NAVFAC ATLANTIC

WORK ORDER NO. 860913

CONTRACT NO. N40085-10-R-3034

Dry Dock 8 Caisson Replacement

At the

Norfolk Naval Shipyard

Station Project # RM09-1390

PREPARED BY:

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A/E Contract No. N62473-06-D-3029

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Date: 2-8-10

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DIVISION I

ADMINISTRATIVE

SECTION 00 01 15

LIST OF DRAWINGS
01/07

PART 1 GENERAL

1.1 SUMMARY

This section lists the drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings, Maps and Specifications."

1.2 CONTRACT DRAWINGS

Contract drawings are as follows:

DWG NO	Revision No.	NAVFAC DWG NO	DRAWING TITLE
			GENERAL
G-001	-	12554309	Cover Sheet
G-002	-	12554310	List of Drawings
G-003	-	12554311	General Notes and Abbreviations
G-100	-	12554312	General Arrangements
G-101	-	12554313	Table of Offsets and Molded Lines
G-150	-	12554314	Curves of Form
G-151	-	12554315	Tank Soundings and Curves
			STRUCTURAL
S-001	-	12554316	General Structural Notes
S-010	-	12554317	G1 Framing Plan
S-011	-	12554318	G2 Framing Plan
S-012	-	12554319	G3 Framing Plan and Plating Plan
S-013	-	12554320	G4 Framing Plan
S-014	-	12554321	G5 Framing Plan and Plating Plan
S-020	-	12554322	Starboard Profile of Shell Plating
S-021	-	12554323	Port Side Profile of Shell Plating
S-022	-	12554324	Starboard Profile Shell Plating Stiffeners
S-023	-	12554325	Port Side Profile Shell Plating Stiffeners
S-030	-	12554326	Inboard Profile Looking to Starboard
S-031	-	12554327	Section Through Typical Frames
S-032	-	12554328	Sections Through Frame 18
S-040	-	12554329	Structural Details Sections
S-050	-	12554330	Details – Sheet 1 of 8
S-051	-	12554331	Details – Sheet 2 of 8
S-052	-	12554332	Details – Sheet 3 of 8
S-053	-	12554333	Details – Sheet 4 of 8
S-054	-	12554334	Details – Sheet 5 of 8
S-055	-	12554335	Details – Sheet 6 of 8
S-056	-	12554336	Details – Sheet 7 of 8
S-057	-	12554337	Details – Sheet 8 of 8
S-060	-	12554338	Docking Plan and Side Dock Blocking Details
S-100	-	12554339	Fittings Plan
S-101	-	12554340	Fittings Elevation and Details
S-102	-	12554341	Access Ladders Sections and Details – Sheet 1 of 2
S-103	-	12554342	Access Ladders Sections and Details – Sheet

DWG NO	Revision No.	NAVFAC DWG NO	DRAWING TITLE
			2 of 2
S-104	-	12554343	Railing Sections and Details
S-105	-	12554344	Access Hatch Details
S-106	-	12554345	Shore-Tie Cable Roller Details
S-107	-	12554346	Dog House Details
S-108	-	12554347	Mooring Hardware Details – Sheet 1 of 2
S-109	-	12554348	Mooring Hardware Details – Sheet 2 of 2
S-110	-	12554349	Hinged Ramp Details – Sheet 1 of 3
S-111	-	12554350	Hinged Ramp Details – Sheet 2 of 3
S-112	-	12554351	Hinged Ramp Details – Sheet 3 of 3
S-120	-	12554352	Overall Catwalk Framing Plan at Level G4
S-121	-	12554353	Partial Catwalk Framing Plan at Level G4 – Sheet 1 of 3
S-122	-	12554354	Partial Catwalk Framing Plan at Level G4 – Sheet 2 of 3
S-123	-	12554355	Partial Catwalk Framing Plan at Level G4 – Sheet 3 of 3
S-124	-	12554356	Overall Catwalk Framing Plan at Level G2
S-125	-	12554357	Partial Catwalk Framing Plan at Level G2 – Sheet 1 of 3
S-126	-	12554358	Partial Catwalk Framing Plan at Level G2 – Sheet 2 of 3
S-127	-	12554359	Partial Catwalk Framing Plan at Level G2 – Sheet 3 of 3
S-130	-	12554360	Catwalk Framing Sections and Details – Sheet 1 of 3
S-131	-	12554361	Catwalk Framing Sections and Details – Sheet 2 of 3
S-132	-	12554362	Catwalk Framing Sections and Details – Sheet 3 of 3
S-133	-	12554363	Catwalk Vertical Ladder Sections and Details
S-140	-	12554364	Overall Catwalk Railing Plan at Level G4
S-141	-	12554365	Partial Catwalk Railing Plan at Level G4 – Sheet 1 of 3
S-142	-	12554366	Partial Catwalk Railing Plan at Level G4 – Sheet 2 of 3
S-143	-	12554367	Partial Catwalk Railing Plan at Level G4 – Sheet 3 of 3
S-144	-	12554368	Overall Catwalk Railing Plan at Level G2
S-145	-	12554369	Partial Catwalk Railing Plan at Level G2 – Sheet 1 of 3
S-146	-	12554370	Partial Catwalk Railing Plan at Level G2 – Sheet 2 of 3
S-147	-	12554371	Partial Catwalk Railing Plan at Level G2 – Sheet 3 of 3
S-148	-	12554372	Catwalk Railing Types Details
S-149	-	12554373	Catwalk Railing Sections and Details
S-150	-	12554374	Seal Arrangement
S-151	-	12554375	Seal Details
S-200	-	12554376	Concrete Ballast Plan at G1
S-201	-	12554377	Concrete Ballast Elevation
S-202	-	12554378	Concrete Ballast Sections
	-		MECHANICAL
M-001	-	12554379	General Mechanical Notes, Legend and

DWG NO	Revision No.	NAVFAC DWG NO	DRAWING TITLE
			Abbreviations
M-100	-	12554380	Ballast System Diagram, Valve and Pump Schedules
M-110	-	12554381	Ballast System Plan
M-111	-	12554382	Ballast System Sections – Sheet 1 of 4
M-112	-	12554383	Ballast System Sections – Sheet 2 of 4
M-113	-	12554384	Ballast System Sections – Sheet 3 of 4
M-114	-	12554385	Ballast System Sections – Sheet 4 of 4
M-115	-	12554386	Ballast Tank Vent Plan
M-116	-	12554387	Ballast Tank Ventilation Inboard Profile
M-117	-	12554388	Ballast Tank Ventilation Sections and Details
M-200	-	12554389	Flood Through System Diagram, Plan and Valve Schedule
M-201	-	12554390	Flood Through System Elevation
M-202	-	12554391	Flood Through System Section
M-203	-	12554392	Flood Through System Details
M-300	-	12554393	Flood Through and Ballast System Details – Sheet 1 of 2
M-301	-	12554394	Flood Through and Ballast System Details – Sheet 2 of 2
M-400	-	12554395	HVAC Equipment Diagram
M-401	-	12554396	Dehumidification System Plan and Partial Section
M-402	-	12554397	Dehumidification System Details
M-450	-	12554398	Ventilation System Plans
M-451	-	12554399	Ventilation System Longitudinal Section
M-452	-	12554400	Ventilation System Sections and Details – Sheet 1 of 2
M-453	-	12554401	Ventilation System Sections and Details – Sheet 2 of 2
M-500	-	12554402	Washdown Pump Out Pipes Plan
M-501	-	12554403	Washdown Pump Out Pipes Sections
	-		ELECTRICAL
E-001	-	12554404	General Electrical Notes, Legend and Abbreviations
E-100	-	12554405	Electrical Single Line Diagram
E-200	-	12554406	Electrical Equipment Arrangement Plans
E-300	-	12554407	Electrical Lighting Plans
E-400	-	12554408	Exterior Cathodic Protection Plan, Elevation and Details
E-401	-	12554409	Interior Cathodic Protection Elevation and Section
E-500	-	12554410	Panel Schedule – Sheet 1 of 2
E-501	-	12554411	Panel Schedule – Sheet 2 of 2
E-502	-	12554412	Shore-Tie Receptacle Station Details
E-503	-	12554413	Cable Ladder Details
E-504	-	12554414	Dog House Lighting Plan and Section
E-600	-	12554415	Ballast System Notes, Legend and Abbreviations
E-601	-	12554416	Ballast System Electrical System Bill of Materials and Typical Dewatering Pump Connection
E-602	-	12554417	Ballast System Electrical - Single Line Diagram Sheet 1 of 2

DWG NO	Revision No.	NAVFAC DWG NO	DRAWING TITLE
E-603	-	12554418	Ballast System Electrical - Single Line Diagram Sheet 2 of 2
E-604	-	12554419	Control Panel Notes, Legend and Abbreviations
E-605	-	12554420	Control Panel Bill of Materials
E-606	-	12554421	Control Panel Single Line Diagram
E-607	-	12554422	Control Panel Elevation
E-700	-	12554423	Tank Level Indicators System Notes and Legend
E-701	-	12554424	Tank Level Indicators System Bill of Materials
E-702	-	12554425	Tank Level Indicators System Wiring Diagram
E-703	-	12554426	Tank Level Indicators System Layout
E-800	-	12554427	Fire and Flooding System Notes, Legend and Abbreviations
E-801	-	12554428	Fire and Flooding System Bill of Materials
E-802	-	12554429	Fire and Flooding System Diagram
E-803	-	12554430	Fire and Flooding System Layout

-- End of Document --

SECTION 01 11 00

SUMMARY OF WORK
01/08

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

It is the Government's requirement to construct a new caisson at its existing graving Dry Dock 8 in order to retire its existing aging caisson.

The caisson will be similar to the existing caisson in overall geometry and must fit the existing seats at the dry dock entrance.

Construction of the caisson includes a complete structural steel hull and framing system, ballast trim and pumping systems, permanent ballast, mechanical systems, electrical and control systems, and all other pertinent elements as further defined in the contract documents for a complete operating vessel.

It is anticipated that the major portion of the work will be conducted at the contractors yard, including major fitting out and testing of all systems and components. The Government will witness various stages of construction, fitting out and testing at the contractor's site.

Upon substantial completion of the caisson, the contractor shall ship the caisson to the Government's Dry Dock 8 for final ballasting, testing, commissioning and final acceptance by the Government.

1.1.2 Location

Dry Dock 8 is located within the Norfolk Naval Shipyard, Portsmouth, Virginia and as further indicated. The exact location will be shown by the Contracting Officer.

1.2 CONTRACT DRAWINGS

Contract Drawings are indicated in Section 00 01 15 LIST OF DRAWINGS.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 14 00.00 22

WORK RESTRICTIONS
07/07

PART 1 GENERAL

This section applies to all work conducted at Norfolk Naval Shipyard (NNSY).

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.

COMMANDER NAVY REGION MID-ATLANTIC (COMNAVREGMIDLANT)

COMNAVREGMIDLANT 11320.11 Fire Prevention and Protection Regulations

1.2 SUBMITTALS

Government approval 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 01 33 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Completed Special Access Determination (NAVSEA 5510/15); G

List of Contact Personnel; G

Radioactive Materials; G

1.3 SPECIAL SCHEDULING REQUIREMENTS

a. Have materials, equipment, and personnel required to perform the work at the site prior to the commencement of the work.

b. The facility/utility will remain in operation during the entire construction period as directed by the Contracting Officer. The Contractor shall conduct his operations so as to cause the least possible interference with normal operations of the activity.

c. Permission to interrupt any roads, railroads, and/or utility service shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption.

d. The work under this contract requires special attention to the scheduling and conduct of the work in connection with existing operations. Identify on the construction schedule each factor which constitutes a potential interruption to operations.

1.4 CONTRACTOR ACCESS AND USE OF PREMISES

1.4.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress as directed. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

A copy of the Activity Hazard Analysis (AHA) plan shall be submitted to Code 1102 ten working days prior to all construction work in the vicinity of telephone/communications systems. The contractor shall include in the AHA plan the approximate location of all communication equipment, cabling, and work procedure to protect the integrity of these systems. Code 1102 shall assess the impact on these systems and will review the plan to ensure the incorporation of the details that eliminate or minimize the risks to the systems. Code 1102 shall provide to the Contracting Officer concurrence with the planned work and state any preconditions required for the additional protection of equipment. These preconditions may include, but not limited to, establishing temporary telecommunications systems, arranged outages, or changes to the planned construction activity.

1.4.1.1 Subcontractors and Personnel Contacts

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.4.1.2 Identification Badges

Identification badges, if required, will be furnished without charge. Application for and use of badges will be as directed. Furnish a completed EMPLOYMENT ELIGIBILITY VERIFICATION (DHS FORM I-9) form for all personnel requesting badges. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.4.1.3 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installations under the cognizance of NAVFAC except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.4.2 Emergency Response Requirement

The Norfolk Naval Shipyard has instituted a requirement for all personnel to take shelter for personal safety in the event of certain emergencies. This policy includes Contractors, Subcontractors, and any person who is employed by the Contractor.

The most appropriate protective action for certain emergencies is to take shelter. Personnel shall immediately seek shelter while an assessment is made of the threat and determinations are being made regarding subsequent actions such as "all clear" or selected building evacuations. The following procedures have been put in place in the event of an emergent condition.

1. NOTIFICATION: The primary means of alerting personnel shall be emergency alert signals. The alerting signal to seek shelter shall be three steady tones that last for thirty seconds separated by ten seconds of silence. The notification for "all clear" shall be three short tones repeated three times.

2. SHELTERING: When personnel hear the alert signal, the area of work must be secured in a manner that will leave the site in safe condition. Personnel shall seek shelter in the nearest occupied building in calm and orderly manner. If possible, secure all windows and doors and shut off ventilation. If working aboard ship, proceed into the interior of the ship and wait for further directions from official personnel. If in a vehicle, park the vehicle so that it does not block the normally traveled portion of the road and proceed into the nearest occupied building.

3. EVACUATION: In the event of an evacuation, personnel shall receive directions from team members of the Crowd Control Center (CCC) or the building custodian acting on the directions from the CCC. Contract personnel shall comply with instructions given at all times.

NNSY PERSONNEL NOTIFICATION: The Contractor shall instruct their personnel, including subcontractors assigned to a job within NNSY, upon witnessing flooding, fire, injury to personnel, or any other incident or casualty requiring emergency response, to immediately contact all the below, providing the location and other pertinent details:

a. Any NNSY Supervisor or Manager

b. NNSY Fire Department dispatcher (396-3333)

c. The Contracting Officer

1.4.2.1 Safety and Fire Protection Awareness

a. Contractor personnel shall be made aware of emergency evacuation signals and best escape routes.

b. All personnel shall comply with NAVFAC Fire Code requirements as stated in COMNAVREGMIDLANT 11320.11.

c. Notify the Fire Department upon discovery of any discharge, regardless of the source.

1.4.3 Shipyard Regulations

Ensure that Contractor personnel employed on the Shipyard become familiar with and obey Shipyard regulations. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification. Comply with the following conditions:

a. Restrict employees/representatives to the work site and control travel directly to and from the work site.

b. Restore all traffic/parking/security signs and markings, including space numbers, designations, and lines, to their original form if

such signs/markings are defaced or deleted during construction/repair.

c. Be responsible for control and security of Contractor-owned equipment and materials at the work site. Report immediately missing/lost/stolen property to the Shipyard Police Department (phone 396-7266) as each case occurs.

d. Ensure that no material is stacked within 10 feet of the Controlled Industrial Area (CIA) perimeter. Remove from the work site, or secure ladders or other such equipment which could be used to climb the CIA perimeter fence. Ensure that no vehicles are parked within 10 feet of the CIA perimeter.

e. Ensure that no opening in the roof/walls/windows/fence of the building exist at the end of the work day and do not exist where penetration is possible during non-working hours. If the building cannot be secured at the end of the workday, coordinate action with the Contracting Office to notify the cognizant code to arrange for a security watch by their personnel.

f. Seventy-two hours prior to making any penetrations (such as tunneling under, cutting through a fence or building) in a restricted area, contact the Shipyard Security Office to make arrangements for a security guard or other measures required to meet all security requirements. Cost of security guard will be charged to the Contractor.

g. Crane rails within Norfolk Naval Shipyard, including the yellow painted safety zones, shall not be blocked without the prior written approval of the Contracting Officer for each instance (place or time) of blockage.

h. Contractors shall not enter the cafeterias in buildings 16, M-32, 202, 298, 435, 1436, and 1526 until after 1200 hours unless authorized work is to be performed.

1.4.4 Entry to Radiologically Controlled Areas

Entry to radiologically controlled areas for the purpose of facilities inspection, repair, alteration, or modification by Contractor personnel shall be effected only after notification in writing to the Contracting Officer by the Contractor at least 5 calendar days in advance of the need for such entry. Entry will be granted only after specification of appropriate radiological controls and personnel dosimetry requirements by the Shipyard Radiological Control Office, Code 105. This paragraph applies to contract work on the shipyard, including pre-work inspections, investigations, construction, and post-work warranty adjustments, and for reentry following a stoppage of work for more than 7 calendar days during any phase of any such work. Radiation areas are posted with signs consistent with OSHA requirements. Radiation areas are marked with rectangular signs with yellow background and magenta (purplish shade of red) propeller shape color symbol and legend. These signs are usually posted on doors or hatches leading to radiation areas or secured to magenta and yellow colored ropes which mark the perimeters of radiation areas. Ensure that employees are familiar with the radiation signs and symbols.

1.4.4.1 Radioactive Materials and Equipment

All testing equipment, containing a radioactive source or capable of generating ionizing radiation, such as radiographic exposure devices, x-ray machines and moisture/soil density guages,, shall be operated in accordance with an approved radioactive equipment plan or NRC license. This plan, permit, or license shall be submitted to the Contracting Officer and approved by the Radiation Officer (Code 105.5), prior to bringing the equipment into the shipyard. This plan shall include:

a. The name and type of equipment.

b. The type and size (activity/curie content) of radiation source.

c. The dates and locations of the equipment's usage.

d. The radiological controls that the Contractor will use while operating the equipment.

e. This plan should include:

1. The projected locations of the restricted area boundaries and calculations for isodose zones adjacent to the equipment usage, to insure that no unmonitored personnel receive radiation exposure in excess of 2 mR/hr. Note: This is a radiation exposure rate of 2 mR/hr not an integrated exposure of 2 mR in any one hour.

2. The locations/numbers of boundary guards/radiographic assistants that will be used to monitor radiation levels at boundaries and insure that no unmonitored personnel cross the restricted area boundary.

3. The qualifications of the radiographers, boundary guards, and operators of other equipment capable of generating ionizing radiation.

1.4.5 Working Hours

Regular working hours shall consist of an 8 1/2 hour period, between 0700 and 1600 Monday through Friday, excluding Government holidays.

1.4.6 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. The Contracting Officer shall obtain approval from the respective Shipyard departments, offices, and shops. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer. Make utility cutovers after normal working hours or on Saturdays, Sundays, and Government holidays unless directed otherwise.

