements. Use cement with a tricalcium aluminate (C3A) content of less than 8 percent.

2.1.1.2 Fly Ash and Pozzolan

ASTM C618, Class N, or F except that the maximum total alkalies shall be 3 percent. If the aggregates are reactive the maximum calcium oxide content shall be 13.0 percent. Class C shall not be used.

2.1.1.3 Ground Iron Blast-Furnace Slag

ASTM C989/C989M, Grade 120.

2.1.1.4 Silica Fume

ASTM C1240, provide silica fume that is a by-product of silicon or ferrosilicon production. Provide percent by weight of the total cementitious materials as indicated in table below.

2.1.1.5 Supplemental Cementitious Materials (SCM) Content

The concrete mix shall contain one of the four SCMs listed below, or a linear combination thereof.

SUPPLEMENTARY CEMENTITIOUS MATERIALS CONTENT		
SCM	Minimum Content	Maximum Content
Class N Pozzolan or Class F Fly Ash with with SiO_2 plus Al_2O_3 plus Fe_2O_3 greater than 70 percent	20 percent	30 percent

SUPPLEMENTARY CEMENTITIOUS MATERIALS CONTENT		
SCM	Minimum Content	Maximum Content
Class N Pozzolan or Class F Fly Ash with with SiO2 plus Al2O3 plus Fe2O3 greater than 80 percent	15 percent	30 percent
Class N Pozzolan or Class F Fly Ash with with SiO2 plus Al2O3 plus Fe2O3 greater than 90 percent	15 percent	30 percent
GGBF Slag	20 percent	40 percent
Silica Fume	5 percent	10 percent

2.1.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete or steel.

2.1.3 Aggregates

ASTM C33/C33M, except as modified herein. Provide aggregate free from any substance which may be deleteriously reactive with alkalies in cement in an amount sufficient to cause excessive expansion of concrete. Do not mix, store in same stockpile, or use fine aggregates from different sources of supply in same concrete mix or same structure without approval. The fineness modulus of fine aggregate shall be not less than 2.40 or greater than 3.0. Prior to pile fabrication, submit certified test reports for the following tests specified in ASTM C33/C33M:

a. Grading

b. Amount of material finer than No. 200 sieve

c. Organic impurities

d. Soundness

e. Clay lumps and friable particles

f. Coal and lignite

g. Weight of slag

h. Abrasion of coarse aggregate

i. Fineness modulus

j. Reactive aggregates

k. Freezing and thawing

2.1.3.1 Alkali-Silica Reactivity (ASR)

Fine and coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate activity.

The fine and coarse aggregates shall be evaluated separately, using ASTM C1260. Test results of the individual aggregates shall have a measured expansion equal to or less than 0.08 percent at 16 days after casting. Should the test data indicate an expansion of greater than 0.08 percent, the aggregates(s) shall be rejected or additional testing, using ASTM C1567 shall be performed as follows: utilize the Contractor's proposed low alkali portland cement or blended cement and SCM in combination with the proposed aggregate for the test portioning. The SCM quantity shall be determined that will meet all the requirements of these specifications and that will lower the ASTM C1567 expansion to equal or less than 0.08 percent at 16 days after casting.

If the above option does not lower the expansion to less than 0.08 percent at 16 days after casting, reject the aggregate(s) and submit new aggregate sources for retesting. Submit the results of testing to the Contracting Officer for evaluation and acceptance.

2.1.4 Admixtures

Chemical admixtures shall conform to ASTM C494/C494M, Type A Type B. Air-entraining admixture shall conform to ASTM C260/C260M. Do not use admixtures containing chlorides.

2.1.5 Prestressing Steel

Use seven-wire stress-relieved or low-relaxation strand conforming to ASTM A416/A416M, Grade 270 psi. Use prestressing steel free of grease, oil, wax, paint, soil, dirt, and loose rust. Do not use prestressing strands or wire having kinks, bends, or other defects.

2.1.6 Reinforcing Steel

ASTM A615/A615M, Grade 60; or ASTM A706/A706M, Grade 60. Weld reinforcing steel in accordance with AWS D1.4/D1.4M.

2.1.7 Ties and Spirals

Steel, ASTM A1064/A1064M for spirals and ASTM A615/A615M for ties.