1.4.7 Utility Cutovers and Interruptions

a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."

b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours."

d. Contractor is responsible for locking out and tagging out of service, all equipment/utility systems involved under this contract. After an outage has been approved , Government personnel will secure the equipment/utility distribution systems and tag those systems outside the building. Operation and isolation of utility services within the building are the responsibility of the Contractor. Where possible, the Contractor shall provide any necessary locks and chains to secure utility systems (i.e. steam, water, air, electricity) and to achieve a zero mechanical state (ZMS) for all machinery involved. ZMS is defined as the mechanical state of a machine in which:

1. Every power source that can produce machine movement has been locked off.

2. The mechanical potential energy of all portions of the machine is at its lowest potential value so opening of pipes, valves, hoses, or actuation of any valve will not produce a movement that could easily cause injury.

3. The kinetic energy of the machine is at its lowest practical value.

4. Pressurized fluid (air, oil, or other) trapped in the machine lines, cylinders, or other components is not capable of producing a machine motion upon actuation of any valve.

1.4.8 RESTRICTIONS ON USE OF YELLOW MATERIALS

Contractor shall refrain from use of yellow or orange-yellow materials for the following purposes: sheeting, tarpaulins, polyethylene bottles or other containers, tapes, bags, banding of identification marks on tools, boundary markers such as ribbons. Contractor generated yellow waste materials such as torn foul weather gear shall be disposed of by the Contractor off-yard. Shipyard dumpsters and trash cans shall not be used for disposal of Contractor generated yellow waste materials. Yellow colored items such as described above are of specific significance within the shipyard and are subject to strict controls.

1.5 COMPRESSED AIR UTILITY RESTRICTIONS

Connection of any equipment or system containing a water to air interface to the shipyard compressed air system or which is likely by virtue of delivery arrangement to introduce moisture or foreign material into the shipyard compressed air system is prohibited. Fittings, valves, connections to

shipyard compressed air system shall be removed. Portable air compressors will not be connected to the shipyard compressed air system.

For exclusion to this requirement, Contractor shall request for variance from NNSY Utility Manager. Upon approval, Utility Manager shall provide adequate design precautions and installation instructions to Contracting Officer within 10 days of request. After work is completed, Contractor shall notify NNSY Utility Manager, via Contracting Officer.

Do not remove, substitute, or modify the NNSY compressed air system fittings or perform any maintenance on NNSY installed components, unless work authorization has been given by the Contracting Office. Do not use compressed air for 'blowing down' of any space.

1.6 EXCAVATION NEAR GROUND LEVEL TRACK

Any excavation within ten feet of any ground level trackage (crane or rail) requires a track outage before the work is begun. The Contractor shall submit a track outage request 15 days prior to such work. During construction, if the expected completion date is not met, a follow-up track outage request must be submitted.

1.7 SECURITY REQUIREMENTS

Contract Clause "FAR 52.204-2, Security Requirements and Alternate II," "FAC 5252.236-9301, Special Working Conditions and Entry to Work Area".

1.7.1 Norfolk Naval Shipyard, Portsmouth, VA

Contractor employees and representatives performing work under this contract are required to be United States citizens. If naturalized, the individual shall present his naturalization papers to the Security Officer for inspection. Foreign born personnel shall present evidence of citizenship regardless of citizenship of parents, as required by immigration laws. Contractors and Contractor personnel shall be the subject of a local police records check. Contractor personnel who possess a security clearance issued by the Defence Industrial Security Clearance Office (DISCO) shall be issued a shipyard badge in the appropriate category. Each Contractor employee shall be required at the time of issuance of a personnel badge to submit a signed Privacy Act Release Form, in duplicate, to complete the local police check. Requested information shall be furnished. Individuals who have felony convictions (e.g., murder, rape, drug offences, of theft) or who are deemed untrustworthy by the Security Department, Norfolk Shipyard will be denied access to the shipyard and their personnel badge will be recalled.

1.7.1.1 Shipyard CIA and Sensitive Areas

All Contractor or visitor personnel requesting access to the Controlled Industrial Area (CIA0) will be required to view an orientation videotape prior to receiving a badge. The videotape is 20 minutes in length and includes radiological indoctrination training as well as security, environmental, safety and health issues.

Entry into the CIA for those listed with the Contracting Officer may be authorized under one of the following conditions.

a. Contractors having a DOD Facility Security clearance and whose employees have a DOD security clearance may be badged for immediate unescorted access into the CIA.

b. Employees and representatives having current Shipyard ID badges authorizing CIA access will be permitted entry into the CIA.

c. Employees not holding a current DOD security clearance or current CIA access badge must establish suitability and eligibility prior to being badged for unescorted CIA access. Provide a Completed Special Access Determination (NAVSEA 5510/15) (Apr 90) for each employee.

d. For situations other than the above, US citizens who are employees or representatives requiring a CIA access may be issued an "Escort Required" ("ER") pass for CIA access under the escort of a cleared individual employed by the activity. Processing of "ER" passes may take up to 5 days.

(1) The initial submittal of Visit Request forms need not be all inclusive. It may be expanded to meet essential requirements of the Contractor. Each individual added to the list, however, shall be subject to the same pre-entry screening requirements as outlined above.

(2) Shipyard ID badge will be issued by the Shipyard pass and Identification Office (Pass and ID Office).

1.7.1.2 Shipyard Nuclear Buildings

Prior to commencement of work, the Contractor shall obtain a NNSY Code 2380 Building Permit from the Contracting Officer. A fourteen day notice is required prior to on-site work to coordinate a pre-job brief and obtain the building permit.

1.7.1.3 Vehicle Regulations in the Shipyard CIA

No vehicle will be permitted access to a work site in the CIA without a DOD vehicle sticker and a valid Shipyard vehicle pass. The Shipyard vehicle passes are issued by the Shipyard Pass and ID Office. Shipyard vehicle passes will not be issued unless a DOD vehicle sticker has been obtained and proof of vehicle registration to the Contractor's company has been presented to Shipyard Pass and ID. Vehicles are required to conform to Shipyard traffic regulations. The speed limit is 15 mph in the CIA. Outside the CIA, the speed limit is as posted or marked. No privately owned vehicles are allowed inside the CIA with the exceptions of handicap, CO/XO/CMC of ships.

a. Only those Contractor vehicles meeting the following criteria will be allowed to enter the CIA with the Shipyard vehicle pass:

(1) Vehicles must clearly display an authorized company sign or logo.

(2) Vehicles must be company or commercial vehicles used to transport heavy equipment or material to the job site or to conduct bonafide and required inspections and surveillance at the job site.

Privately owned vehicles will not be used to transport employees to the job site and will not be allowed in the CIA.

1.7.1.4 Commercial Vehicles

Vehicle passes will be issued to each commercial vehicle that is required for the job, authorizing entry and parking within the CIA. Every vehicle entering the CIA will display the pass on the dashboard or visor (facing outward). The pass will be visible at all times while in the CIA. Parking is limited to those areas that are specifically identified on the pass. If additional passes are required, present adequate justification to the Pass and ID Office via the Contracting officer.

Contractor vehicles that enter the Controlled Industrial Area (CIA) will enter through Gate "F" only. Gate "F" is adjacent to building 369 and is open 0600-1800 weekdays. Contractor vehicles may use other open CIA gates when Gate "F" is closed (backshifts and weekends".

1.7.1.5 Parking

Prohibited on any piers and dry dock/waterfront areas. Do not park on or block the marked fire lanes or crane rail traveling zones (marked in yellow) at any time. Vehicles may stop on the piers or dry dock/waterfront areas for 15 minutes for loading and unloading. An exception may be made for vehicles which are part of the equipment needed to do the required work and are attached or connected to the pier of ship; for example, a truck which uses a mounted generator or a vehicle with built-in equipment.

1.7.1.6 Vehicle Searches

Vehicles are subject to search while entering, remaining in, or leaving the Shipyard. Government material being transported out of the CIA shall be covered by a Property Pass (OP-7), issued and signed by the Security Officer. Material found without a Property Pass will be confiscated and a police officer offense report issued.

1.7.1.7 Escort

For entrance to and work inside any building inside the CIA, the cognizant Shipyard code will provide escort services in the affected area.

1.7.1.8 Areas Not Covered by Contract

Contractor personnel will not be permitted to enter Shipyard buildings, spaces, and areas not covered by this contract except on prior approval of the Shipyard department/office/shop having jurisdiction of the areas. Coordinate action with the Contracting officer to obtain such entry approval.

1.7.1.9 Access to Unclassified Information

Access to unclassified U.S. Navy shipbuilding, conversion, or repair technology and related technical information manuals, documents, drawings, plans, specifications, and other unclassified information is restricted to official need-to-know basis, designated by physical markings to show the appropriate control designations. Handle, control, and safeguard to prevent oral, visual, and documentary disclosure to the public, to foreign sources,

and to personnel not having an official need-to-know. Return this information to the naval Shipyard upon completion of contracted work, except when specific retention authorization is granted by the Contracting Officer's Security Representative.

1.7.1.10 Photographs

Unofficial photograph y is prohibited in the Naval Shipyard. When operationally required, submit a written request containing specific justification and details to the Security Officer prior to release.

1.7.1.11 Identification Badges

In addition to the requirements specified in Section 01 30 00.00 22, "Administrative Requirements", comply with the following:

a. Submit a Visit Request (VR) and Special Access Determination (SAD) for each person listed to the Security Officer (Code 1125.2) via the Contracting Officer at least 6 weeks prior to the start date.

b. Employees and representatives requiring access are U.S. citizens or U.S. Nationals.

c. Under no circumstances shall personnel hand carry their own visit request.

d. Employees shall provide documented proof of U.S. citizenship to the Pass and ID Office prior to being issued a Shipyard badge.

e. Employees shall be available for interviews upon request by the Shipyard Personnel Security Specialist.

f. Employees shall wear and display the Shipyard badge in the chest area at all times while entering, remaining in, and exiting Shipyard spaces and each badge shall be used only by the specific individual named on the badge.

g. Maintain strict accountability over identification badges and passes issued by the Pass and ID Office. Return badges/passes to the Pass Office immediately upon termination of any employee, expiration, completion of contract, or when no longer required.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 30 00.00 22

ADMINISTRATIVE REQUIREMENTS
08/08

PART 1 GENERAL

1.1 SUBMITTALS

Government approval 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 01 33 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of contact personnel; G

Qualifications of Superintendent; G

1.2 MINIMUM INSURANCE REQUIREMENTS

Procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

a. Comprehensive general liability: $500,000 per occurrence

b. Automobile liability: $200,000 per person, $500,000 per occurrence for bodily injury, $20,000 per occurrence for property damage

c. Workmen's compensation as required by Federal and State workers' compensation and occupational disease laws.

d. Employer's liability coverage of $100,000, except in States where workers compensation may not be written by private carriers,

e. Others as required by State law.

1.2.1 Additional Insurance Requirements

a. Before commencing work under this contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance 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.

b. The Contractor shall insert the substance of this clause, including this paragraph b., in subcontracts under this contract that require work on a Government installation and shall make copies available to the Contracting Officer upon request.

1.3 CONTRACTOR PERSONNEL REQUIREMENTS

1.3.1 Subcontractors and Personnel

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.2 Identification Badges

Identification badges will be furnished without charge. Application for and use of badges will be as directed. Immediately report instances of lost or stolen badges to the Contracting Officer.

a. Submit a list of all employees to the Security Office, Code 1121.3. Each employee will be required to complete a Special Access Determination and be interviewed by a Personnel Security Specialist upon request.

b. Certify in writing that all employees and representatives requiring access are U.S. citizens.

c. Employees shall wear and display the Shipyard badge in the chest area at all times while entering, remaining in, and exiting Shipyard spaces and each badge shall be used only by the specific individual named on the badge.

d. Maintain strict accountability over identification badges and passes issued by the Pass and ID Office. Return badges/passes to the Pass Office immediately upon termination of any employee, expiration, completion of contract, or when no longer required.

1.4 SUPERVISION

The Superintendent for this contract is to have a minimum of seven years experience as a Superintendent, QC Manager, Project Manager or Construction Manager on similar size (dollar wise) and type construction contracts which included the major trades that are part of this contract. He is to be capable of reading, writing, and conversing in the English language on the job site during working hours. If this contract allows for the Superintendent and Quality Control Manager to be one person, then the qualifications for the Quality Control Manager will override this paragraph. Provide a submittal on Qualifications of superintendent as indicated in the paragraph entitled, "Submittals." The superintendent shall be subject to an interview by the construction office

In addition to the above experience requirements, the Project Manager and on-site Project Superintendent shall complete the course entitled "Construction Quality Management for Contractors" prior to the start of construction. This course is periodically offered at ROICC offices in Italy. Contact the Contracting Officer to schedule attendance in the course.

1.5 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual

understanding relative to the administration of the value engineering and safety program, preparation of the schedule prices, shop drawings, and other submittals, scheduling programming, and prosecution of the work. Major subcontractors who will engage in the work shall also attend.

1.6 PARTNERING

LEVEL C PARTNERING: To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership with the Contractor and its subcontractors. The partnership will draw on the strength of each organization in an effort to achieve a quality project done right the first time, within budget, on schedule, and without any safety mishaps. This level of partnering discusses partnering concepts and benefits and should become a part of the preconstruction conference. The senior Government representative and senior Contractor representative present will jointly host the partnering sessions. The partners will determine the frequency of the follow-on sessions. Partnering sessions should be held at or near the location of the activity contracting office. The participants shall bear their own costs for meals, lodging, and transportation associated with partnering.

1.7 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments in Microsoft, Adobe Acrobat, and other similar formats. Within 10 days after contract award, the Contractor shall provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple email address will not allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including field office(s). The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to this email address.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 32 16.00 22

CONSTRUCTION PROGRESS DOCUMENTATION
04/06

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor quality control approval . The following shall be submitted in accordance with Section 01 33 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction schedule; G

1.2 CONSTRUCTION SCHEDULE

Prior to the start of work, prepare and submit to the Contracting Officer for acceptance a construction schedule in the form of a Critical Path Method (CPM), Network Schedule in accordance with the terms in Contract Clause "FAR 52.236-15, Schedules for Construction Contracts," except as modified in this contract. Updated schedules shall be provided at each regularly scheduled CQC meeting. this shall be a newly revised schedule. Refer to Section 01 32 17.00 22 NETWORK ANALYSIS SCHEDULES (NAS) for schedule requirements.

1.3 EQUIPMENT DELIVERY SCHEDULE

1.3.1 Initial Schedule

Within 30 calendar days after acceptance of the proposed construction schedule, submit for Contracting Officer acceptance a schedule showing procurement plans for materials and equipment. Submit in the format and content as prescribed by the Contracting Officer, and include as a minimum the following information:

a. Description.

b. Date of the purchase order.

c. Promised shipping date.

d. Name of the manufacturer or supplier.

e. Date delivery is expected.

f. Date the material or equipment is required, according to the current construction schedule.

1.4 NETWORK ANALYSIS SCHEDULE (NAS)

The Contractor shall use the critical path method (CPM) to schedule and control construction activities. The Network shall have a minimum of 20 construction activities. The scheduling software that will be utilized by the Government on this project is SureTrak by Primavera Systems, Inc. and Primavera Project Planner (P3) by Primavera Systems, Inc. Notwithstanding any other provision in the contract, schedules submitted for this project

must be prepared using either Primavera P3 or Primavera SureTrak (files saved in Concentric P3 format). Submission of data from another software system where data conversion techniques or software is used to import into Primavera's scheduling software is not acceptable and will be cause for rejection of the submitted schedule. The schedule shall identify as a minimum:

a. Construction time for all major systems and components;

b. Each activity shall be assigned its appropriate Responsibility Code;

c. Each activity shall be assigned its appropriate Phase Code;

d. Major submittals and submittal processing time; and

e. Major equipment lead time.

1.4.1 CPM Submittals and Procedures

Submit all network analysis and updates in hard copy and on electronic media that is acceptable to the Contracting Officer. The project schedule will also be posted in the format specified as an Adobe PDF file with no relationship lines displayed in the graphic. The network analysis system shall be kept current, with changes made to reflect the actual progress and status of the construction.

1.5 UPDATED SCHEDULES

Update the construction schedule and equipment delivery schedule at monthly intervals or when the schedule has been revised as indicated in the paragraph entitled, "Construction Schedule" whichever is most frequent. Reflect any changes occurring since the last update. Submit copies of the purchase orders and confirmation of the delivery dates as directed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 32 17.00 22

NETWORK ANALYSIS SCHEDULES (NAS)
11/08

PART 1 GENERAL

1.1 DESCRIPTION

The network analysis system shall consist of the network analysis schedule (diagram) and associated reports. The scheduling of all procurement and construction shall be the responsibility of the Contractor. Construction increments will be interrelated on a single schedule that represents the entire project duration from Contract Award to the Contract Completion Date. Schedule updates will build upon each other and will include construction increments as they are detailed, submitted and accepted. Submission of progress and revision data will be used to measure work progress, aid in the evaluation for requests for time extensions, and to provide the basis of all progress payments. The Critical Path Method (CPM) of network calculation shall be used to generate the project schedule and will utilize the Precedence Diagram Method (PDM) to satisfy both time and cost applications. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities.

For consistency, when scheduling software terminology is used in this specification, the terms in Primavera's scheduling programs are used. Primavera Project Planner, P3, Primavera Project Manager, SureTrak and PrimeContract are registered trademarks or service marks of Primavera Systems, Inc. Adobe and Acrobat are registered trademarks of Adobe Systems Incorporated.

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 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualifications; G

Standard Activity ID Dictionary; G

Construction Network Analysis Schedule; G

Baseline Network Analysis Schedule; G

SD-07 Certificates

Monthly Network Analysis Updates; G

Summary Network; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.3 SCHEDULE ACCEPTANCE

Review comments made by the Government on the Contractor's schedule(s) will not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for scheduling, sequencing, and prosecuting the Work to comply with the requirements of the Contract Documents. Government acceptance extends only to the activities of the Contractor's schedule that the Government has been assigned responsibility and agrees it is responsible. The Government will also review for contract imposed schedule constraints and conformance, and cost loading of the CPM activities. Comments offered on other parts of the schedule, which the Contractor is assigned responsibility, are offered as a courtesy and are not conditions of Government acceptance; but are for the general conformance with established industry schedule concepts.

1.3.1 Schedule Acceptance Prior to Start of Work

The Baseline Network Analysis Schedule described in the paragraph entitled "Baseline Network Analysis Schedule" must be submitted and accepted by the Government before the Contractor will be allowed to start work on the construction stage(s) of the contract. Examples of construction stages are, but not limited to; demolition, site work, temporary work for construction, etc.

1.3.2 Acceptance

a. When the Construction Network Analysis Schedule is submitted and accepted by the Contracting Officer, it will then be considered the "Baseline Network Analysis Schedule". The Baseline Network Analysis Schedule will then be used by the Contractor for planning, organizing, and directing the work; reporting progress; and requesting payment for work accomplished. The schedule will be updated monthly by the Contractor and submitted monthly with the progress pay request to reflect the current status of the work. Submittal and acceptance of the Baseline Network Analysis Schedule and accurate updated schedules accompanying the pay requests are both conditions precedent to processing pay requests. Only bonds will be paid prior to acceptance of the Baseline Schedule(s).

b. Submittal of the Baseline Network, and subsequent schedule updates, will be understood to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor's plan on how the work will be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

1.4 SOFTWARE

The scheduling software that will be utilized by the Government on this project is SureTrak by Primavera Systems, Inc. and Primavera Project Planner (P3) by Primavera Systems, Inc.. Notwithstanding any other provision in the contract, schedules submitted for this project must be prepared using either Primavera P3 or Primavera SureTrak (files saved in Concentric P3 format). The Contractor shall provide electronic files saved in a format that is compatible with the Contracting Officer's current software version. Submission of data from another software system where data conversion

techniques or software is used to import into Primavera's scheduling software is not acceptable and will be cause for rejection of the submitted schedule.

1.5 QUALIFICATIONS

The Contractor shall designate a part time Scheduler that will be responsible for the development, preparation, and maintenance of an accurate, computerized Network Analysis Schedule. Part time is defined as the Scheduler performing coordination, attending project meetings, and updates as may be necessary . The Scheduler shall have previously developed, created and maintained at least 2 previous computerized schedules of similar size and complexity of this contract. A resume outlining the qualifications of the Scheduler and their SureTrak or P3 training certificate from an authorized Primavera trainer shall be submitted for acceptance to the Contracting Officer. If at a later date, the Contracting Officer considers the Contractor's Scheduler to be incompetent or objectionable, the Contractor will propose a new Scheduler, meeting the qualification requirements. Payments will not be processed until an acceptable Scheduler is provided.

1.6 NETWORK SYSTEM FORMAT

The system shall consist of time scaled logic diagrams and specified reports.

1.6.1 Diagrams

Show the order and interdependence of activities and the sequence in which the work is planned to be accomplished. The basic concept of the network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and how its completion restricts or restrains the start of following activities. Activity durations shall not be resource-driven, activities shall start according to network logic and finish when its duration has elapsed. Diagrams shall be sorted by Early Start Date and will show a continuous flow from left to right with no logic from right to left. With the exception of the Contract Award, Start Project and End Project milestone activities, no activities will be open-ended; each activity will have predecessor and successor ties. The diagram shall clearly show the activities of the critical path and must be red in color. Once an activity exists on the schedule it may not be deleted or renamed, and must remain in the logic. No more than 20 percent of the activities may be critical or near critical. Critical will be defined as having zero days of Total Float. "Near critical" will be defined as having Total Float in the range of 1 to 14 days. Show the following information on the diagrams for each activity:

a. Activity ID

b. Activity Description

c. Original Duration in Work Days

d. Remaining duration

e. Actual Duration in Work Days

f. Early Start Date

g. Early Finish Date

h. Total Float

Provide network diagrams on tabloid (11X17) sheets. Updated diagrams shall show the date of the latest revision.

1.6.2 Schedule Activity Properties and Level of Detail

Numbering shall be assigned so that, in general, predecessor activity numbers are smaller numerically than the successor activity numbers. Skip numbering shall be used on the network to allow insertion of additional activities for contract modifications and logic changes. The minimum number of construction activities in the final network diagram shall be equal to the number of definable features of work. Activity categories included in the schedule are specified below.

1.6.2.1 Activity Categories

a. Procurement Activities: Tasks related to the procurement of material or equipment shall be included as separate activities in the project schedule. Examples of procurement activities include, but are not limited to; Material/equipment submittal preparation, submittal and approval of material/equipment; delivery of O&M manuals; material/equipment fabrication and delivery, delivery of extra parts, extra stock, special tools, notification of Government Furnished Material/Equipment delivery requirement, etc. As a minimum, separate procurement activities will be provided for every specification section. If the Contractor intends on using Just-In-Time (JIT) delivery methods, the schedule will show each JIT delivery with relationship tie to the Construction Activity specifically for the JIT delivery. Material and equipment for which payment will be requested in advance of installation shall be cost-loaded with the procurement costs (e.g.; the delivery milestone(s)). All activities within a procurement process/cycle will have a unique identifier in the activity code to show their relationships and will extend to the related construction activities (i.e., CSI Code).

If the Government's action on any submittal is "Disapproved" or "Revise and Resubmit", a new series of Procurement Activities will be inserted into the schedule. Predecessor for the new submittal preparation activity will be the original approval activity and the successor of the new approval activity will be the fabrication/deliver activity for the equipment or material.

b. Government Activities: Government and other agency activities that could impact progress shall be clearly identified. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted inspections/tests, environmental permit approvals by State regulators, utility outages, Notice(s) to Proceed and delivery of Government Furnished Material/Equipment. Show activities indicating Government furnished materials and equipment utilizing delivery dates indicated in "FAR 52.245-2, Government Property (Fixed-Price Contracts)." Government activities will be driven by calendars

that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

c. Construction Quality Management (CQM) Activities: CQM Activities will identify the Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan. These activities will be added to each 3-Week Look Ahead Schedule referenced in the paragraph entitled "THREE-WEEK LOOK AHEAD SCHEDULE" and will also be included in each monthly update referenced in the paragraph entitled "Monthly Network Analysis Updates". The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.

d. Construction Activities: Construction activities shall include, but are not limited to: Tasks related to mobilization or demobilization; the installation of temporary or permanent work by tradesman; testing and inspections of installed work by technicians, inspectors or engineers; start-up and testing of equipment; commissioning of building and related systems; scheduling of specified manufacture's representatives; Punch Out Inspection; Pre-Final Inspection, Final Acceptance Inspection; final clean-up; training to be provided; and administrative tasks necessary to start, proceed with, accomplish or finalize the contract. No onsite construction activity shall have a duration in excess of 20 working days. Contractor activities will be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

1.6.2.2 Project Milestones

Dates shall be shown on the diagram for the start of the project, any contract required interim start and completion dates, contract completion date and other significant milestones.

a. Project Start Date Milestones: The schedule shall start no earlier than the Contract Award Date and the project duration (Day 1) will start on the Notice-to-Proceed (NTP) date. The Contractor shall include as the first milestone in the schedule, an activity named "Contract Award". Another milestone shall be included that will be named "Start Project". The Contract Award and Project Start milestones shall have mandatory start constraint dates equal to the Contract Award and NTP dates, respectively.

b. Constraint of Last Activity Milestone: The Contractor shall include as the last activity in the project schedule, an activity named "End Project". The "End Project" activity shall have a mandatory finish constraint equal to the contract completion date for the project. Calculation of project updates shall be such that if the finish of the last activity falls after the contract completion date, then the float calculation shall reflect negative float on the critical path and if the finish of the last activity falls before the contract completion date, the float calculation shall reflect positive float on the critical path. The only predecessor activity to this activity will be either the "Contractor Early Completion" or the "Substantial Completion" milestone, whichever is used by the Contractor.

c. Early Project Completion: In the event the Contractor's project schedule shows completion of the project prior to the contract completion date, the Contractor shall include an activity named "Contractor Early Completion". The activity shall be a milestone with an unconstrained date representing the Contractor's Early Completion date. The only successor activity to this activity will be the "End Project" milestone.

d. Substantial Completion: If the Contractor elects to include an activity for Substantial Completion, then it is agreed that Substantial Completion will be the point in time that the Government considers the project is complete and ready for its intended use. The activity will be named "Substantial Completion". The activity shall be a milestone with an unconstrained date representing the Contractor's Substantial Completion date. The only successor activity to this activity will be the "End Project" milestone.

1.6.2.3 Activity Identification (ID) and Description

a. Standard Activity ID Dictionary: The Contractor shall submit the alphanumeric coding scheme for Schedule Activity Numbers that shall be used throughout the project. The coding scheme submitted shall list the values for each activity code and translate those values into project specific designations. Code length shall not exceed 25 characters. Once accepted, the coding scheme will be used for the duration of the project.

b. Activity Description: Each activity shall have a narrative description consisting of a Verb or work function (e.g.; form, pour, excavate), an Object (e.g.; slab, footing, under floor plumbing), and Area (e.g.; 3rd floor, northeast quadrant, basement).

1.6.2.4 Activity Code Dictionary and Values

The Contractor shall establish the activity codes identified in this specification. The codes will have values assigned that will allow the scheduling program to sort, select, group and organize the activities in the schedule. Activity codes include, but are not limited to, the following codes:

a . Area Code: All activities shall be identified in the project schedule by the Area Code in which the activity occurs. Activities shall not be contained in more than one Area Code. Area is defined as distinct separations in construction, such as a story of construction, separate structure, usage or function difference, utility distribution systems, etc.

b . Responsibility Code: All activities in the project schedule shall be identified with the party responsible to perform the task. Responsibility includes, but is not limited to; the Prime Contractor, subcontracting firm, or Government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by a responsibility code. For example, a responsibility code value, "ELEC", may be used to identify the "Electrical Subcontractor".

c . CSI Code: All activities in the project schedule shall be identified with its respective 5-digit Specification Section number. Activities shall not belong to more than one Section number. If an activity does not have an applicable CSI Code, (such as "Mobilize"), the code will be "00000".

d . Drawing Code: All activities in the project schedule shall be identified with its respective project Drawing Code. The Drawing Code is the Sheet Number on the primary project drawing, which indicates the work to be performed. Activities shall not belong to more than one Drawing Code. Examples of Drawing Codes are "C-10", "C.10" or "C10". The code system will allow organizing all activities by Drawing Code in alpha and numeric order. If an activity does not have an applicable Drawing Code, (such as "Mobilize"), the code will be "00000".

e . Modification Code: The Modification Code shall identify activities that are modified or added by contract modification. Activities shall not belong to more than one Modification Code. The Government will assign the modification number, which will be shown on the Standard Form 30. Use a shortened version of the modification number for the code (e.g.; A00010 = 010).

f . Request for Equitable Adjustment (REA) or Claim Code: Activities that are modified or added, as a result of a Contractor's REA or Claim shall be identified by a code generated by the Contractor. Activities shall not belong to more than one REA or Claim Code.

1.6.2.5 Cost and Resource Loading

a. Cost Loading Activities: Equipment costs will be assigned to their respective Procurement Activities (i.e., the delivery milestone activity). Costs for installation of the material/equipment (labor, construction equipment, and temporary materials) will be assigned to their respective Construction Activities. Evenly disperse overhead and profit to each activity over the duration of the project. The total of all cost loaded activities; including costs for material and equipment delivered for installation on the project, and labor and construction equipment loaded construction activities, shall total to 100 percent of the value of the contract.

b. Quantities and Units of Measure: Each cost loaded activity will have a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, etc. These entries are informational only and are non-calculating. Quantities shall be entered as Log Text 1 (in SureTrak) or Log 1 (in P3) for each activity, column heading will be "Quantities". Units of Measure shall be entered as Log Text 2 (in SureTrak) or Log 2 (in P3) for each activity, column heading will be "Units of Measure".

c . Equipment Resource loading: As part of the Baseline Schedule development each construction activity shall have an estimate of the equipment used per day, number of units per day and total expected hours for each piece of equipment used during the duration of the activity. Include a description of the major items of construction equipment planned for each construction activity on

the project. The description shall include the year, make, model, and capacity. If no equipment is required for an activity, then the activity shall be identified as using zero equipment per day. All equipment resources loaded into the schedule shall be non-driving and will not be used to calculate activity cost or duration. Resource leveling shall not be used. Actual equipment resource expended on an activity will be recorded in the monthly updated schedules and will coincide with entries made in the Daily Reports.

1.6.2.6 Anticipated Weather Delays

Schedule activity duration(s) shall be formulated with allowance for normal adverse weather conditions. Any activity duration, which could be impacted by normally anticipated adverse weather (precipitation, high or low temperature, wind, etc.), due to the time period that the Contractor has scheduled the work, shall include an adjustment to include the anticipated weather delay. The Contractor shall anticipate delay by comparing the contractually imposed environmental restrictions in the Contract Documents to the National Oceanic and Atmospheric Association's (NOAA) historical monthly averages for the NOAA location closest to the project site. The number of anticipated adverse weather delays allocated to an activity will be reflected in the activity's calendar. A lost workday, due to weather conditions, is defined as a day in which the Contractor's workforce cannot work 50 percent or more of the day on the impacted activity(s). The Contractor shall immediately notify the Contracting Officer when a lost day has occurred due to weather, will record on the Daily Reports the occurrence of adverse weather and resultant impact to the normally scheduled work. If the number of actual adverse weather delay days exceeds the number of days anticipated, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days and issue a modification in accordance with the contract clauses.

1.6.2.7 Schedule Software Settings and Restrictions

a. Activity Constraints: Date/time constraint(s), other than those required by the contract, will not be allowed unless accepted by the Contracting Officer. Contractor will identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.

b. Lags: Lags will not be used when the creation of an activity will perform the same function (e.g., concrete cure time). Lag durations contained in the project schedule shall not have a negative value. Contractor will identify any lag proposed and provide an explanation for the purpose of the lag in the Narrative Report.

c. Default Progress Data Disallowed: Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates on the CPM schedule shall match the dates provided from Contractor Quality Control and Production Reports. These reports will be the sole basis for updating the schedule. Work activities will be updated by actual work progression rather than being cash flow driven. Actual labor and equipment hours used on activities will be derived from the Daily Reports.

d. Software Settings: If the contractor chooses to use Primavera's SureTrak software, the Autocost Rules shall be set to:
   1) Uncheck - Link Remaining Duration and Schedule Percent Complete;
   2) Check - Use Updated Percent Complete Against Budget to Estimate Actual to Date;
   3) Check - Freeze Resource Units per Hour When Quantities Change;
   4) Check - Update Cost and Revenue Information; and,
   5) Set Resource Data to "Two decimal places".

If the contractor chooses to use Primavera's P3 software, the AutoCost rules shall be set as shown below, all others shall be deactivated (i.e.; check boxes and radio buttons not filled in):
   1) Use the update percent complete against budget to estimate: Actual cost to date.
   2) Link budget and EAC for non-progressed activties: Budget-EAC.
   3) Perform these calculations during each schedule computation: Apply these rules when moving from one Resource to another.

Schedule calculations and Out-of-Sequence progress (if applicable) shall be handled through Retained Logic, not Progress Override. All activity durations and float values will be shown in days, time will not be shown in the duration display. Activity progress will be shown using Remaining Duration. Date format will be DDMMMYY (i.e., 11DEC02). Default activity type will be set to "Task".

1.6.3 Required Tabular Reports

The following reports will be based on the information in the paragraph entitled "Diagrams" and included with the schedule submittals and in each updated schedule submission provided on disk by the Contractor:

a. Earned Value Report: Listing all activities having a budget amount and cost. A compilation of total earnings on the project from the notice to proceed to the most recent monthly progress payment request and the difference between the previous request amount and the current payment request amount. Sort report first by resource and then by activity.

b. Log Report: With each updated schedule submission, provide a computer generated Log Report using a recognized schedule comparison software listing all changes made between the previous schedule and current updated schedule. Identify the name of the previous schedule and name of the current schedule being compared. This report will as a minimum show changes for: Added & Deleted Activities, Original Durations, Remaining Durations, Activity Percent Complete, Total Float, Free Float, Calendars, Descriptions, Constraints (added, deleted or changed), Actual Starts/Finishes, Added/Deleted Resources, Resource Quantities, Costs, Resource Percents, Added/Deleted Relations, Changed Relation Lags, Changed Driving Relations, and Changed Critical Status.

c. Activity ID Report: By activity number in ascending order showing the current status of all activities.

d. Total Float Report: List of all activities by total float in ascending order and then in order of activity number.

e. Early Start Report: By earliest allowable start dates and then in order of activity number.

f. 30-Day Look Ahead: Activities in progress or scheduled to start or finish within the next 30 calendar days of the project Data Date or is continuing through the 30 day period.

g. Predecessor/Successor Report: By activity number from lowest to highest, showing preceding and succeeding activity numbers for each activity and showing the current status of each activity.

h. Labor Staffing Report and Histogram: With each Baseline Network Analysis Schedule submittal and each updated schedule, a planned early and planned late versus actual labor resource report and histogram will be provided. The report and histogram shall be based upon and shall be in agreement with, the number of shifts and crew sizes by craft, in the Baseline Network Analysis Schedule (planned) and the Monthly Network Update (actual). Included in the report will be a tabular listing of each trade that worked on the activities during the construction period.

i. Equipment Usage Report and Histogram: With each Baseline Network Analysis Schedule submittal and each updated schedule, a planned early and planned late versus actual equipment resource report and histogram will be provided. The report and histogram shall be based upon and shall be in agreement with the equipment allocation in the Baseline Network Analysis Schedule (planned) and the Monthly Network Update (actual). Included in the report will be a tabular listing of equipment (by year, make and model) that worked on the activities during the construction period.

1.7 SUBMISSION AND ACCEPTANCE

1.7.1 Preliminary Meeting

Prior to the preparation of the Construction Network Analysis Schedule for acceptance; the Contracting Officer, Contractor and the scheduler shall participate in a preliminary meeting to discuss the proposed schedule and requirements of this section prior to submission of the network. Discussions shall include: 1) Which construction activities may have delivered material costs included (e.g., concrete placement, etc.), 2) Which procurement activities will have material/equipment costs separated from their respective construction activity costs (e.g., any stored equipment, etc.) and, 3) Which procurement and construction activities will have separate testing/inspection costs; per the paragraph entitled "Cost Loading Activities".

1.7.2 Construction Network Analysis Schedule

Submit the complete network analysis schedule and obtain acceptance prior to starting construction work. Submit three copies of the diagrams described in the paragraph entitled "Diagrams" and the reports listed in the paragraph entitled "Required Tabular Reports". As part of this submittal, provide the Project Name format (and Project Group Name if used) that will be used by the Contractor to identify initial schedule submittals, updates, fragnets,

changes, etc. Include 1 copy of the Construction Network Analysis Schedule on electronic media that is acceptable to the Contracting Officer.

1.7.3 Review and Evaluation

After the Government's review(s) of the Construction Network Analysis Schedule, the Contractor shall meet with the Contracting Officer to discuss the review and evaluation of the NAS submittal. Revisions necessary as a result of this review shall be resubmitted for acceptance within 10 calendar days after the meeting.

1.7.4 Baseline Network Analysis Schedule

Once review comments are resolved and the Contracting Officer has accepted the Construction Network Analysis Schedule, the Contractor shall within 5 calendar days furnish:

a. Two copies of the network diagrams.

b. Two copies of the reports listed in paragraph entitled "Required Tabular Reports".

c . Two sets of data disks containing the project schedule shall be provided for the each Baseline submission and every periodic project update. Data shall be submitted on electronic media that is acceptable to the Contracting Officer. A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Construction NAS, Baseline, Update, Recovery, Time Impact Analysis (PC#), etc.), full contract number, Project Name used to identify project in scheduling software, contract name & location, data status date, diskette number with total number of diskettes in set, software name and version used to run the schedule, and the name and telephone number of person responsible for the schedule.

For major revisions, updates or changes to the network diagrams, once accepted by the Contracting Officer, the Contractor shall submit these same diagrams and reports.