2.1.8 Bolts, Nuts, and Washers

2.1.8.1 Stainless Steel Bolts and Nuts

ASTM F593 or ASTM F594, Group 2 (316 Alloy).

2.1.8.2 Washers

ASTM F844, except fabricate washers of 316 alloy stainless steel.

2.1.9 Ultrahigh Molecular Weight Polyethylene (UHMWPE) Rubbing Surface

2.1.9.1 General

a. Materials including additives shall be traceable by original lot number.

b. Materials used shall be FDA approved or otherwise harmless to marine life.

c. Fabricated form shall be virgin resin.

2.1.9.2 Resin

a. ASTM D4020. Virgin resin shall be homopolymer of ethylene and have an intrinsic viscosity (IV) between 22.0 and 28.0 dl/g.

b. No reprocessed resin shall be used.

c. Resin shall be oil and moisture free (0.2 percent weight maximum).

2.1.9.3 Composition and Fabricated Form

a. Resin shall comprise a minimum 95.0 percent by weight concentration in the formulation.

b. The finished form shall maintain ultraviolet stability for a minimum of 25 years and be free of saltwater or petroleum product leachable materials.

c. No unfused areas or light patches greater than No. 50 sieve shall be in the final fabricated form.

d. The fabricated form shall have the following properties:

Density (ASTM D792)	57.5-58.7 lb/cu.ft
Tensile Strength (ASTM D638)	
Ultimate, minimum	4600 psi
Ultimate Elongation, minimum	250 percent
Impact Strength (ASTM D256)	
Test Method A, Izod	Non-break for all five determinations in sample
Hardness (ASTM D2240), minimum	Shore D 65
Coefficient of Friction (ASTM D1894)	
Kinetic, maximum	0.13
Static, maximum	0.20

Water Absorption (ASTM D570)	Nil
Abrasion Index (relative to steel = 100), maximum	10

e. Color shall be black.

2.2 CONCRETE

2.2.1 Contractor-Furnished Concrete Mix Design

Concrete shall have a minimum specified compressive strength, f'c, of 8,000 psi at 28 days. The minimum cementitious materials content shall be 600 pounds per cubic yard of concrete. The design shall be prepared in accordance with ACI 211.1 or ACI 318M. The mix design shall be based on current materials previously evaluated by the concrete producer whose established methods of statistical quality control is in conformance with ACI 318M. In the absence of such data, the Contractor shall sample and test the aggregates for the design of concrete.

2.2.2 Concrete Mix Design Proportioning

a. Water cement ratio shall be equal to or less than 0.40. If fly ash is used, the water cement ratio shall be calculated as the weight of water divided by the weight of cement plus 60 percent of the weight of fly ash. If silica fume is used, the water cement ratio shall be calculated as the weight of water divided by the weight of cement plus the weight of silica fume.

b. Maximum aggregate size shall not exceed 3/4 inch.

c. Air-entrainment shall be 4.5 to 7.5 percent. Determine air void structure in accordance with ACI 212.3R. Spacing factor shall be less than 0.01 inch, the specific surface area shall be greater than 600 square inches per cubic inch of air void volume, and the number of air voids per inch of traverse shall be significantly greater than the numerical value of the percentage of air in the concrete.

2.2.3 Trial Mixtures

Trial mixtures having proportions and consistencies of the proposed mix design shall be made to document the Contractor's ability to produce workable concrete which does not segregate or show excessive slump loss characteristics.

2.3 FABRICATION OF PRETENSIONED PILES

Piles shall be pretensioned concrete piles. Workmanship shall conform to standard commercial practice in prestressing plants.

2.3.1 Formwork

Provide forms of metal, braced and stiffened against deformation, accurately constructed, watertight, and supported on unyielding casting beds. Forms shall permit movement of pile without damage during release of the prestressing force. Make piles to dimensional tolerances in accordance with PCI MNL-116 and as follows:

a. Length: 3/8 inch per 10 feet.

b. Cross section: plus 1/2 inch to minus 1/4 inch.

c. Deviation from straight lines: not more than 1/8 inch per 10 feet of length.

d. Pile head: plus or minus 1/4 inch per foot of head dimension from true right angle plane. Surface irregularities: plus or minus 1/8 inch.

e. Location of reinforcing steel

(1) Main reinforcement: 1/8 to 1/4 inch from position designated on drawings.

(2) Spacing of spiral: plus or minus 1/2 inch from position designated on drawings.

f. Location of pipe sleeves from true position: plus or minus 3/8 inch.

2.3.2 Pretensioning

Measure tension to which steel is to be pretensioned by jack pressure read on a calibrated gage and verify by elongation of steel. Use gage calibrated within last 6 months by a laboratory approved by Contracting Officer. Provide means for measuring elongation of steel to nearest 1/8 inch. When difference between results of measurement and gage reading is more than 5 percent, determine cause of discrepancy and correct. Give tensioning steel a uniform prestress prior to being brought to design prestress. Induce same initial prestress in each unit when several units of prestressing steel in a pile are stretched simultaneously.

2.3.3 Casting

2.3.3.1 Conveying

Clean conveying equipment thoroughly before each run. Convey concrete from mixer to forms as rapidly as practicable by methods which will not cause segregation or loss of ingredients. Deposit concrete as nearly as practicable to its final position. During placing, make any free vertical drop of the concrete less than 3 feet. Remove concrete which has segregated in conveying or placing.

2.3.3.2 Placing and Casting

Perform concrete casting within 3 days after pretensioning steel; however, do not deposit concrete in forms until placement of reinforcement and anchorages have been inspected and approved by pile manufacturer's quality control representative. Produce each pile of dense concrete straight with smooth surfaces with reinforcement retained in its proper position during fabrication. Use vibrator with heads smaller than the minimum distance between steel for pretensioning. Make surface of pile ends perpendicular to axis of pile. Chamfer, 3/4 inch, ends of piles and corners of square piles.

2.3.4 Curing of Piles

Cure piles using moist or accelerated curing.

2.3.4.1 Moist Curing

a. Impervious sheeting: ASTM C171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

b. Pervious sheeting: AASHTO M 182.

c. Liquid membrane-forming compound: ASTM C309, white pigmented, Type 2, Class B.

2.3.4.2 Accelerated Curing

After placement of concrete, moist cure for a period of 4 hours. Follow by accelerated curing until concrete has reached specified release strength. Enclose casting bed for accelerated curing with a suitable enclosure. During application of steam or heat, increase the air temperature at a rate not to exceed 40 degrees F per hour. Cure at a maximum temperature of 150 degrees F until concrete has reached specified release strength. Reduce temperature at a rate not to exceed 20 degrees F per hour until a temperature of 20 degrees F above ambient air temperature is reached. After accelerated curing, moist cure using either water or membrane curing until a total accelerated and moist curing time of 72 hours is achieved.

2.3.5 Detensioning

Perform releasing of prestressed steel in pretensioned piles in such an order that eccentricity of prestress will be minimized. Gradually release tension in strands from anchorage. Detension after approval by pile manufacturer's quality control representative. Perform transfer of prestressing force when concrete has reached a minimum compressive strength of 4,800 psi.

2.3.6 Marking

Mark pile to identify in-place impact face. Marking shall be clearly visible during driving.

2.4 PRODUCT QUALITY CONTROL

Where piling is manufactured in a plant with an established quality control program as attested to by a current certification in the PCI Certification Program for Quality Control, perform product quality control procedures in accordance with PCI MNL-116. Where piling is manufactured by specialists or in plants not currently enrolled in the PCI Certification Program for Quality Control, set up a product quality control system in accordance with PCI MNL-116 and perform concrete and aggregate quality control testing using an independent commercial testing laboratory approved by the Contracting Officer in accordance with the following.

2.4.1 Aggregate Tests

Take samples of fine and coarse aggregate at the concrete batch plant and test. Perform mechanical analysis (one test for each aggregate size) in accordance with ASTM C136/C136M including determination of the specific gravity. Tabulate the results of the tests in accordance with ASTM C33/C33M.

2.4.2 Strength Tests

Sample concrete in accordance with ASTM C172/C172M at the time the concrete

is deposited for each production line. Compression tests shall conform to methods of ASTM C39/C39M and ASTM C31/C31M. Perform slump tests in accordance with ASTM C143/C143M. Mold at least six cylinders per day or ***one cylinder*** for every 20 cubic yards of concrete placed, whichever is greater. Test two cylinders of the set at 7 days of 14 days, or at a time for establishing transfer of prestressing force (release strength) and removal of pile from forms. Perform strength tests 28 days after molding using the remaining cylinders of the set. Cure the cylinders in the same manner as the piles and place at the point where the poorest curing conditions are offered. This is the coolest point in the bed for steam curing. Cylinders to be tested at 28 days shall be moist cured.