1.7.5 Monthly Network Analysis Updates

At monthly intervals the Contractor and Government representatives will meet to jointly update the project schedule and agree on percentage of payment for each activity progressed during the update period. The purpose of the meeting is to determine progress payment amounts for each activity, allow all parties to evaluate project status at the data date, provide a complete and accurate update of procurement and construction progress, create an historical record of the project and establish prediction of completion date(s) based upon current status. The Contractor is responsible to gather all supporting documentation, present the update data for the schedule and record the meeting minutes. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities. Submit at monthly intervals a report of the actual construction progress by updating the required reports and the time scaled logic diagram. Meeting to update the schedule and the submission of an error free, acceptable updated schedule to the Government is a condition precedent to the processing of the

Contractor's pay request. As a minimum, the following actions will be accomplished during the meeting:

a. Identify activities started and completed during the previous period and enter the Actual Start and Actual Finish dates. It will be understood that Actual Start is defined as the date that work begins on an activity with the intent to pursue the work represented by the activity to substantial completion, and Actual Finish is defined as the date that the activity's work is substantially complete to the point that its successor activity(s) may begin.

b. Show estimated duration (in workdays) to complete each activity started but not completed (remaining duration).

c. Indicate percentage of cost payable and percent of work complete as separate and independent entries for each activity. The assignment of an Actual Finish date to an activity does not imply that the activity's percent of payment will be statused to 100%.

d. Reflect changes in the network diagram. All changes (i.e., remaining duration changes, logic changes, new logic, conformed change orders, new activities, changes due to Conformed Modifications, changes in work sequence, entry of as-built relationship logic, etc.) shall be recorded and a note added to the activity log field. The log shall include as a minimum, the date and reason for the change, and description of the change.

e. Submit two copies of a Narrative Report describing: 1) Progress made in each area of the project; 2) Changes in the following; activities, original durations, logic interdependencies, milestones, planned sequence of operations, critical path, and resource and loading; 3) Pending items and status thereof, including permits, change orders, and time extensions; 4) Status of Contract Completion Date and interim milestones; 5) Current and anticipated delays (describe cause of the delay and corrective action(s)); and 6) Description of current and future schedule problem areas. Each entry in the narrative report will cite the respective Activity ID and Activity Description.

f. Submit two copies of the reports listed in paragraph entitled "Required Tabular Reports".

g. Two hard copies of the network diagrams and two sets of data disks.

h. Submit two copies of the Update Meeting minutes.

1.7.6 Summary Network

A summary network shall have the same network format as the Baseline Network Analysis Schedule. The summary network will contain a minimal number of activities that represent the general approach of work sequence. The Summary will be a time-scaled logical sequence. The Contractor shall submit a summary network diagram along with the Baseline Network Analysis Schedule. A summary network update shall be submitted every 6 months during the contract duration and immediately following acceptance of each major schedule change. Submit the following:

a. Two copies of the summary network diagram.

b. Two copies of the Activity ID Report.

c. Two copies of the Total Float Report.

d. Two copies of the Earned Value Report indicating the actual cash flow for the current updated (not summary) network based upon both the early and late start schedules.

1.7.7 As-Built Schedule

As a condition precedent to the release of retention and making final payment, the Contractor shall submit an "As-Built Schedule", which is the last schedule update. The As-Built Schedule shall reflect the exact manner in which the project was actually constructed (including actual start and finish dates, activities, sequences, and logic) and shall be certified by the Contractor's Project Manager and Construction Scheduler as being a true reflection of the way the project was actually constructed. If more than one person filled the position(s) during the course of the project, each person will provide certification for the period of time they were responsible.

1.8 CONTRACT MODIFICATION

When a contract modification to the work is required, submit proposed revisions to the network with a fragnet and a cost proposal for each proposed change. All modifications shall be incorporated into the network analysis system as separate identifiable activities broken down and inserted appropriately on the first update following issuance of a directive to proceed with the change. Submit one copy of the Total Float Report, Log Report and a copy of the proposed Time Impact Analysis on disk, with the cost proposal. Unless the Contracting Officer requests otherwise, only conformed contract modification fragnets will be added into the subsequent monthly updates. All revisions to the current baseline schedule activities that are necessary to further refine the schedule so that the changed work activities can be logically tied to the schedule shall be made. Financial data shall not be incorporated into the schedule until the Contracting Officer signs the contract modification.

1.8.1 Time Impact Analysis:

The Time Impact Analysis method shall be used by the Contracting Officer and Contractor in determining if a time extension or reduction to the contract milestone date(s) is justified. The Contractor shall provide a Time Impact Analysis to the Contracting Officer for any proposed contract change or as support for a Value Engineering Proposal, Variance Request, Claim or Request for Equitable Adjustment by the Contractor. Submit the Time Impact Analysis schedule, reports, etc. on disk and as a printed/plotted hardcopy.

a. The Contractor shall submit a Time Impact Analysis (TIA) illustrating the influence of each change or delay on the Contract Completion Date or milestones. Unless the Contracting Officer requests an interim update to the schedule, the current monthly updated schedule accepted by the Government shall be used to display the impacts of the change. Unless requested by the Contracting Officer, no other non-conformed changes will be

incorporated into the schedule being used to justify the change impact.

b. Each TIA shall include a Fragmentary Network (fragnet) demonstrating how the Contractor proposes to incorporate the impact into the project schedule. A fragnet is defined as the sequence of new activities and/or activity revisions, logic relationships and resource changes that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Contractor shall provide a hardcopy printout of the fragnet activities and relationships being added and also insert the fragnet into the most current, accepted Monthly Network Analysis Update, run the schedule calculations and submit the impacted schedule with the proposal, claim, etc. Include a narrative report describing the effects of new activities and relationships to interim and contract completion dates, with each TIA. Submit time extension requests with a Time Impact Analysis and three hardcopies of the fragnet (in a graphic format), impacted schedule (with fragnet loaded), Total Float Report, Narrative Report and Log Report.

c. Following the Contractor's receipt of a contract modification on a Standard Form 30 signed by the Government; all changes in the fragnet used to determine impacts, shall be incorporated into the schedule. Changes to the schedule will occur during the next monthly schedule update meeting.

1.8.2 No Reservation-Of-Rights

All direct costs, indirect costs, and time extensions will be negotiated and made full, equitable and final at the time of modification issuance.

1.9 CHANGES TO THE NETWORK ANALYSIS SCHEDULE

If changes in the method of operating and scheduling are desired, the Contracting Officer shall be notified in writing stating the reasons for the change. If the Contracting Officer considers these changes to be of a major nature, the Contractor may be required to revise and submit for acceptance, without additional cost to the Government, the network diagrams and required reports. A change may be considered of a major nature if the estimated time required or actually used for an activity or the network logic has varied from the original plan to a degree that there is a reasonable doubt as to the effect on the contract completion date(s)[or phase completion dates]. Changes that affect activities with adequate float time shall be considered a major change when their cumulative effect could extend the contract completion date.

1.10 FLOAT

Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to Government caused delay), lag logic restraints, zero total or free float constraints, extended activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of Resource Leveling (or similar software features) used

for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

1.10.1 Definitions of Float

Free Float is the length of time the start of an activity can be delayed without delaying the start of a successor activity. Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the project completion date. Project Float is the length of time between the Contractor's Early Completion (or Substantial Completion or similar activity) and the Contract Completion Date.

1.10.2 Ownership of Float

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Government or the Contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the reserve of float. A schedule showing work completing in less time than the Contract time, and accepted by the Government, will be considered to have Project Float. Project Float will be a resource available to both the Government and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the Project's critical path, consumes all available float or contingency time, and extends the work beyond the Contract Completion Date.

1.10.3 Negative Float

Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the paragraphs entitled "CONTRACT MODIFICATION". Scheduled completion date(s) that extend beyond the contract or phase completion date(s) (evidenced by negative float) may be used in computations for assessment of payment withholdings. The use of this computation is not to be construed as a means of acceleration.

1.11 THREE-WEEK LOOK AHEAD SCHEDULE

To provide a more detailed day-to-day planning of upcoming construction work, the Contractor shall prepare and issue detailed work plans that coordinate with and supplement the above defined network analysis. The work plans shall be keyed to the CPM activity numbers and shall be submitted each week and shall show the project activities that will occur during the current and following two-week interval. Additionally, the critical path activities are to be identified on the 3-Week Look Ahead Schedule. The schedule will be a bar chart type schedule prepared by the Contractor in sufficient detail to define the work to be accomplished, the crews, construction tools and equipment to be used during the current and next two-week interval. The bar charts shall be formatted to allow reproduction on 8 1/2 by 11 sheets. Three copies of the bar chart schedules shall be delivered to the Contracting Officer not less than 3 work hours prior to the start of the weekly coordination meeting.

1.12 WEEKLY COORDINATION MEETING

In conjunction with the receipt of the 3-Week Look Ahead Schedule, a coordination meeting will be held each week [on-site][in the Contracting Officer's conference room] to discuss the work schedule. The Contractor shall make a presentation of the previously submitted and current 3-Week Look Ahead Schedule to the Contracting Officer so as to provide an overview of the project's schedule and provide an opportunity to discuss items of coordination. Consideration of materials, crews, and equipment shall be addressed to ascertain their respective availability. The meeting shall identify actions necessary to provide adherence to the 3-Week Look Ahead Schedule and the overall network for the project defined above. The Contractor will take meeting minutes. All meeting minute entries will be keyed to the schedule activity number(s) being addressed. Within one day of the meeting, the Contractor will provide a draft copy of the meeting minutes to the Contracting Officer for review and comment. Final copies of the minutes containing the comments provided by the Contracting Officer will be issued within 3 days of the meeting.

1.13 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs, etc.) shall reference the Schedule Activity Number(s) that are being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure, etc.) shall reference the Schedule Activity Number(s) that are being addressed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 33 00.00 22

SUBMITTAL PROCEDURES
11/08

PART 1 GENERAL

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations samples remaining upon completion of the work.

1.1 DEFINITIONS

1.1.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to a notice to proceed commencing work on site. Submittals required prior to the start of the next major phase of the construction on a multi-phase contract. Schedules or tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work, submitted prior to contract notice to proceed or next major phase of construction.

Certificates of insurance
Surety bonds
List of proposed subcontractors
List of proposed products
Construction Progress Schedule
Network Analysis Schedule (NAS)
Submittal register
Schedule of prices

Health and safety plan
Work plan
Quality control(QC) plan
Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and must state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.1.2 Approving Authority

Office or designated person authorized to approve submittal.

1.1.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

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 .

SD-01 Preconstruction Submittals

Submittal register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Government Approved

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.3.2 Information Only

Submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.4 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

1.4.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward to the Designer of Record, via the Contracting Officer, submittals required in the technical sections of this specification, including shop drawings, product data and samples. One copy of the transmittal form for all submittals shall be forwarded to the Resident Officer in Charge of Construction.

1.4.1.1 O&M Data

Contracting Officer will review and approve for the Contracting Officer O&M Data to verify the submittals comply with the contract requirements; submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

a. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.5 PREPARATION

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to office of approving authority. Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding samples, installations or panels.

1.5.2 Identifying Submittals

When submittals are provided by a lower tier contractor the Prime Contractor is to prepare, review and stamp with Contractor's approval all specified submittals prior to submitting for Government approval.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Date of the drawings and revisions.

d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal.

e. Section number of the specification section by which submittal is required.

f. Submittal description (SD) number of each component of submittal.

g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.

h. Product identification and location in project.

1.5.3 Format for SD-02 Shop Drawings

a. Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 11 by 17 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."

d. Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

e. Reserve a blank space, no smaller than 2 inches on the right hand side of each sheet for the Government disposition stamp.

f. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

g. Include the nameplate data, size and capacity on drawings. Also include applicable federal, military, industry and technical society publication references.

1.5.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.

d. Provide product data in metric dimensions. Where product data are included in preprinted catalogs with English units only, submit metric dimensions on separate sheet.

e. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require

supplemental information for clarification, submit as specified for SD-07 Certificates.

f. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

g. Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of construction effort.

h. Submit manufacturer's instructions prior to installation.

1.5.5 Format of SD-04 Samples

a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

(1) Sample of Equipment or Device: Full size.

(2) Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

(3) Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

(4) Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

(5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: 100 square feet.

b. Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at time of use.

d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.5.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.5.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

a. Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.

b. Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

1.5.8 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.5.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

b. Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with English units only, submit metric dimensions on separate sheet.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit seven copies of submittals of shop drawings requiring review and approval only by the approving authority.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.6.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.6.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.6.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit three copies of O&M Data to the Contracting Officer for review and approval.

1.6.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit three sets of administrative submittals.

1.7 VARIATIONS / SUBSTITUTION REQUESTS

Variations from contract requirements require Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.7.1 Considering Variations

Discussion with Contracting Officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government

requiring rejection and removal of such work at no additional cost to the Government.

1.7.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.7.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.7.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.8 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. The Government will provide the initial submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

1.8.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to the Government.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.8.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p)List Date related to review actions.

Column (q) List date returned to Contractor.

1.8.4 Action Codes

1.8.4.1 Contractor Action Codes

CC - Submittal is certified by the Contractor to be in compliance with the contract drawings and specifications.

1.8.4.2 Approving Authority Action Codes

A - Approved
D - Disapproved
AN - Approved as noted
RA - Receipt acknowledged
C - Comments

R - Resubmit

1.8.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.9 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A".

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

e. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for Government approval. Period of review for submittals begins when Government receives submittal from QC organization.

f. For submittals requiring review by fire protection engineer, allow review period, beginning when Government receives submittal from QC organization, of 30 working days for return of submittal to the Contractor.

g. Period of review for each resubmittal is the same as for initial submittal.

1.9.1 Reviewing, Certifying, Approving Authority

The QC organization is responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is Government.

1.9.2 Constraints

a. Conform to provisions of this section, unless explicitly stated otherwise for submittals listed or specified in this contract.

b. Submit complete submittals for each definable feature of work. Submit at the same time components of definable feature interrelated as a system.

c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

e. Review and/or approval of a submittal does not relieve the Contractor of responsibility for accuracy of details, dimensions, or quantities on contract drawings nor does it extend or alter any contractual obligations of the Government or Contractor(s).

1.9.3 QC Organization Responsibilities

a. Note date on which submittal was received from Contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

d. Forward submittals to the Government with certifying statement.

(1) When the A/E is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."

(2) When the Government is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

e. Ensure that material is clearly legible.

f. Stamp each sheet of each submittal with QC certifying statement except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is the Government, QC organization will certify submittals forwarded to Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

(2) When approving authority is the A/E, the A/E will use the following approval statement when returning submittals to Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by A/E _____, Date _____"
(Signature)

g. Sign certifying statement or approval statement. The QC organization member designated in the approved QC plan is the person signing certifying statements. The use of original ink for signatures is required. Stamped signatures are not acceptable.

h. Update submittal register as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Contracting Officer.

i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

1.10 GOVERNMENT APPROVING AUTHORITY

The Government will:

a. Note date on which submittal was received from QC Manager.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph entitled "Review Notations" and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date approved submittals. 2 copies of the approved submittal will be retained by the Contracting Officer and 5 copies of the submittal will be returned to the Contractor.

1.10.1 Review Notations

Contracting Officer review will be completed within 20 calendar days after date of submission. Submittals will be returned to the Contractor with the notations as described in the paragraph entitled, "Approving Authority Action Codes":

1.11 DISAPPROVED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes" is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, the Contractor shall make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.12 APPROVED SUBMITTALS

The Government's approval or acceptance of submittals is not be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory. Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary. Review of submittals requiring the stamp of a registered professional engineer will not address the accuracy of any calculations, drawings, or other work covered by the professional engineer's stamp.

1.12.1 Actions Possible

a. Submittals marked "approved" authorize the Contractor to proceed with work covered.

b. Submittals marked "approved as noted" authorize the Contractor to proceed with work as noted provided the Contractor takes no exception to the notation(s).

c. Submittals marked "resubmit" or "disapproved" indicate that the submittal is incomplete or does not comply with design concept or requirements of the contract drawings. The submittals shall be resubmitted with appropriate changes. No work shall proceed for this item until the resubmission is approved.

d. Submittals marked "receipt acknowledged" indicate that the submittals have been received and the Contractor is authorized to proceed with the work."

1.13 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for Materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapproved any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 35 13.00 22

SPECIAL PROJECT PROCEDURES
07/06

PART 1 GENERAL

This section applies to all work conducted at Norfolk Naval Shipyard, (NNSY)

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.

NORFOLK NAVAL SHIPYARD INSTRUCTIONS (NNSI)

NNSI P5100.56 Industrial Hazard Control

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 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Heavy Equipment and Vehicle List; G

Existing Conditions Survey; G

Construction Operations Plan; G

Schedule of Work; G

SD-02 Shop Drawings

Crane Operating Envelope (COE)

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 HEAVY EQUIPMENT AND VEHICLE LIST

Prior to construction, furnish list of all heavy equipment and vehicles which will be expected to be brought onto the shipyard.

3.2 EXISTING CONDITIONS SURVEY

Provide documentation of existing conditions in vicinity of proposed work at the shipyard. Document all damages discovered prior to mobilizing at the site.

3.3 CONSTRUCTION OPERATIONS PLAN

Provide a construction operations plan indicating type of work which will be anticipated at the shipyard site.

3.4 SCHEDULE OF WORK

Provide a schedule indicating all work to be performed at the shipyard site.

3.5 CRANE OPERATIONS

All Contractor cranes and crane operations shall conform to specification section 01 35 2.00 22, " Governmental Safety Requirements."

3.5.1 Crane Operating Envelope (COE)

No temporary (i.e. scaffolding, staging, etc.) or permanent work shall be conducted within 12 inches of the Crane Operating Envelope (COE) without prior approval from the Contracting Officer. This restriction applies to the hammer head (B-448), the Stiff Leg Derrick (B1539) and all bridge, sidewall, monorail, or jib cranes. The COE consists of the perimeter around the entire bridge, boom, trolley structure, hoist block (with the hook in the upper limits) and the operator's cab.

If work is indicated or required within the COE, the Contractor shall submit detailed drawings to the Contracting Officer for review 15 working days prior to commencement of work. The drawings shall include complete installation details of the equipment, conduit, piping, ductwork, hangers and other accessories required to complete the work. The drawings shall also indicate proposed location, layout and arrangement of the items of work in relation to the COE. The Contractor shall allow at least 10 working days for approval/disapproval of the COE drawings. No work within the COE shall begin prior to written approval of the COE drawings by the Government. The Contracting Officer shall be the approving authority.

3.6 MERCURY MATERIALS

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed. Immediately report to the Shipyard fire department and the SUBASE Mercury Control Coordinator via the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

All Contractors and contract personnel performing work on items, equipment, components, materials which contain mercury or mercury compounds, such as mercury switches or fluorescent/mercury vapor lamps, shall abide by the requirement of NNSI P5100.56, VOL V, Industrial Hazard Control Bulletin #16." Mercury may have harmful effects on personnel, materials and the environment. The Occupational Safety, Health and Environment Office (Code 106) must be contacted for approval prior to using mercury, mercury compounds, mercury containing items, equipment, materials or prior to using any materials contaminated by mercury. Mercury containing items, including fluorescent/mercury vapor lamps, must be properly disposed of in accordance with NNSI P5100.56, VOL V, "Industrial Hazard Control Bulletin #16".

3.7 RESTRICTIONS ON USE OF YELLOW MATERIALS

Contractor shall refrain from use of yellow or orange-yellow materials for the following purposes: sheeting, tarpaulins, polyethylene bottles or other containers, tapes, bags, banding of identification marks on tools, boundary markers such as ribbons. Contractor generated yellow waste materials such as torn foul weather gear shall be disposed of by the Contractor off-yard. Shipyard dumpsters and trash cans shall not be used for disposal of Contractor generated yellow waste materials. Yellow colored items such as described above are of specific significance within the shipyard and are subject to strict controls.

-- End of Section --

SECTION 01 35 26.00 22

GOVERNMENTAL SAFETY REQUIREMENTS
11/08

PART 1 GENERAL

The section applies to all work conducted at Norfolk Naval Shipyard, (NNSY).