2.4.3 Changes in Proportions

If, after evaluation of strength test results, the compressive strength is less than the specified compressive strength, make adjustments in the proportions and water content and changes in the temperature, moisture, and curing procedures as necessary to secure the specified strength. Submit changes to the Contracting Officer in writing.

2.4.4 Compressive Strength Test Results

Evaluate compression test results at 28 days in accordance with ACI 214R using a coefficient of variation of 10 percent. Evaluate the strength of concrete by averaging the test results (two specimens) of each set (four specimens) of standard cylinders tested at 28 days. Not more than 10 percent of the individual specimens tested shall have an average compressive strength less than specified average compressive strength.

2.4.5 Chloride Ion Concentration

Sampling and determination of water soluble chloride ion content in accordance with ASTM C1218/C1218M. Maximum water soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed 0.06 percent by weight of cement.

2.4.6 Chloride Ion Penetration

To ensure the durability of concrete in marine environment, concrete shall be proportioned to have the chloride ion penetration test in accordance with ASTM C1202, and be below 3000 coulombs for concrete specimens tested at 56 days.

PART 3 EXECUTION

3.1 PILE DRIVING

3.1.1 Driving Piles

Piles shall not be driven until 100 percent of design strength has been attained and until at least 14 days after detensioning. Drive piles to the indicated tip elevation and to the minimum embedment depth shown on the drawings. Pile driving shall be conducted as one continuous operation. The pile shall be driven until the resistance criterion is met. During the initial driving and until the pile tip has penetrated beyond layers of very soft soil or below the bottom of prejetted or preformed holes, use a reduced rated driving energy of the hammer of not more than 15,000 foot-pounds per blow or as otherwise directed by the Contracting Officer,

to prevent high tension-wave driving stresses which could damage the pile. Resistance criterion shall be 20 blows for one foot or less. The Contracting Officer may modify the criteria based upon the actual hammer being used and its rated energy and its compatibility as verified by a pile test program. If a pile fails to reach the indicated butt elevation or minimum embedment, the Contractor shall notify the Contracting Officer and perform corrective measures as directed. Provide hearing protection when noise levels exceed 140 dB.

3.1.2 Pile Driving Leads and Templates

Piles shall be driven with the hammer positioned in a fixed or swinging lead. "Free hammer" will not be permitted. Swinging lead shall be used only in conjunction with a template system to spot the piles.

Provide temporary wales, templates, or guide structures to ensure that the pilings are placed and driven to the correct alignment. Use a system of structural framing sufficiently rigid to resist lateral and driving forces and to adequately support the fender piling until design tip elevation is achieved. Use two templates, at least, when placing each piling not less than 8 feet apart. Templates shall not move when supporting piling. If in view, also mark the second level to assure that the piles are vertical and in position. If two guide marks cannot be seen, other means shall be used to keep the piles vertical along its length.

3.1.3 Installation of Piles

Take care to avoid damage to piles during handling, when placing the pile in leads, and during pile-driving operations. Inspect piles when delivered, when in leads immediately before driving, and after installation. Notify the Contracting Officer of any unusual cracks and perform corrective measures as directed. Laterally support piles during driving, but allow rotation in leads. Take special care to maintain the pile orientation during driving. Square the top of the pile to the longitudinal axis of the pile. Maintain axial alignment of pile hammer with that of pile.

3.1.4 Tolerances in Driving

Drive piles with a variation of not more than one percent from vertical for plumb piles. Maintain and check axial alignment of pile and leads at start of pile driving and when the pile top is approximately 5 feet above the indicated elevation. Make intermediate checks of pile alignment if there is evidence of pile drifting. If subsurface conditions cause pile drifting beyond the allowable axial alignment tolerance, notify the Contracting Officer and perform corrective measures as directed. Place butts within 2 inches of the location indicated. Manipulation of pile within specified tolerances is permitted, but do not manipulate piles more than one percent of their exposed length above the mudline. Check piles for heave. Redrive, to the indicated elevation, piles found to be heaved.

3.1.5 Jetting of Piles

Water jets will not be permitted. Before starting final driving, firmly seat piles in place by application of a number of reduced energy hammer blows.

3.1.6 Pre-drilling of Piles

Predrilling to remove soil or other material representing the bulk of the volume of the pile to be driven will be permitted. The diameter of the hole should not exceed two-thirds the width of the pile. Discontinue drilling when the pile tip is approximately 5 feet above the indicated pile tip elevation. Drive pile the final 5 feet of penetration.

3.1.7 Splices

Splicing of piles is not permitted.

3.1.8 Buildup

Buildups are not permitted.

3.1.9 Pile Cutoffs

Cut off piles with a smooth level cut using pneumatic tools, sawing, or other suitable methods approved by the Contracting Officer. The use of explosives for cutting is not permitted.

3.1.10 Patching

a. Embedded Lifting Loops. Provide a one inch minimum conical depression around embedded lifting loops. Cut off lifting loops at bottom of depression and patch depression with epoxy mortar.

b. Pile Butt. Apply one inch thick layer of epoxy mortar cover over exposed prestressing strand on pile butt after driving.

3.2 EQUIPMENT

3.2.1 Pile Hammers

Furnish a hammer having a capacity at least equal to the hammer manufacturer's recommendation for the total weight of pile and character of subsurface material to be encountered. Obtain the required driving energy of the hammer, except for diesel hammers, by use of a heavy ram and a short stroke with low-impact velocity. The pile hammer shall be capable of operating at a reduced energy level (1/2 to 2/3 of rated energy level) during seating of the piles in preformed holes and when driving through soft or loose materials. The driving energy of the hammer, at final driving, shall be not less than 30,000 foot-pounds. At final driving, operate the pile hammer in accordance with the manufacturer's recommendation. At final driving, operate diesel-powered hammers at the rate recommended by the manufacturer for hard driving. Maintain sufficient pressure at the steam hammer so that (1) for double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated; (2) for single-acting hammer, there is a full upward stroke of the ram; and (3) for differential-type hammer, there is a slight rise of the hammer base during each downward stroke.

3.2.2 Driving Helmets, Capblocks, and Pile Cushions

3.2.2.1 Driving Helmets or Caps and Pile Cushions

Use a steel driving helmet or cap, including a pile cushion between top of

pile and driving helmet or cap, to prevent impact damage to pile. The driving helmet or cap-and-pile cushion combination shall be capable of protecting the head of the pile, minimize energy absorption and dissipation, and transmit hammer energy uniformly over the top of the pile. The driving helmet or cap shall fit sufficiently loose around the top of the pile so that the pile may be free to rotate without binding within the driving helmet. The Contractor shall demonstrate to the satisfaction of the Contracting Officer that the equipment to be used on the project performs the above function. The pile cushion shall be of laminated construction using softwood boards with the grain parallel to the end of the pile. The thickness of the pile cushion shall be 12 inches minimum. The cushion shall not be changed near the end of driving. Replace the pile cushion when it has become compressed beyond two-thirds of its original thickness, charred, or burned, or has become spongy or deteriorated in any manner. Use new cushions for initial driving of each pile. During redriving or restriking of piles, a used cushion assembly shall be used. The Contractor shall submit to the Contracting Officer at least 2 weeks before the start of pile driving operations detailed drawings of the driving helmet and pile cushion to be used.

3.2.2.2 Hammer Cushion or Capblock

Use a hammer cushion or capblock between driving helmet or cap and hammer ram consisting of a solid hardwood block with grain parallel to the pile axis and enclosed in a close-fitting steel housing or an aluminum and micarta (or equal) discs stacked alternately in a steel housing. Use steel plates at top and bottom of capblock. Replace wood capblock when it becomes highly compressed, charred or burned, or becomes spongy or deteriorated in any manner. Replace aluminum or micarta discs that have become damaged, split, or deteriorated in any manner. Do not replace wood capblock during final driving of any pile. Do not use small wood blocks, wood chips, rope, or other materials that permit excessive loss of hammer energy.