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 SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.32	(2004) Fall Protection
ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

ASME B30.22	(2005) Articulating Boom Cranes
ASME B30.3	(2004) Construction Tower Cranes
ASME B30.5	(2007) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks

COMMANDER NAVY REGION MID-ATLANTIC (COMNAVREGMIDLANT)

COMNAVREGMIDLANT 11320.11	Fire Prevention and Protection Regulations

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA NPG 8621.1	(2004a) NASA Mishap Reporting, Investigating and Record Keeping Policy
NASA NPG 8715.3	(2004) NASA Safety Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2007; Errata 2007; AMD 1 2007) Standard for Portable Fire Extinguishers
NFPA 241	(2004) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 51B	(2008) Fire Prevention During Welding, Cutting, and Other Hot Work

NFPA 70	(2007; AMD 1 2008) National Electrical Code - 2008 Edition
NFPA 70E	(2008) Electrical Safety in the Workplace

NORFOLK NAVAL SHIPYARD INSTRUCTIONS (NNSI)

NNSI P5090.2 VOL II CH. 15	Personal Protective Equipment

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1919	Gear Certification
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor's Quality Control approval . Submit the following in accordance with Section 01 33 00.00 22 SUBMITTAL PROCEDURES:
Government acceptance is required for submittals with a "G, A" designation.

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G,

Activity Hazard Analysis (AHA); G,

Crane Critical Lift Plan; G,

Proof of qualification for Crane Operators; G,

Crane Work Plan; G,

SD-06 Test Reports

Reports

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

Accident Reports

Monthly Exposure Reports

Crane Reports

SD-07 Certificates

Confined Space Entry Permit

Hot work permit

Contractor Safety Self-Evaluation Checklist; G,

Third Party Certification of Barge-Mounted Mobile Cranes

Certificate of Compliance (Crane)

Submit one copy of each permit/certificate attached to each Daily Production Report.

1.3 DEFINITIONS

a. Competent Person for Fall Protection. A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.

b. High Visibility Accident. Any mishap which may generate publicity and/or high visibility.

c. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

d. Operating Envelope. The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers and crane walkers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

e. Qualified Person for Fall Protection. A person with a recognized degree or professional certificate, and with extensive knowledge, training and experience in the field of fall protection; who is capable of performing design, analysis, and evaluation of fall protection systems and equipment.

f. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

(1) Death, regardless of the time between the injury and death, or the length of the illness;

(2) Days away from work (any time lost after day of injury/illness onset);

(3) Restricted work;

(4) Transfer to another job;

(5) Medical treatment beyond first aid;

(6) Loss of consciousness; or

(7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

g. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.

h. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).

1.4 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction conference. The checklist will be completed monthly by the Contractor and submitted with each request for payment voucher. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90, will result in a retention of up to 10 percent of the voucher.

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with USACE EM 385-1-1, and the following federal, state, and local, laws, ordinances, criteria, rules and regulations OSHA . Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

Provide a site Safety and Health Officer (SSHO) at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The Contractor Quality Control (QC) person can be the SSHO on this project. Meet the following requirements within the SSHO:

Level 4:

A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.

30-hour OSHA construction safety class or equivalent within the last 5 years.

An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following 4 areas of competency: Fall protection; Hazardous energy; Confined space; Personal protective equipment and clothing to include selection, use and maintenance.

1.6.1.2 Competent Person for Confined Space Entry

Provide a competent person for confined space meeting the definition and requirements of EM 385-1-1.

1.6.1.3 Crane Operators

Meet the crane operators requirements in USACE EM 385-1-1, Section 16 and Appendix G. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacitates of 50,000 pounds or greater, designate crane operators as qualified by a source that qualifies crane operators (i.e., union, a government agency, or and organization that tests and qualifies crane operators). Provide proof of current qualification.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production and/or quality control report.

b. Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and sub-contractors.

c. Maintain applicable safety reference material on the job site.

d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.

e. Implement and enforce accepted APPS and AHAs.

f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.

g. Ensure sub-contractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

1.6.3 Meetings

1.6.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

d. The functions of a Preconstruction conference may take place at the Post-Award Kickoff meeting for Design Build Contracts.

1.6.3.2 Safety Meetings

Conduct and documente meetings as required by EM 385-1-1. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractors' daily production and/or quality control report.

1.6.3.3 Crane Prework Meeting

The Contractor shall host a prework meeting to discuss all crane operations and potential hazards associated with the upcoming work. This meeting is to take place prior to the submission of the crane work plan. The Contractor shall provide the Contracting Officer written notice five working days prior to the meeting. Attendees will include, at a minimum, the Contractor, ROICC, Code 106, and Code 700 (NNSY Crane Division.)

1.7 ACCIDENT PREVENTION PLAN (APP)

Use a qualified person to prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of USACE EM 385-1-1 and as supplemented herein. Cover all paragraph and subparagraph elements in USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan" and show compliance with NASA NPG 8715.3. Specific requirements for some of the APP elements are described below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and

health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer and any designated CSP and/or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any hazard become evident, stop work in the area, secure the area, and develop a plan to remove the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34,) and the environment.

Copies of the accepted plan will be maintained at the Contracting Officer's office and at the job site.
Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

1.7.1 EM 385-1-1 Contents

In addition to the requirements outlines in Appendix A of USACE EM 385-1-1, the following is required:

a. Names and qualifications (resumes including education, training, experience and certifications) of all site safety and health personnel designated to perform work on this project to include the designated site safety and health officer and other competent and qualified personnel to be used such as CSPs, CIHs, STSs, CHSTs. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; personal protective equipment and clothing to include selection, use and maintenance.

c. Confined Space Entry Plan. Develop a confined space entry plan in accordance with USACE EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, and any other federal, state and

local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

d. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. Submit 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.C.18. and the following:

(1) For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.550(g).

(2) For barge mounted mobile cranes, barge stability calculations identifying barge list and trim based on anticipated loading; and load charts based on calculated list and trim. The amount of list and trim shall be within the crane manufacturer's requirements.

e. Fall Protection and Prevention (FP&P) Plan. The plan shall be site specific and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A qualified person for fall protection shall prepare and sign the plan. Include fall protection and prevention systems, equipment and methods employed for every phase of work, responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Revise the fall Protection and Prevention Plan every six months for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan at the job site for the duration of the project. Include the Fall Protection and Prevention Plan in the Accident Prevention Plan (APP).

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1.7.2 Crane Work Plan

The Contractor shall provide a crane work plan to the Contracting Officer for approval. The crane work plan shall include, for each crane proposed, the specific model of crane, a drawing of all locations (exact) at which dimensions, wheel sized, number of wheels, wheel spacing, tire pressure(s), number of axles, axle spacing, maximum wheel load to be exerted during operations and maximum outrigger load to be exerted during operations. The Contractor shall allow at least 10 working days for approval/disapproval of the crane work plan provided. No crane operations shall begin prior to written approval of the crane work plan by the Government. The Contracting Officer shall be the approving authority.

1.8 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE EM 385-1-1. Submit the AHA for review at least 15 calendar days prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the Contracting Officer.

1.9 DISPLAY OF SAFETY INFORMATION

Within 1 calendar days after commencement of work, erect a safety bulletin board at the job site. Include and maintain information on safety bulletin board as required by EM 385-1-1, section 01.A.06. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.10 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.11 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.12 SAFETY AND FIRE PROTECTION AWARENESS

a. Contractor personnel shall be made aware of emergency evacuation signals and best escape routes.

b. All personnel shall comply with NAVFAC Fire Code requirements as stated in COMNAVREGMIDLANT 11320.11.

c. Notify the Fire Department upon discovery of any discharge, regardless of the source.

1.13 REPORTS

1.13.1 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, and property damage accidents resulting in at least $2,000 in damages, to establish the root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) formUSACE Accident Report Form 3394 and provide the report to the Contracting Officer within 24 hours of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Conduct an accident investigation for any weight handling equipment accident (including rigging gear accidents) to establish the root cause(s) of the accident, complete the WHE Accident Report (Crane and Rigging Gear) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer. The Contracting Officer will provide a blank copy of the accident report form.

1.13.2 Accident Notification

Notify the Contracting Officer immediately, but not later than four hours after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident in accordance with NASA NPG 8621.1. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. All witnesses shall remain on the site until released by the Contracting Officer.

1.13.3 Monthly Exposure Reports

Monthly exposure reporting to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms.

1.13.4 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix H and as specified herein with Daily Reports of Inspections.

1.13.5 Certificate of Compliance

Provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a blank certificate). State within the certificate that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance comply with 29 CFR 1926 and USACE EM 385-1-1 section 16 and Appendix H. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. Also certify that all of its crane operators working on the DOD activity have been trained in the proper use of all safety devices (e.g., anti-two block devices). Post certifications on the crane.

1.13.6 Third Party Certification of Barge-Mounted Mobile Cranes

Certify barge-mounted mobile cranes in accordance with 29 CFR 1919 by an OSHA accredited person.

1.14 HOT WORK

Submit and obtain a written permit prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, from the Fire Division. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division at 396-3333 phone number. ANY FIRE, NO MATTER HOW SMALL, SHAL BE REPORTED TO THE Contracting Officer and the RESPONSIBLE FIRE DIVISION IMMEDIATELY.

1.15 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government shall not be closed or obstructed without written permission from the Contracting Officer.

1.16 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

Provide permanent signs integral to or securely attached to access covers for new permit-required confined spaces. Signs wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER -" in bold letters a minimum of one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" shall be red and readable from 5 feet.

2.2 FALL PROTECTION ANCHORAGE

Leave in place fall protection anchorage, conforming to ASSE/SAFE Z359.1, installed under the supervision of a qualified person in fall protection, for continued customer use and so identified by signage stating the capacity

of the anchorage (strength and number of persons who may be tied-off to it at any one time).

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with USACE EM 385-1-1, NFPA 241, the APP, the AHA, Federal and/or State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

3.1.1 Hazardous Material Use in the Norfolk Naval Shipyard

Each hazardous material must receive approval prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

Any work or storage involving hazardous chemicals or materials must be done in a manner that will not expose shipyard employees to any unsafe or unhealthful conditions. Adequate protective measures must be taken to prevent shipyard employees from being exposed to any hazardous condition that could result from the work or storage. Approval by the Contracting Officer of protective measures and storage area is required prior to start of work.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

3.1.3 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos. If additional material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary

sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the Contracting Officer and the Public Utilities representative to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 SAFETY LOCKOUT/TAGOUT PROCEDURES

Contractor shall ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

Contracting Officer will, at the Contractor's request, apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on.

No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section.

No person shall work on any equipment that requires a lockout/tagout tag unless he, his immediate supervisor, project leader, or a subordinate has in his possession the stubs of the required lockout/tagout tags.

When work is to be performed on electrical circuits, only qualified personnel shall perform work on electrical circuits.

A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.

Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks.

Pressurized or vacuum systems shall be vented to relieve differential pressure completely.

Vent valves shall be tagged open during the course of the work.

Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

3.3.1 Tag Placement

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist.

If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached.

When it is required that certain equipment be tagged, the Government will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

3.3.2 Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Contracting Officer. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the Contracting Officer.

3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

3.4.1 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protectionin accordance with USACE EM 385-1-1, section 21.A.16.

3.4.2 Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, section 21. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, paragraphs 05.H. and 05.I. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with 29 CFR 1926.500, Subpart M, USACE EM 385-1-1 and ASSE/SAFE A10.32.

3.4.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ASSE/SAFE Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 6 feet. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.4.3 Existing Anchorage

Certified (or re-certified) by a qualified person for fall protection existing anchorage points, to be used for attachment of personal fall arrest equipmentin accordance with ASSE/SAFE Z359.1. Exiting horizontal lifeline anchorages must be certified (or re-certified) by a registered professional engineer with experience in designing horizontal lifeline systems.

3.4.4 Horizontal Lifelines

Design, install, certify and use under the supervision of a qualified person horizontal lifelines for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500).

3.4.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1 and 29 CFR 1926 Subpart M.

3.4.6 Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.5 SHIPYARD REQUIREMENTS

NNSI P5090.2 VOL II CH. 15. All personnel who enter the Controlled Industrial Area (CIA) shall wear mandatory personal protective equipment (PPE) at all timesand comply with PPE postings of shops both inside and outside the CIA. PPE is governed in all other areas by the nature of the work the employee is performing. They will also use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Mandatory PPE includes:

a. Hard Hat

b. Safety Glasses

c. Safety Toed Shoes

3.6 SCAFFOLDING

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access scaffold platforms greater than 20 feet maximum in height by use of a scaffold stair system. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 20 feet maximum in height. The use of an adequate gate is required. Ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.6.1 Stilts

The use of stilts for gaining additional height in construction, renovation, repair or maintenance work is prohibited.

3.7 EQUIPMENT

3.7.1 Material Handling Equipment

a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.

c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

3.7.2 Weight Handling Equipment

a. Equip cranes and derricks as specified in EM 385-1-1, section 16.
b. Notify the Contracting Officer 15 days in advance of any cranes entering the activity so that necessary quality assurance spot checks

can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the Contracting Officer. A copy of the permitting process will be provided at the Preconstruction Conference. Contractor's operator shall remain with the crane during the spot check.

c. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.

e. Under no circumstance shall a Contractor make a lift at or above 90% of the cranes rated capacity in any configuration.

f. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and follow the requirements of USACE EM 385-1-1 section 11 and ASME B30.5 or ASME B30.22 as applicable.

g. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.

h. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

i. All employees must keep clear of loads about to be lifted and of suspended loads.

j. Use cribbing when performing lifts on outriggers.

k. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

l. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

m. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

n. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by Contracting Officer personnel.

o. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).
p. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. Prior to conducting lifting operations set a maximum wind speed at which a crane can be

safely operated based on the equipment being used, the load being lifted, experience of operators and riggers, and hazards on the work site. This maximum wind speed determination shall be included as part of the activity hazard analysis plan for that operation.

3.7.3 Equipment and Mechanized Equipment

a. Proof of qualifications for operator shall be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment shall be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorperate such additional safety precautions or requirements into the AHAs.

3.8 EXCAVATIONS

Perform soil classification by a competent person in accordance with 29 CFR 1926.

Remove existing utilities as indicated and uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer. The Contractor shall exercise extreme caution during demolition/excavation. Location of the known existing utilities is approximate. The Contractor shall physically verify the location and elevation of all indicated existing utilities to the greatest extent possible prior to starting the demolition and/or excavation process. The Contractor shall also scan the construction site within the necessary limits of demolition/excavation with electromagnetic and sonic equipment in order to identify the presence and location of all known and unknown existing utilities prior to starting the demolition/excavation process. The Contractor shall mark the surface of the ground where subsurface utilities are located. If additional subsurface utilities other than those indicated are discovered at any time during the execution of work, it shall immediately be brought to the attention of the Contracting Officer. If utility lines are encountered that are not shown on drawings, contact the Contracting Officer for further instructions.

3.8.1 Utility Locations

All underground utilities in the work area must be positively identified by a private utility locating service. Any markings made during the utility investigation must be maintained throughout the contract.

3.8.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within 2 feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility expose the utility by hand digging every 100 feet if parallel within 5 feet of the excavation.

3.8.3 Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding must have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

3.8.4 Trenching Machinery

Operate trenching machines with digging chain drives only when the spotters/laborers are in plain view of the operator. Provide operator and spotters/laborers training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Keep documentation of the training on file at the project site.

3.9 UTILITIES WITHIN CONCRETE SLABS

Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with a private locating service. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

3.10 ELECTRICAL

3.10.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Station Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers will be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In addition, provide electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets,

hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

3.10.2 Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Iimmediately removed from service all damaged extension cords. Portable extension cords shall meet the requirements of NFPA 70.

3.11 WORK IN CONFINED SPACES

Comply with the requirements in Section 06.I of USACE EM 385-1-1, OSHA 29 CFR 1910.146 and OSHA 29 CFR 1926.21(b)(6). Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.06 of USACE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

-- End of Section --

SECTION 01 45 02.00 22

NAVFAC QUALITY CONTROL
11/08

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 the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.2	(2007; Interpertation 1: 2007) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

ASTM INTERNATIONAL (ASTM)

ASTM D 6245	(2007) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation
ASTM D 6345	(1998; R 2003e1) Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 008	(2007) IAQ Guidance for Occupied Buildings Under Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

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 00.00 22 SUBMITTAL PROCEDURES

SD-01 Preconstruction Submittals

Construction Quality Control (QC) Plan; G

Submit a Construction QC Plan prior to start of construction.

SD-05 Design Data

Design Review

SD-10 Operation and Maintenance Data

Training Plan

For each training session submit dates, start and finish times, and locations; outline of the information to be presented; names and qualifications of the presenters; and list of texts and other materials required to support training.

SD-11 Closeout Submittals

Training Outline; G

Training Video Recording; G

Validation of Training Completion; G

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Prior to commencing work on construction, the Contractor can obtain a single copy set of the current report forms from the Contracting Officer. The report forms will consist of the Contractor Production Report, Contractor Production Report (Continuation Sheet), Contractor Quality Control (CQC) Report, (CQC) Report (Continuation Sheet), Preparatory Phase Checklist, Initial Phase Checklist, Rework Items List, and Testing Plan and Log.

Deliver the following to the Contracting Officer during Construction:

a. CQC Report: Deliver to the Contracting Officer the original (wet signatures) as directed by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work.

b. Contractor Production Report: Submit the report electronically by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work. Deliver to the Contracting Officer the original (wet signatures) as directed by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work, attached to the CQC Report.

c. Preparatory Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Preparatory Phase held. Original attached to the original CQC Report and one copy attached to each QC Report copy.

d. Initial Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Initial Phase held. Original attached to the original CQC Report and one copy attached to each QC Report copy.

e. QC Specialist Reports: Submit the report electronically by 10:00 AM the next working day after each day that work is performed. Deliver to the Contracting Officer the original (wet signatures) as directed by 10:00 AM the next working day after each day that work is performed.

f. Field Test Reports: Within two working days after the test is performed, submit the report as an electronic attachment to the CQC Report. Deliver to the Contracting Officer as directed the original within two working days after the test is performed, attached to the original CQC Report and one copy attached to each QC Report copy.

g. Monthly Summary Report of Tests: Submit the report as an electronic attachment to the CQC Report at the end of each month. Deliver to the Contracting Officer as directed the original attached to the last QC Report of the month.

h. Testing Plan and Log: Submit the report as an electronic attachment to the CQC Report, at the end of each month. A copy of the final Testing Plan and Log shall be provided to the OMSI preparer for inclusion into the OMSI documentation. Deliver to the Contracting Officer as directed the original attached to the last CQC Report of each month and one copy attached to each CQC Report copy. A copy of the final Testing Plan and Log shall be provided to the OMSI preparer for inclusion into the OMSI documentation.

i. Rework Items List: Submit lists containing new entries daily, in the same manner as the CQC Report. Deliver to the Contracting Officer as directed the original attached to the last CQC Report of each month and one copy attached to each CQC Report copy.

j. CQC Meeting Minutes: Within two working days after the meeting is held, submit the report as an electronic attachment to the CQC Report. Deliver to the Contracting Officer as directed the original within two working days after the meeting is held, attached to the original CQC Report and one copy attached to each CQC Report copy.

k. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. This QC program is a key element in meeting the objectives of NAVFAC Commissioning. The QC program consists of a QC Organization, QC Plan, QC Plan Meeting(s), a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review, testing, completion inspections, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program must cover on-site and off-site work and be keyed to the work sequence. No construction work or testing may be performed unless the QC Manager is on the work site. The QC Manager must report to an officer of the firm and not be subordinate to the Project Superintendent or the Project Manager. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the QC Manager is the primary individual responsible for quality control, all individuals will be held responsible for the quality of work on the job.