3.3 FIELD QUALITY CONTROL

3.3.1 Pile Records

For each pile, keep a record of the number of blows required for each 0.985 feet of penetration and the number of blows for the last 6 inch penetration or fraction thereof. Include in the record the beginning and ending times of each operation during driving of pile, type and size of the hammer used, rate of operation, stroke or equivalent stroke for diesel hammer, type of driving helmet, and type and dimension of the hammer cushion (capblock) and pile cushion used. Record re-tap data and any unusual occurrence during driving of the pile. Include in the record performance characteristics of jet pump, unassisted penetration of pile, jet-assisted penetration of pile, and tip elevation before driving and at end of driving. Notify Contracting Officer 10 days prior to driving of piles. Submit complete and accurate records of installed piles to Contracting Officer within 15 calendar days after completion of the pile driving. Make pile-driving records available to the Contracting Officer at the job site within 24 hours of each day's pile driving. A preprinted form for recording pile driving data, the Pile Driving Log, is included at the end of this section.

PILE DRIVING LOG

CONTRACT NO._____ CONTRACT NAME_____
CONTRACTOR_____ TYPE OF PILE_____
PILE LOCATION_____ PILE SIZE: BUTT/TIP: _____ LENGTH_____
GROUND ELEVATION_____ CUT OFF ELEVATION_____
PILE TIP ELEVATION_____ VERTICAL (_____) BATTER 1 ON (_____)
SPLICES ELEVATION_____ COMPANY_____

HAMMER: MAKE & MODEL_____ WT. RAM_____
STROKE_____ RAM RATED ENERGY_____
DESCRIPTION & DIMENSIONS OF DRIVING CAP_____
CUSHION MATERIALS & THICKNESS_____

INSPECTOR_____

"DEPTH" COLUMN OF PILE DRIVING RECORD REFERENCED TO:
_____ CUT-OFF ELEVATION
_____ FINISH FLOOR ELEVATION

TIME: START DRIVING_____ FINISH DRIVING_____ DRIVING TIME_____
INTERRUPTIONS (TIME, TIP ELEV. & REASON)_____
JET PRESSURE & ELEVATIONS_____

_____

DRIVING RESISTANCE

DEPTH FT.	NO. OF BLOWS	DEPTH FT.	NO. OF BLOWS	DEPTH FT.	NO. OF BLOWS
0	_____	18	_____	36	_____
1	_____	19	_____	37	_____
2	_____	20	_____	38	_____
3	_____	21	_____	39	_____
4	_____	22	_____	40	_____
5	_____	23	_____	41	_____
6	_____	24	_____	42	_____
7	_____	25	_____	43	_____
8	_____	26	_____	44	_____
9	_____	27	_____	45	_____
10	_____	28	_____	46	_____
11	_____	29	_____	47	_____
12	_____	30	_____	48	_____
13	_____	31	_____	49	_____
14	_____	32	_____	50	_____
15	_____	33	_____	51	_____
16	_____	34	_____	52	_____
17	_____	35	_____	53	_____

SHEET 1 OF 2

PILE DRIVING LOG

54	_____	77	_____	99	_____
55	_____	78	_____	100	_____
56	_____	79	_____	101	_____
57	_____	80	_____	102	_____
58	_____	81	_____	103	_____
59	_____	82	_____	104	_____
60	_____	83	_____	105	_____
61	_____	84	_____	106	_____
62	_____	85	_____	107	_____
63	_____	86	_____	108	_____
64	_____	87	_____	109	_____
65	_____	88	_____	110	_____
66	_____	89	_____	111	_____
67	_____	90	_____	112	_____
68	_____	91	_____	113	_____
69	_____	92	_____	114	_____
70	_____	93	_____	115	_____
71	_____	94	_____	116	_____
72	_____	95	_____	117	_____
73	_____	96	_____	118	_____
74	_____	97	_____	119	_____
75	_____	98	_____	120	_____
76	_____				

DRIVING RESISTANCE IN BLOWS PER INCH FOR LAST FOOT OF PENETRATION:

DEPTH_____ DEPTH_____

1"___2"___3"___4"___5"___6"___7"___8"___9"___10"___11"___12"___

ELEV._____ ELEV._____

REMARKS_____

CUT OFF ELEVATION: FROM DRAWING _____

TIP ELEVATION = GROUND ELEVATION - DRIVEN DEPTH = _____

DRIVEN LENGTH = CUT OFF ELEVATION - TIP ELEVATION = _____

CUT OFF LENGTH = PILE LENGTH - DRIVEN LENGTH = _____

SHEET 2 OF 2

-- End of Section --