1.4.1 Commissioning

Commissioning (Cx) is a systematic process of ensuring that all building systems meet the requirements and perform interactively according to the Contract. The QC Program is a key to this process by coordinating, verifying and documenting measures to achieve the following objectives:

a. Verify and document that the applicable equipment and systems are installed in accordance with the design intent as expressed through the Contract and according to the manufacturer's recommendations and industry accepted minimum standards.

b. Verify and document that equipment and systems receive complete operational checkout by the installing contractors.

c. Verify and document proper performance of equipment and systems.

d. Verify that Operation and Maintenance (O&M) documentation is complete.

e. Verify and document that the Government's operating personnel are adequately trained.

1.4.2 Acceptance of the Construction Quality Control (QC) Plan

Acceptance of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel are subject to acceptance by the Contracting Officer. The Contracting Officer may require the removal of any individual for non-compliance with quality requirements specified in the Contract.

1.4.3 Preliminary Construction Work Authorized Prior to Acceptance

The only construction work that is authorized to proceed prior to the acceptance of the QC Plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.4 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed changes in the QC Plan or changes to the QC organization personnel, a minimum of 10 work days prior to a proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. In addition to implementing and managing the QC program, the QC Manager may perform the duties of Project Superintendent. The QC Manager is

required to attend the partnering meetings, QC Plan Meetings, Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this Contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by testing laboratory personnel and any other inspection and testing personnel required by this Contract. The QC Manager is the manager of all QC activities.

The QC Manager cannot be employed by any other Contractor or work on any other contract for the duration of this construction contract. If the Contracting Officer determines the QC Manager or any of his authorized support personnel are not effectively enforcing or performing the Quality Control requirements specified in this contract, or if they are engaging in any production work associated with this contract, the Contracting Officer will, in writing, require the Contractor to remove such personnel from the work and replace such personnel at the Contractor's expense. The QC Manager cannot be relieved of his/her authority or responsibilities by the Contractor without the written approval of the Contracting Officer.

1.5.1.2 Qualifications

An individual with a minimum of 5 years combined experience in the following positions: Project Superintendent, QC Manager, Project Manager, Project Engineer or Construction Manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual must have at least two years experience as a QC Manager. The individual must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification, safety compliance, and sustainability.

1.5.2 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager must have completed the course entitled "Construction Quality Management (CQM) for Contractors." If the QC Manager does not have a current certification, they must obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

1.5.3 Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager must be the same as for the QC Manager.

1.5.4 Submittal Reviewer Duties and Qualifications

Provide a Submittal Reviewers, other than the QC Manager or CA, qualified in the disciplines being reviewed, to review and certify that the submittals meet the requirements of this Contract prior to certification or approval by the QC Manager.

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Construction Quality Control (QC) Plan

1.6.1.1 Requirements

The QC plan shall cover the first 90 days of construction. Provide, for acceptance by the Contracting Officer, a Construction QC Plan submitted in a three-ring binder that includes a table of contents, with major sections identified with tabs, with pages numbered sequentially, and that documents the proposed methods and responsibilities for accomplishing commissioning activities during the construction of the project:

a. QC ORGANIZATION: A chart showing the QC organizational structure.

b. NAMES AND QUALIFICATIONS: Names and qualifications, in resume format, for each person in the QC organization. Include the CQM for Contractors course certifications for the QC Manager and Alternate QC Manager as required by the paragraphs entitled "Construction Quality Management Training" and "Alternate QC Manager Duties and Qualifications".

c. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL: Duties, responsibilities, and authorities of each person in the QC organization.

d. OUTSIDE ORGANIZATIONS: A listing of outside organizations, such as architectural and consulting engineering firms, that will be employed by the Contractor and a description of the services these firms will provide.

e. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as described in this Contract. Include in this letter the responsibility of the QC Manager and Alternate QC Manager to implement and manage the three phases of control, and their authority to stop work which is not in compliance with the Contract. Letters of direction are to be issued by the QC Manager to all other QC Specialists outlining their duties, authorities, and responsibilities. Include copies of the letters in the QC Plan.

f. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving, and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in Section 01 33 00.00 22 SUBMITTAL PROCEDURES.

g. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs entitled "Accreditation Requirements", as applicable.

h. TESTING PLAN AND LOG: A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test. Use Government forms to log and track tests.

i. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track, and complete rework items. Use Government forms to record and track rework items.

j. DOCUMENTATION PROCEDURES: Use Government form.

k. LIST OF DEFINABLE FEATURES: A Definable Feature of Work (DFOW) is a task that is separate and distinct from other tasks and has control requirements and work crews unique to that task. A DFOW is identified by different trades or disciplines and is an item or activity on the construction schedule. Include in the list of DFOWs, but not be limited to, all critical path activities on the NAS. Include all activities for which this specification requires QC Specialists or specialty inspection personnel. Provide separate DFOWs in the Network Analysis Schedule for each design development stage and submittal package.

l. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL: Identify procedures used to ensure the three phases of control to manage the quality on this project. For each DFOW, a Preparatory and Initial phase checklist will be filled out during the Preparatory and Initial phase meetings. Conduct the Preparatory and Initial Phases and meetings with a view towards obtaining quality construction by planning ahead and identifying potential problems for each DFOW.

m. PERSONNEL MATRIX: Not Applicable

n. PROCEDURES FOR COMPLETION INSPECTION: Procedures for identifying and documenting the completion inspection process. Include in these procedures the responsible party for punch out inspection, pre-final inspection, and final acceptance inspection.

o. TRAINING PROCEDURES AND TRAINING LOG: Procedures for coordinating and documenting the training of personnel required by the Contract. Include a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was performed and who attended the training.

p. ORGANIZATION AND PERSONNEL CERTIFICATIONS LOG: Procedures for coordinating, tracking and documenting all certifications on subcontractors, testing laboratories, suppliers, personnel, etc. QC Manager will ensure that certifications are current, appropriate for the work being performed, and will not lapse during any period of the contract that the work is being performed.

Key events are defined as Quality Control hold points where Contracting Officer and Government involvement and/or a sign-off is required prior to continuation of work on that phase of the project.

1.7 QC PLAN MEETINGS

At the descrection of the E
FEAD/ROICC and prior to submission of the QC Plan, the QC Manager will meet with the Contracting Officer to discuss the QC Plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding

of the QC Plan requirements prior to plan development and submission and to agree on the Contractor's list of DFOWs.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to the start of construction, the QC Manager will meet with the Contracting Officer to present the QC program required by this Contract. When a new QC Manager is appointed, the coordination and mutual understanding meeting shall be repeated.

1.8.1 Purpose

The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, design intent, Cx, environmental requirements and procedures, coordination of activities to be performed, and the coordination of the Contractor's management, production, and QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each DFOW, as well as how each DFOW will be affected by each management plan or requirement as listed below:

a. Waste Management Plan.

b. IAQ Management Plan.

c. Procedures for noise and acoustics management.

d. Environmental Protection Plan.

e. Environmental regulatory requirements.

f. Cx Plan.

1.8.2 Coordination of Activities

Coordinate activities included in various sections to assure efficient and orderly installation of each component. Coordinate operations included under different sections that are dependent on each other for proper installation and operation. Schedule construction operations with consideration for indoor air quality as specified in the IAQ Management Plan. Coordinate prefunctional tests and startup testing with Cx.

1.8.3 Attendees

As a minimum, the Contractor's personnel required to attend include an officer of the firm, the Project Manager, Project Superintendent, QC Manager, Alternate QC Manager, and subcontractor representatives. Each subcontractor who will be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by the Contractor and the Contracting Officer. Provide a copy of the signed minutes to all attendees and shall be included in the QC Plan.

1.9 QC MEETINGS

After the start of construction, conduct QC meetings at a minimum of once every two weeks by the QC Manager at the work site with the Project

Superintendent and the ultimate end user of the facility/utility and others have a need to know about the facility/utility and the foremen who are performing the work of the DFOWs. The QC Manager is to prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. The Contracting Officer may attend these meetings. As a minimum, accomplish the following at each meeting:

a. Review the minutes of the previous meeting.

b. Review the schedule and the status of work and rework.

c. Review the status of submittals.

d. Review the work to be accomplished in the next two weeks and documentation required.

e. Resolve QC and production problems (RFI, etc.).

f. Address items that may require revising the QC Plan.

g. Review Accident Prevention Plan (APP).

h. Review environmental requirements and procedures.

i. Review Waste Management Plan.

j. Review IAQ Management Plan.

k. Review Environmental Management Plan.

l. Review the status of training completion.

m. Review Cx Plan and progress.

1.10 DESIGN REVIEW AND DOCUMENTATION

1.10.1 Design Review

Review design documents to verify that each commissioned system meets the design intent relative to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. Fully document review in written report.

1.10.2 Contract Document Review

Review the Contract documents to verify that Cx is adequately specified, and that each commissioned system is likely to meet the design intent relative to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts.

1.11 THREE PHASES OF CONTROL

Adequately cover both on-site and off-site work with the Three Phases of Control and include the following for each DFOW.

1.11.1 Preparatory Phase

Notify the Contracting Officer at least two work days in advance of each preparatory phase meeting. The meeting will be conducted by the QC Manager and attended by the Project Superintendent, and the foreman responsible for the DFOW. When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman shall attend the preparatory phase meeting. Document the results of the preparatory phase actions in the Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

a. Review each paragraph of the applicable specification sections.

b. Review the Contract drawings.

c. Verify that field measurements are as indicated on construction and/or shop drawings before confirming product orders, in order to minimize waste due to excessive materials.

d. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.

e. Review the testing plan and ensure that provisions have been made to provide the required QC testing.

f. Examine the work area to ensure that the required preliminary work has been completed.

g. Coordinate the schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

h. Arrange for the return of shipping/packaging materials, such as wood pallets, where economically feasible.

i. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data.

j. Discuss specific controls used and construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW.

k. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

l. Review the Cx Plan and ensure all preliminary work items have been completed and documented.

1.11.2 Initial Phase

Notify the Contracting Officer at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the Project Superintendent, and the foreman

responsible for that DFOW. Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

a. Establish the quality of workmanship required.

b. Resolve conflicts.

c. Ensure that testing is performed by the approved laboratory.

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

e. Review the Cx Plan and ensure all preparatory work items have been completed and documented.

1.11.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report:

a. Ensure the work is in compliance with Contract requirements.

b. Maintain the quality of workmanship required.

c. Ensure that testing is performed by the approved laboratory.

d. Ensure that rework items are being corrected.

e. Assure manufacturers representatives have performed necessary inspections if required and perform safety inspections.

f. Review the Cx Plan and ensure all work items, testing, and documentation has been completed.

1.11.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

1.11.5 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.12 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section 01 33 00.00 22 SUBMITTAL PROCEDURES.

1.13 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

1.13.1 Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

1.13.2 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at http://ts.nist.gov/ts/htdocs/210/214/214.htm , the American Association of State Highway and Transportation Officials (AASHTO) program at http://www.transportation.org/aashto/home.nsf/frontpage , International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, U. S. Army Corps of Engineers Materials Testing Center (MTC)at http://www.wes.army.mil/SL/MTC/, the American Association for Laboratory Accreditation (A2LA) program at http://www.a2la.org/, the Washington Association of Building Officials (WABO) at http://www.wabo.org/ (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) at http://www.wacel.org/labaccred.html (Approval authority by WACEL is limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

1.13.3 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.13.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results must be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field

tests at the end of each month, per the paragraph entitled "INFORMATION FOR THE CONTRACTING OFFICER".

1.13.5 Test Reports and Monthly Summary Report of Tests

Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. Provide a copy of the signed test reports and certifications to the OMSI preparer for inclusion into the OMSI documentation.

1.14 QC CERTIFICATIONS

1.14.1 CQC Report Certification

Contain the following statement within the CQC Report: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.14.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current, coordinated and attesting that the work for which payment is requested, including stored material, is in compliance with Contract requirements.

1.14.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract." Provide a copy of this final QC Certification for completion to the OMSI preparer for inclusion into the OMSI documentation.

1.15 COMPLETION INSPECTIONS

1.15.1 Punch-Out Inspection

Near the completion of all work or any increment thereof, established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager and the CA must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract. Include in the punch list any remaining items on the "Rework Items List", which were not corrected prior to the Punch-Out Inspection. Include within the punch list the estimated date by which the deficiencies will be corrected. Provide a copy of the punch list to the Contracting Officer. The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government "Pre-Final Inspection".

1.15.2 Pre-Final Inspection

The Government and QCM will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" will be documented by the CQM as a result of this inspection. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled. Any items noted on the "Pre-Final" inspection must be corrected in a timely manner and be accomplished before the contract completion date for the work,or any particular increment thereof, if the project is divided into increments by separate completion dates.

1.15.3 Final Acceptance Inspection

Notify the Contracting Officer at least 14 calendar days prior to the date a final acceptance inspection can be held. State within the notice that all items previously identified on the pre-final punch list will be corrected and acceptable, along with any other unfinished Contract work, by the date of the final acceptance inspection. The Contractor must be represented by the QC Manager, the Project Superintendent, the CA, and others deemed necessary. Attendees for the Government will include the Contracting Officer, other FEAD/ROICC personnel, and personnel representing the Client. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract Clause entitled "Inspection of Construction."

1.16 TRAINING

Prior to acceptance of the facility by the Contracting Officer for beneficial occupancy, the QC Manager and Contractor must provide a comprehensive project-specific Government personnel training program for the systems and equipment of the facility specified in the technical specifications of this Contract. The trainees must include the Contracting Officer, facilities managers, and maintenance staff. The Contractor is responsible for coordinating, scheduling, and ensuring that training is completed. Instructors shall be well-versed in the particular systems that they are presenting. Provide instruction time on site at a location approved by the Contracting Officer.

1.16.1 Training Plan

Submit a written training plan to the Contracting Officer for review and approval prior to training. Coordinated and scheduled the training with the Contracting Officer. Include within the plan the following elements:

a. Equipment included in training.

b. Intended audience.

c. Location of training.

d. Objectives.

e. Subjects covered including description.

f. Duration of training on each subject.

g. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.).

h. Instructor and instructor qualifications for each subject.

1.16.2 Content

Stress and enhance the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The core of this training will be based on manufacturer's recommendations and the operation and maintenance information provided as a part of this Contract. A review of environmentally-related aspects of the Operation and Maintenance Manuals shall be included. Include the following for each commissioned system:

a. Design intent.

b. Use of O&M Manuals.

c. Review of control drawings and schematics.

d. Start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting, and alarms.

e. Interactions with other systems.

f. Adjustments and optimizing methods for energy conservation.

g. Relevant health and safety issues.

h. Special maintenance and replacement sources.

i. Tenant interaction issues.

j. Discussion of how the feature or system is environmentally responsive.

1.16.3 Training Outline

The QCM is responsible for overseeing and approving the content and adequacy of the training. The QCM must interview the Government facilities manager and Contracting Officer to determine the special needs and areas where training will be most valuable. The Contracting Officer and QCM must decide how rigorous the training should be for each piece of equipment. The QCM is to communicate the results to the Contractor, who will provide each trainee in the course a written course outline, listing the major and minor topics to be discussed by the instructor on each day of the course.

1.16.4 Video Recording

Provide to the Contracting Officer two copies of the training course in DVD video recording format, and add one copy to the O&M manual data. Capture within the recording, in video and audio, all instructors' training presentations including question and answer periods with the trainees. Videotaping of the training sessions shall be provided by the Contractor.

1.16.5 Unresolved Questions From Trainees

If, at the end of the training course, there are questions from trainees that remain unresolved, the instructor will send the answers, in writing, to the Contracting Officer for transmittal to the trainees, and the training video should be modified to include the appropriate clarifications.

1.16.6 Validation of Training Completion

Develop criteria for determining that the training was satisfactorily completed, including attending some of the training, and upon fulfillment of the criteria, validate training completion. The QCM will then recommend approval of the training to the Contracting Officer using a standard form and the QCM and Contracting Officer will sign the approval form. Provide completed and signed validation of training forms as provided in the QC Plan for all training sessions accomplished. Provide two copies of the signed training validation forms to the Contracting Officer and one copy to the OMSI preparer for inclusion into the OMSI documentation.

1.17 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.17.1 Construction Documentation

Reports are required for each day that work is performed and must be attached to the Contractor Quality Control Report prepared for the same day. Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER" will be used. Reports are required for each day work is performed. Account for each calendar day throughout the life of the Contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The Project Superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work must be identified by terminology consistent with the construction schedule. In the "remarks" sections of the reports, enter pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, meetings held. For each entry in the report(s), identify the Schedule Activity No. that is associated with the entered remark.

1.17.2 Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders shall be divided and tabbed as shown below. These binders must be readily available to the Contracting Officer during all business hours.

a. All completed Preparatory and Initial Phase Checklists, arranged by specification section.

b. All milestone inspections, arranged by Activity Number.

c. An up-to-date copy of the Testing Plan and Log with supporting field test reports, arranged by specification section.

d. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.

e. An up-to-date copy of the Rework Items List.

f. Maintain up-to-date copies of all punch lists issued by the QC staff to the Contractor and Sub-Contractors and all punch lists issued by the Government.

g. Commissioning documentation including Cx checklists, schedules, tests, and reports.

1.17.3 Testing Plan and Log

As tests are performed, the QC Manager will record on the "Testing Plan and Log" the date the test was performed and the date the test results were forwarded to the Contracting Officer. Attach a copy of the updated "Testing Plan and Log" to the last daily CQC Report of each month, per the paragraph "INFORMATION FOR THE CONTRACTING OFFICER". Provide a copy of the final "Testing Plan and Log" to the OMSI preparer for inclusion into the OMSI documentation.

1.17.4 Rework Items List

The QC Manager must maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily CQC Report of each month. The Contractor is responsible for including those items identified by the Contracting Officer.

1.17.5 As-Built Drawings

The QC Manager is required to ensure the as-built drawings are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager must initial each revision. Upon completion of work, the QC Manager will furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.18 NOTIFICATION ON NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected non-compliance with the Contract. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due

to such stop orders will be made the subject of claim for extension of time for excess costs or damages by the Contractor.

1.19 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

Submit an IAQ Management Plan within 15 days after Contract award and not less than 10 days before the preconstruction meeting. Revise and resubmit Plan as required by the Contracting Officer. Make copies of the final plan available to all workers on site. Include provisions in the Plan to meet the requirements specified below and to ensure safe, healthy air for construction workers and building occupants.

1.19.1 Requirements During Construction

Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D 6245. Provide for evaluation of volatile organic compounds (VOCs) in indoor air in accordance with ASTM D 6345. Use filters with a Minimum Efficiency Reporting Value (MERV) of 8 in permanently installed air handlers during construction.

1.19.1.1 Control Measures

Meet or exceed the requirements of SMACNA 008, Chapter 3, to help minimize contamination of the building from construction activities. The five requirements of this manual which must be adhered to are described below:

a. HVAC protection: Isolate return side of HVAC system from surrounding environment to prevent construction dust and debris from entering the duct work and spaces.

b. Source control: Use low emitting paints and other finishes, sealants, adhesives, and other materials as specified. When available, cleaning products shall have a low VOC content and be non-toxic to minimize building contamination. Utilize cleaning techniques that minimize dust generation. Cycle equipment off when not needed. Prohibit idling motor vehicles where emissions could be drawn into building. Designate receiving/storage areas for incoming material that minimize IAQ impacts.

c. Pathway interruption: When pollutants are generated use strategies such as 100 percent outside air ventilation or erection of physical barriers between work and non-work areas to prevent contamination.

d. Housekeeping: Clean frequently to remove construction dust and debris. Promptly clean up spills. Remove accumulated water and keep work areas dry to discourage the growth of mold and bacteria. Take extra measures when hazardous materials are involved.

e. Scheduling: Control the sequence of construction to minimize the absorption of VOCs by other building materials.

1.19.1.2 Moisture Contamination

a. Remove accumulated water and keep work dry.

b. Use dehumidification to remove moist, humid air from a work area.

c. Do not use combustion heaters or generators inside the building.

d. Protect porous materials from exposure to moisture.

e. Remove and replace items which remain damp for more than a few hours.

1.19.2 Requirements after Construction

After construction ends and prior to occupancy, conduct a flush-out or test the indoor air contaminant levels. Flush-out must be a minimum two-weeks with MERV-13 filtration media as determined by ASHRAE 52.2at 100 percent outside air. Air contamination testing must be consistent with EPA's current Compendium of Methods for the Determination of Air Pollutants in Indoor Air. After flush-out or testing and prior to occupancy, replace filtration media. Filtration media must have a MERV of 13 as determined by ASHRAE 52.2.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PREPARATION

Designate receiving/storage areas for incoming material to be delivered according to installation schedule and to be placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. Store and handle materials in a manner as to prevent loss from weather and other damage. Keep materials, products, and accessories covered and off the ground, and store in a dry, secure area. Prevent contact with material that may cause corrosion, discoloration, or staining. Protect all materials and installations from damage by the activities of other trades.

-- End of Section --

SECTION 01 50 00.00 22

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
10/07

PART 1 GENERAL

This section applies to all work conducted at Norfolk Naval Shipyard, (NNSY).

1.1 SUMMARY

Requirements of this Section apply to, and are a component of, each section of the specifications.

1.2 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 WATER WORKS ASSOCIATION (AWWA)

AWWA C510	(1997e2) Standard for Double Check Valve Backflow Prevention Assembly
AWWA C511	(1997e1) Standard for Reduced-Pressure Principle Backflow Prevention Assembly

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	(continuously updated) List of Approved Backflow Prevention Assemblies
FCCCHR Manual	(1988e9) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2002) Portable Fire Extinguishers
NFPA 241	(2004) Safeguarding Construction,Alteration, and Demolition Operations
NFPA 70	(2005; TIA 2005) National Electrical Code

NORFOLK NAVAL SHIPYARD INSTRUCTIONS (NNSI)

NNSI P5090-1B	Potable Water Cross-Connection Control and Backflow Prevention Program

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(Rev K; Change 1) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA SA-89-006 (1988) Manual on Uniform Traffic Control Devices for Streets and Highways

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are Contractor Quality Control approval. Submitted the following in accordance with Section 01 33 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Traffic control plan; G

Backflow preventers; G

SD-06 Test Reports

Backflow Preventer Tests; G

SD-07 Certificates

Backflow Tester Certification; G
Backflow Preventers Certificate of Full Approval

Backflow Prevention Training Certificate; G

1.4 BACKFLOW PREVENTERS MANUFACTURER'S CERTIFICATE

Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval. Certificate of Provisional Approval will not be acceptable.

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that publication control tests have been performed at the intervals or frequency specified in that publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade and size of material as is being provided for the project.

1.4.1 Backflow Tester Certificate

NNSI P5090-1B. Prior to testing, submit to the Contracting Officer certification issued by the City of Portsmouth, the Virginia Department of Health and/ or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester must not be affiliated with any company participating in any other phase of this Contract.

1.4.2 Backflow Prevention Training Certificate

NNSI P5090-1B.Submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

1.4.3 Backflow Preventer Tests

A certified tester(s) shall perform testing of backflow preventer(s) for proper installation and operation and provide subsequent tagging. Backflow preventer tests shall be performed using test equipment, procedures, and certification forms conforming to those outlined in the latest edition of the Manual of Cross-Connection Control published by the FCCCHR Manual. Test and tag each backflow preventer upon initial installation (prior to continued water use). Tag shall contain the following information: make, model, serial number, dates of tests, results, maintenance performed, and signature of tester. Record test results on certification form conforming to requirements cited earlier in this paragraph.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Immediately upon beginning of work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer.

2.1.2 Project and Safety Signs

Construct sign with a face sheet of 4- by 8-foot exterior grade plywood, 1/2-inch thick, mounted on a substantial frame of treated lumber. Provide one coat of lead-free alkyd primer paint and two coats of an exterior type white enamel to frame and sign. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.2.2 Temporary Fencing

a. Provide temporary fencing along the construction site at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.

2.2.3 Temporary Wiring

Provide temporary wiring in accordance with NFPA 10 NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Include frequent inspection of all equipment and apparatus.

2.2.4 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements AWWA C510 and AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, bronze mounted gate valve and strainer, internal parts. The particular make, model/design, and size of backflow preventers to be installed must be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and be accompanied by a Certificate of Full Approval from FCCCHR List. After installation conduct Backflow Preventer Tests and provide test reports verifing that the installation meets the FCCCHR Manual Standards.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. Contractor employee parking must not interfere with existing and established parking requirements of the government installation.

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

3.2.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.2.2 Payment for Utility Services

a. The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed will be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. Carefully conserve any utilities furnished without charge.

b. Reasonable amounts of the following utilities will be made available to the Contractor without charge.

Electricity
Potable Water
Salt Water
Compressed Air
Steam
Sanitary Sewer

c. The point at which the Government will deliver such utilities or services and the quantity available will be provided by the Contracting Officer . Pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on

connections to domestic water lines; and providing transformers; and make disconnections. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

3.2.3 Sanitation

a. Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

3.2.4 Sewage System Notification

Complete the Occupational Safety and Health Division "SHIPYARD UTILITY SYSTEM IMPACT STATEMENT SHEET" (at the end of this section) and return it to the Contracting Officer prior to placing the line in service.

3.2.5 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.6 Obstruction Lighting of Cranes

Provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

3.2.7 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

3.3 TRAFFIC PROVISIONS

3.3.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the FHWA SA-89-006, Part VI. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction. Contractor may move oversized and

slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

3.3.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

3.3.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

3.3.4 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

3.4 CONTRACTOR'S TEMPORARY FACILITIES

3.4.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.4.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

3.4.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green or brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store Trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

3.4.4 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor is responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

3.4.5 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.

b. Paint using suitable paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.4.6 Maintenance of Storage Area

a. Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

3.4.7 New Building

In the event a new building is constructed for the temporary project field office, it will be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. Equip the building with approved electrical

wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. Provide a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building must be waterproof, supplied with a heater, have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities must be furnished. Screen the windows and doors and provide the doors with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins will be non-removable. Arrange the windows to open and to be securely fastened from the inside. Protect glass panels in windows by bars or heavy mesh screens to prevent easy access. In warm weather, furnish air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F. Any new building erected for a temporary field office must be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work become the property of the Contractor and removed from the site. All charges for telephone service for the temporary field office will be borne by the Contractor, including long distance charges up to a maximum of $75.00 per month.

3.4.8 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

3.4.9 Storage Size and Location

The open site available for storage must be confined to the area directed by the Contracting Officer .

3.4.10 Storage in Existing Buildings

Storage in existing buildings is not permitted.

3.4.11 Weather Protection of Temporary Facilities and Stored Materials

3.4.11.1 Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

3.4.11.2 Hurricane Condition of Readiness

Unless directed otherwise, comply with:

a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards. Contact Contracting Officer for Condition of Readiness (COR) updates and completion of required actions.

b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.

c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.

d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

3.5 FIELD OFFICE

3.5.1 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer . Securely anchor the trailer to the ground at all four corners to guard against movement during high winds.

3.6 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor must install a satisfactory means of communication, such as telephone or other suitable devices and made available for use by Government personnel.

3.7 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts

located on maximum 10 foot centers, constructed at the approved location. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

3.8 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store within the fenced area described above or at the supplemental storage area any materials resulting from demolition activities which are salvageable. Neatly stacked stored materials not in trailers, whether new or salvaged.

3.9 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletinboard, signs, barricades, haulroads, and any other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore to the original or better condition, areas used by the Contractor for the storage of equipment or material, or other use. Gravel used to traverse grassed areas must be removed and the area restored to its original condition, including top soil and seeding as necessary.

OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT OFFICE
SHIPYARD UTILITY SYSTEM
IMPACT STATEMENT

This form must be completed and submitted to Code 106.323 (Fax 396-1406) with receipt confirmed, prior to performing any of the following work:

(1) All new installations or modifications to the sanitary or storm systems piping and appurtenances (e.g. valves, cleanouts, manholes, hydrants, etc.)

(2) Any replacement of sanitary or storm system components

(3) Any replacement of sanitary or storm system piping or appurtenances with a nominal pipe size greater than two inches.

From:
To: Code 106.323

The following information is provided regarding a function which may impact the (circle one):

sanitary sewerage storm drainage system

1. Job title:

2. Description (attach additional sheets of paper as needed):

3. Building number or location (use landmarks as appropriate):

4. Contract or control number:

5. Job status (percent completion, and the approximate date of connect/replacement):

6. Point of contact: give name, code or company and telephone number

NOTE: Sanitary or storm systems shall not be placed into service until a verification dye test has been performed by Code 106.323 (Environmental Monitoring Section, 396-7231 Ext. 134. Fax 396-1406)

The following information must be completed by the person submitting the impact Statement Sheet

Printed Name _____

Signature _____ Date _____

Telephone Number _____

Backflow Prevention Test Report

Name of Premises_____
Service Address_____
Use & Location of Device_____
Device_____ _____ _____ _____
Manufacturer Model Size Serial Number
Line Pressure at Time of Test ____(psi) Existing/Replacement/New
(*circle one*)

Reduced Pressure Device	**Requirements**	**Initial Test**	**Repairs**	**Retest**
Check Valve#1	closed tight?	Yes/No (*circle one*)		Yes/No (*circle one*)
Pressure drop across Check Valve #1	min of 5.0 psid	____(psid)(A)		____(psid)
Check Valve#2	closed tight?	Yes/No (*circle one*)		Yes/No (*circle one*)
Differential Pressure Relief Port	Must open at min of 2.0 psid	Opened at ____(psid)(B)		Opened at ____(psid)

Pressure Buffer A-B = or **Double Check Valve Device Requirements**

		Initial Test	**Repairs**	**Retest**
Check Valve#1	closed tight at a min of 1.0 psid	Yes/No (*circle one*)		Yes/No (*circle one*)
Check Valve#2	closed tight at a min of 1.0 psid	Yes/No (*circle one*)		Yes/No (*circle one*)

Pressure Vacuum Breaker	**Requirements**	**Initial Test**	**Repairs**	**Retest**
Air Inlet	Open at a min. of 1.0 psid	Yes/No (*circle one*)		Yes/No (*circle one*)
Check Valve	closed tight at a min of 1.0 psid	Yes/No (*circle one*)		Yes/No (*circle one*)

Remarks_____
Testing Company _____Phone # _____
Company Address _____
E-mail Address _____ Fax # _____
License #_____ Expiration Date _____
City of Certification _____
Certification: *I have made the above test and hereby certify that this backflow prevention device performed satisfactorily and meets all federal, state and local codes and regulations as required.*

Tester Name_____ _____ _____
(Print) (Signature) (Date)

Return completed original test form to: Certification Management Division
Naval Station Norfolk, Building Z-140
9742 MaryLand Avenue
Norfolk, VA 23511-3095

-- End of Section --

SECTION 01 74 19.00 22

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
01/07

PART 1 GENERAL

This section applies to all work conducted at the Norfolk Naval Shipyard, (NNSY).

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.

ASTM INTERNATIONAL (ASTM)

ASTM E 1609	(1994; R 2001) Development and Implementation of a Pollution Prevention Program

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

NAVAL DIRECTIVES (ND OPNAVINST)

ND OPNAVINST 5100.23F	Navy Occupational Safety and Health Program Manual

1.2 DEFINITIONS

1.2.1 Construction and Demolition Waste (Solid Waste)

For purposes of the waste management program, solid waste shall be categorized as material for disposal in a landfill or incinerator (for energy recovery such as SEPSA), or as waste materials for salvage or resale, salvage for reuse, or recycling.

1.2.2 Recyclable Materials

Products and materials that can be recovered and remanufactured into a new product. Recyclable materials include, but are not limited to, the following:

a. Metals (ferrous and non-ferrous), including banding, metal studs, ductwork, piping

b . Concrete, including concrete compression test cylinders, and rubble

c . Paper and cardboard

d . Wood products, including structural, finish, crates, and pallets

e . Plastics

f . Aluminum, including beverage cans

g . Copper wiring

h . Mechanical and electrical products and equipment

1.2.3 Recycling Facility

A business that specializes in collecting, handling, processing, distributing, or remanufacturing waste materials such as those generated by demolition and new construction projects, into products or materials that can be used for this project or by others.

1.2.4 Salvage and Reuse

Existing usable product or material that can be saved and reused in some manner on the project site. Materials for reuse must be approved by the Contracting Officer. Materials that can be salvaged and reused must comply with the applicable technical specifications and include, but are not limited to, the following:

a. Dimensional lumber and other wood products

b. Metal scrap

b. Structural steel items

c. Mechanical or electrical equipment

1.2.5 Salvage for Resale

Existing usable product or material that can be saved and removed intact (as is) from the project site to another site for resale to others without remanufacturing: (Not Applicable)

1.2.6 Trash

Product or material unable to be salvaged for resale, salvaged and reused, returned, or recycled.

1.3 GOVERNMENT POLICY AND INTENT

To the greatest extent practical and economically feasible, the Contractor shall provide for affirmative procurement requirements in accordance with ND OPNAVINST 5100.23F, and that all solid waste materials generated be salvaged for resale, salvaged and reused, or appropriately recycled, rather than transported to a landfill, and control and dispose of solid waste in accordance with RCRA requirements.

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all

reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.4 MANAGEMENT

Develop and implement a waste management program in accordance with ASTM E 1609 and as specified. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. The Environmental Manager, shall be responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the project. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor is responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control only. The following shall be submitted in accordance with Section 01 33 00.00 22 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Solid Waste Management Plan; G

SD-11 Closeout Submittals

Records; (LEED)

1.6 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Waste Management Plan and to develop a mutual understanding relative to the details of waste management. At a minimum, environmental and waste management goals and issues shall be discussed at the following additional meetings:

a. Pre-bid meeting.

b. Preconstruction meeting.

c. Regular QC meetings.

d. Work safety meetings.

1.7 SOLID WASTE MANAGEMENT PLAN

Perform a waste analysis to determine the types and quantity of construction waste anticipated and identify salvage for resale, salvage and reuse, recycling and disposal options available. Within 30 days after contract award and prior to performing any work, submit a Waste Management Plan for review. The plan shall demonstrate how the project waste diversion goal shall be met and shall include the following:

a. Name of individuals on the Contractor's staff responsible for waste prevention and management.

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c . Description of the means by which waste materials, selected for recycling, will be protected from contamination and a description of the means to be employed in recycling waste materials so they will be consistent with the requirements for acceptance by the recycling facilities.

d . Project waste analysis. Characterization, including estimated types and quantities, of the waste to be generated.

e . Name, address and phone number of landfill and/or incinerator (SEPSA) to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

f . Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity. Include the name, location, and phone number for each reuse facility to be used, and provide a copy of the permit or license for each facility.

g . List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Recycling facilities (SEPSA) that will be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.

h . Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the Contracting Officer.

i . Description of the means by which any waste materials identified in item (h) above will be protected from contamination.

j . Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

k . Anticipated net cost savings determined by subtracting Contractor program management costs, savings due to reuse of demolished materials, projected costs of disposing of all trash and waste materials in the landfill or incinerator as if there would be no salvage or recycling on this project, and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste Management Plan to each subcontractor, the Quality Control Manager, and the Contracting Officer.

1.7.1 Salvage and Reuse

Encourage the practice of efficient waste management when using, sizing, cutting, and installing the products and material required for this project, and reuse as many discarded original materials as possible (that would traditionally become waste) that are within the limits of other specification requirements concerning material quality.

1.8 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Quantities may be measured by weight or by volume, but must be consistent throughout. List each type of waste separately noting the disposal or diversion date. Identify the landfill, recycling center, waste processor, or other organization used to process or receive the solid waste. Provide explanations for any waste not recycled or reused. With each application for payment, submit updated documentation for solid waste disposal and diversion, and submit manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. The records shall be made available to the Contracting Officer during construction, and a copy of the records shall be delivered to the Contracting Officer upon completion of the construction.

Demolition accomplished by other parties on this project site count toward the project's total waste diversion cumulative score for LEED. Information on the quantity and disposition of these materials will be provided by the Contracting Officer. Include this data in records, annotated to indicate that it was accomplished by another party.

1.9 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials. Clean contaminated

materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Separate materials by one of the following methods:

1.9.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the following category types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

a . Concrete

b . Metal (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).

(1) Ferrous.

(2) Non-ferrous.

c . Wood (nails and staples allowed).

d . Debris.

e . Glass (colored glass allowed).

f . Paper.

(1) Bond.

(2) Newsprint.

(3) Cardboard and paper packaging materials.

g . Plastic.

(1) Type 1: Polyethylene Terephthalate (PET, PETE).

(2) Type 2: High Density Polyethylene (HDPE).

(3) Type 3: Vinyl (Polyvinyl Chloride or PVC).

(4) Type 4: Low Density Polyethylene (LDPE).

(5) Type 5: Polypropylene (PP).

(6) Type 6: Polystyrene (PS).

(7) Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or

is made of more than one resin listed above, and used in a multi-layer combination.

h . Non-hazardous paint and paint cans.

i . Beverage containers.

1.9.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.9.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.9.4 Hazardous Materials/Hazardous Wastes

If any non-acceptable materials such as hazardous materials or hazardous wastes are encountered, notify the Contracting Officer.

1.10 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.10.1 Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered.

1.10.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling. All fluorescent lamps, HID lamps, and mercury-containing thermostats removed from the site shall be recycled. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

1.10.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator (SEPSA).

1.10.4 Return

Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

1.10.5 Transportation of Recyclable Materials

Contractor must comply with all federal, state, and local environmental regulations and laws, including, but not limited to, the following:

a. DOT requirements for 49 CFR 173

B. 49 CFR 178PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

ot used.

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
07/06

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.

ASTM INTERNATIONAL (ASTM)

ASTM E 1971	(2005) Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of Government personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 0000 22 SUBMITTAL PROCEDURES.

1.2.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.2.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 4. Commissioned items with a Data Package 1 or 2 requirement shall use instead Data Package 4.

1.2.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2.4 Review and Approval

The Contractor's Commissioning Authority (CA) shall review the commissioned systems and equipment submittals for completeness and applicability. The CA shall verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CA shall communicate deficiencies to the Contracting Officer. Upon a successful review of the corrections, the CA shall recommend approval and acceptance of these O&M manuals to the Contracting Officer. This work shall be in addition to the normal review procedures for O&M data.

1.2.5 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.3.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.3.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.3.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.3.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.3.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.3.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.3.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.3.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.3.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.3.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E 1971.

1.3.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.3.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.3.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.3.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.3.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.3.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.3.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.3.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.3.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.3.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.3.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.3.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.3.5.6 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.3.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.3.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and

telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.4 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES

Include Data Package 5 and the following for control systems:

a. Narrative description on how to perform and apply all functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.

b. Full as-built sequence of operations.

c. Copies of all checkout tests and calibrations performed by the Contractor (not Cx tests).

d . Full print out of all schedules and set points after testing and acceptance of the system.

e . Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.5.1 Data Package 1

a. Safety precautions

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Contractor information

f. Spare parts and supply list

1.5.2 Data Package 2

a. Safety precautions

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan and schedule

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Contractor information

1.5.3 Data Package 3

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Lubrication data

h. Preventive maintenance plan and schedule

i. Cleaning recommendations

j. Troubleshooting guides and diagnostic techniques

k. Wiring diagrams and control diagrams

l. Maintenance and repair procedures

m. Removal and replacement instructions

n. Spare parts and supply list

o. Product submittal data

p. O&M submittal data

q. Parts identification

r. Warranty information

s. Testing equipment and special tool information

t. Testing and performance data

u. Contractor information

1.5.4 Data Package 4

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Lubrication data

i. Preventive maintenance plan and schedule

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Corrective maintenance man-hours

q. Product submittal data

r. O&M submittal data

s. Parts identification

t. Warranty information

u. Personnel training requirements

v. Testing equipment and special tool information

w. Testing and performance data

x. Contractor information

1.5.5 Data Package 5

a. Safety precautions

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan and schedule

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Testing and performance data

s. Contractor information

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

DIVISION II

PRODUCTION

ITEM # 000
DESCRIPTION: General and Administrative

1. SCOPE: These Specifications are for building the Norfolk Naval Shipyard Dry Dock 8 Replacement Caisson, hereafter referred to as Caisson 8. These Specifications contain the technical requirements and information related to the construction of Caisson 8.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. None

   2.2. SUBMITTALS
      2.2.1. All submittals shall be in accordance with section 01 33 00.00 22, Submittal Procedures

   2.3. QUALITY ASSURANCE
      2.3.1. Conform with the requirements herein.

3. REQUIREMENTS:
   3.1. General
      3.1.1. These Specifications work with the Drawings to describe the essential features, functions, and arrangement of the design.
      3.1.2. Where conflicts arise between the caisson specifications and Division 01 of the Dry Dock #8 Caisson specifications, the Division 01 shall govern.
   3.2. Definitions: As used throughout these Specifications, the following terms have meanings as indicated. The term “Contractor” means the firm holding the prime Contract with the Government for the construction, industrial efforts, and delivery associated with the Caisson 8.
      3.2.1. The term “Government” means the United States Government, represented by the Contracting Officer or Designee.
      3.2.2. Wherever terms such as “as approved”, “for approval”, “as required”, or .“authorized” are used, without further qualification, the decision of the Government is required.
      3.2.3. Where references state “in accordance with Regulatory Body requirements” the construction, industrial efforts, testing and delivery shall comply with the appropriate Regulatory Body requirements, unless otherwise authorized by the Government.
      3.2.4. The term “COR,” as used in the Specifications, means, Contracting Officer’s Representative.
      3.2.5. The term “commercial marine practice” means the construction of Caisson 8 shall be soundly accomplished using the detailed drawings, incorporating the specified components, to insure that the completed Caisson 8 shall conform with and perform to the design.
      3.2.6. The term “marine” or “marine quality” means that an item shall be constructed of materials unaffected by moisture, salt water, sea spray, extremes in temperature or other hazards of the marine environment, and is designed and constructed to perform its intended functions under marine operating conditions.
      3.2.7. The term “as shown on the drawing” means the applicable Contract Design Drawings listed in Table 1.

3.2.8. Where the term “herein” is used, it means the applicable section(s) of these Specifications.

3.2.9. Where the term “minimum stability” is used, it means that the metacenter is at 1 least foot above the center of gravity in the lightship condition as defined in Section 070b.

3.2.10. The following abbreviations are used throughout these specifications and the drawings:

ABS ..... American Bureau of Shipping
ACI ..... American Concrete Institute
AISI ..... American Iron and Steel Institute
AISC ..... American Institute of Steel Construction
ANSI ..... American National Standards Institute
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME ..... American Society of Mechanical Engineers
ASNT ..... American Society for Non-Destructive Testing
ASTM..... American Society for Testing and Materials.
AWS ..... American Welding Society
AWWA ..... American Water Works Association
CDRL ..... Contract Data Requirements list
CRES ..... Corrosion Resistant Steel
GM ..... Metacentric height
IBC..... International Building Code
IEEE..... Institute of Electrical and Electronics Engineers
MSS ..... Manufacturers’ Standardization Society
NACE ..... National Association of Corrosion Engineers
NAVFAC .... Naval Facilities Command
NAVSEA .... Naval Sea Systems Command
NEMA ..... National Electrical Manufacturers’ Association
NFPA ..... National Fire Protection Association
SSPC Society for Protective Coatings (formerly Steel Structures Painting Council)
SMACNA ... Sheet Metal and Air Conditioning Manufacturers’ Association
UFC ..... Unified Facilities Criteria

3.2.11. The definitions of words throughout these Specifications are those contained in the Webster’s Unabridged Dictionary to insure commonality of understanding.

3.2.12. Contract Drawing – Delineates design features of Caisson 8. Make no departure from a Contract Drawing without prior Government approval.

3.2.13. First-Tier and Sub-tier References - Any referenced document which is directly cited for use or application by an identifying number or name in these Specifications, or in any Contract Drawing, is a first-tier reference for each particular use or application for which cited.

a. Any document, which is cited in a first-tier reference, may also be a first-tier reference. It shall be considered first-tier only for those specific uses or applications for which it is cited.

3.2.14. Government Specification – Are specifications such as Federal Specification (Fed. Spec.). Military Specification (Mil. Spec.), which describes technical requirements for items, materials, or services required.

3.2.15. Government Standards – Are the documents identified as a Federal Standard (Fed. Std.), Military Standard (MIL-STD) or by 13-digit NAVSEA Publication Number that establishes engineering and technical limitations of items, processes, methods, design, and engineering practices.

3.2.16. Industry Standards – Are the documents issued by the recognized non-Government organizations. For example: IEEE and ASTM establish engineering, technical limitations and applications for items, materials, processes, design and engineering practices.

3.2.17. Referenced Documents – Documents, which are referred to in these Specifications or in the documents referenced herein are termed "reference documents." Referenced documents form a part of these Specifications to the extent specified.

3.3. Order of Precedence

3.3.1. In case of inconsistency between these Specifications and referenced documents, the following order of precedence shall apply:

a. These Specifications
b. Contract Drawings
c. Other First-tier References except the Contract Drawings
d. Sub-tier References

3.3.2. Silence of one document with respect to details shown or called out in another shall not be considered an inconsistency.

3.3.3. Order of Precedence of Specification Sections – The order of precedence between requirements of sections within these Specifications is dependent upon the relative broadness of the stated requirements. Requirements within a section applicable to the entire Caisson 8 (for example, General Requirements for Construction) state the broadest requirements and apply to all systems and equipment, unless otherwise specified in the more detailed sections, in which case the detailed section requirements apply.

a. Specific requirements within a lead section (for example, a section that includes the general or common requirements for a number of similar systems, such as General Requirements for Piping Systems) are the next broadest category of requirements and apply to all systems and equipment in its grouping, unless otherwise specified in the detailed system sections.
b. Specific requirements within a detailed system section (for example, a section which includes the details of a particular caisson system, such as Flooding Systems) are the most detailed requirements. Requirements in these detailed system sections apply for the system covered in the detailed section.
c. The omission in one Section of applicable detailed requirements specified in another section is not be construed as an inconsistency.

3.3.4. Effective Issue: The term "effective issue" refers to the issue of a referenced document as revised or amended, which in accordance herein, forms a part of these Specifications. Reference is normally made only to basic Government or commercial specifications, standards or drawing numbers without prefix zeros or suffix numbers that identify revisions or amendments.

a. Whenever a first-tier reference is identified by both its basic number and by issue, revision, or amendment date, or designation, such identified issue is the effective issue for the particular use or application cited. The effective issue of other reference documents is in effect on the date of these Specifications.

3.3.5. Use of Other than the Effective Issues: The effective issues of referenced documents are those used by the Government in preparing these Specifications. Document issue other than the effective issues may be used in accordance with the following procedures: In the event of the use of other than an effective issue, it shall be in accordance with a document that is not technically inferior and is interchangeable with the equipment or specified component. A request for a change, deviation, or certificate of equivalency shall be submitted to the

Government for approval if use of other than the effective issue would result in degradation of the requirements of these Specifications.

a. Where first-tier references are referred to by citing a particular issue including those for which specific modifications are specified, approval shall be obtained from the Government prior to use of any issue other than the particular cited issue.

b. Where first-tier references are referred to only by the use of the basic identification name or number, without citing a specific issue date or designation, a later Issue may be used including a superseding issue of a different number or, subject to prior approval by the Government, an earlier issue including a superseded issue of a different number rather than the effective issue. The Government shall be promptly notified upon election to use such later or earlier issues. If the Government does not concur with the substitution, notification will be provided in writing within 45 calendar days after receipt of the notice of election to use an earlier or later issue. Where an earlier issue is used, it shall be used in its entirety including requirements pertaining to a particular type or class, unless specifically approved otherwise.

c. Effective issue for sub-tier references shall be those in effect on the date of the first-tier referenced document. Deviations from this date shall follow the same procedure described for first-tier references.

3.4. Construction Schedules and Reports

3.4.1. The requirements of this section are supplemental to Section 01 32 17.00 22. It is the Contractors responsibility to develop a schedule that encompasses the caisson gate and sill structure repairs. Where conflicts arise, Section 01 32 17.00 22 shall govern. Prepare and maintain current schedules necessary for the purpose of establishing an orderly and systematic construction approach. Submit these schedules to the Government in accordance with paragraph 2.3.3 and include the following:

a. A Production Schedule covering the entire duration of the project, illustrating a time scale, a network and logic diagram, and start and completion dates of the project and each activity. Include submittals for major components as activities and include the review time as part of their duration. Identify activities on the critical path by highlighting. All changes/revisions to the Production Schedule will be provided to the Government within 48 hours of the change in the form of a revised Production Schedule.

b. An Erection Sequence Schedule to show the order of Caisson 8 construction taking place.

c. A Drawing Schedule Report, as specified in Work Item 085.

d. A Material Ordering Schedule. Identify items with long lead time. Long lead time items are any items taking 30 days or longer from order to delivery.

e. A Test Schedule as described in Work Item 092.

3.4.2. Prepare agendas and detailed minutes for the bi-weekly Caisson 8 Production Progress Conferences to be held at the Norfolk Naval Shipyard unless notified otherwise by the Contracting Officer. Include synopsis of key issues and discussions and a list of action items. The government reserves the right to waive or invoke the requirement of a meeting. Submit draft Production Progress Conference minutes to the government for review and comment within 5 working days of the meeting. Incorporate government comments into the minutes and submit Production Progress Conference minutes final version to the government within 14 days of receipt of the government comments.

3.5. Delivery

3.5.1. Deliver the Caisson at destination complete of production work, fully operational, and safe for operation, including equipment, systems, structure, sealing surfaces, lubrication, and other items associated with the requirements for construction of the Caisson. Insure the Caisson displays an appearance of being new, unused, and is free of dirt, debris, and vermin, displaying the highest level of cleanliness. Insure the caisson is capable of being immediately put to its intended use upon delivery to the required destination.

3.5.2. An opportunity will be afforded to the Contractor to witness, inspect and comment on the operation of Caisson 8 and its components during the Guarantee Period. In the vent that deficiencies are discovered during the Guarantee period, an opportunity will be afforded the Contractor to witness, inspect and comment on such deficiencies.

3.6. Quality of Materials and Articles

3.6.1. Provide materials and articles delivered with Caisson 8 of commercial marine quality conforming to the requirements of the Regulatory Bodies listed herein unless specified to be otherwise. Where terms such as machinery, fittings, structures, and equipment are specified herein, to be in accordance with the Government specifications, it is intended that commercial marine equivalents, when approved by the Government, may be substituted.

3.7. Correspondence and Meetings

3.7.1. Submit all written and electronic Contractor correspondence with the Government, however addressed, via the Contracting Officer (CO).

3.7.2. Submit separate letters, for subjects related to payments, separate to the CO for each subject concerning changes or delivery. Requirements for correspondence concerning drawings are specified in Section 085.

3.7.3. Sign, with Company “authorized representatives” all Contractor correspondence. Furnish the Government with the list of names and telephone numbers of these authorized representatives including each corresponding title or position in the company. Prepare and submit meeting agendas and minutes as required by the CDRL.

3.8. Construction and Design Drawing Review

3.8.1. Conduct monthly construction document reviews at the Norfolk Naval Shipyard, attended by the Government, to review progress of “Design Development” drawings specified in Section 085 and as-built drawings and to discuss and resolve any design issues or problems. Update as-built drawings (red-lined) weekly and kept on the work site. Make these drawings available for government review during construction.

4. <u>OPERATIONAL TEST</u>

4.1. tbd

5. <u>NOTES</u>:

6. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

6.1. None.

ITEM # 045
DESCRIPTION: Care of Caisson During Delivery

SCOPE: This specification provides instruction for the care and protection of the caisson during construction, testing and delivery of the caisson.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None.

   1.2. SUBMITTALS
      1.2.1. All submittals shall be in accordance with section 01 33 00.00 22, Submittal Procedures

   1.3. QUALITY ASSURANCE
      1.3.1. Conform to the requirements herein.

2. REQUIREMENTS:
   2.1. General
      2.1.1. Provide security for and be responsible for the care of Caisson 8, equipment, materials, and components during construction and prior to final acceptance by the Government. Keep Caisson 8 free of chips, shavings, refuse, dirt, scrap materials, welding slag and spatters, and other extraneous matters during construction. Clean tanks and voids and present to Government for inspection prior to being closed. Remove rubbish, equipment, hoses, and other production tools and equipment from places which are to be permanently closed or which may become inaccessible. Take appropriate measures to avoid wear and damage incident to the construction and to prevent corrosion or other deterioration. Do not permit water to accumulate in the hull or structure during construction.
      2.1.2. Protect unpainted machine parts, both interior and exterior, against corrosion and deterioration during the interval between manufacture and final inspection on board Caisson 8. Preserve and protect machinery or equipment in accordance with the manufacturer's instructions if removal of preservative is required for testing the machinery or equipment prior to installation. Remove preservative on working parts prior to operation of the machinery or equipment. Protect piping, machinery and equipment from damage due to freezing temperature.
      2.1.3. Inspect equipment and fabricated parts, which are stowed in warehouses or on piers during construction of Caisson 8, to be free of vermin before being placed on board.
      2.1.4. Keep the caisson clean and well protected during manufacture, storage, assembly, and installation of all equipment and parts, including those having working surfaces and or passages/piping/fittings for lubrication.
   2.2. Launching and Docking
      2.2.1. Provide building and launching ways or a dry dock adequate for the construction of Caisson 8. Conduct intermediate construction stage inspections as part of the construction schedule to insure that temporary or transient loading conditions do not result in overstress or distortion of any element of the structures. Launch Caisson 8 in a manner which does not produce overstress or distortion.
      2.2.2. Provide the method of launching and degree of completion of Caisson 8, prior to launching, to Government for review. Safely launch Caisson 8 and provide

adequate stability when waterborne. Provide a launching plan prepared by the Contractor and approval stamped by a registered professional Naval Architect to the Government. Include drawings and data, describe the method, procedures and processes for the launching, to include but not be limited to, line handling, pumping plans, safety procedures, weather limitations, leak checks, and backup procedures in case of power loss. Prohibit the launch of Caisson 8 without Government review and input to the launching plan.

2.2.3. Conduct an immediate comprehensive inspection, should there be any evidence that Caisson 8 has been strained or damaged during launching. Provide a report of the circumstances surrounding the damage and the Contractor's plan to make repairs, at Contractor expense.

2.3. Grounding

2.3.1. Take precautions to insure that Caisson 8 does not ground at any time during the construction, launching or transportation of Caisson 8. Clean and preserve all affected areas to a condition acceptable by the Government. Accomplish all repairs at the Contractor's expense. If at any time prior to Caisson 8 final acceptance by the Government there is a reason to believe Caisson 8 has been strained, grounded or in any manner damaged, or if the underwater portion has been impaired, prepare and submit to the Government a Grounding/Damage/Collision Report.

2.4. Fire and Flooding Protection During Construction

2.4.1. General: Maintain a comprehensive and effective system of fire and flooding detection, prevention, firefighting and flooding control while Caisson 8 is in the Contractor's facility during construction, on the building ways, in dry dock, at launching, and pier-side after launch. Provide a copy of the Contractor's fire and flooding prevention and control plan to the Government for approval before construction takes place and provide updated copies as conditions change. As part of the fire and flooding plan, provide an employee rescue plan to cover procedures for recovery of employees injured on scaffolding or inside tanks/compartments of Caisson 8.

2.5. Transport to Norfolk Naval Shipyard

2.5.1. Provide a transport plan and degree of completion of Caisson 8 to Norfolk Naval Shipyard, to Government for review. Transport plan shall include description of the means of transport and intended route, date and time. Provide a stability assessment prepared and approved stamped by a registered professional Naval Architect to the Government. Include drawings and data, describe the method, procedures and processes for the transport, to include but not be limited to, line handling, pumping plans, safety procedures, weather limitations, leak checks, and backup procedures in case of power loss. Prohibit the transport of Caisson 8 without Government review and input to the transport plan.

a. Contractor shall blank all piping inlets prior to departure.

3. <u>OPERATIONAL TEST</u>

3.1. None

4. <u>NOTES</u>:

4.1. None

5. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

5.1. None.

ITEM # 070
DESCRIPTION: General Requirements for Construction

1. SCOPE: This specification provides instruction for the general workmanship, material, equipment and inspection of the caisson during construction, testing and delivery.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. None.

   2.2. SUBMITTALS
      2.2.1. Submit tolerance verification data to the Government in accordance with Specification 01 33 00.00 22, Submittal Procedures.
      2.2.2. Provide equipment and material specifications, catalog cuts, envelope dimensions, and actual weight of the proposed equipment.

   2.3. QUALITY ASSURANCE
      2.3.1. Conform to the requirements herein.

3. REQUIREMENTS:
   3.1. General
      3.1.1. Construct Caisson 8 using the Imperial system of measurement to the extent indicated in these Specifications. Express numerical data including dimensions and performance characteristics in terms of Standard Imperial units in all new documents and drawings developed in relation to construction of Caisson 8.
      3.1.2. Provide only new materials to be utilized in the construction of Caisson 8. Conduct receipt inspection, stow and install all materials, equipment, and machinery required by these Specifications.
      3.1.3. Because Caisson 8 functions as the watertight gate at the end of the dry dock, it is dependent on the ability of the rubber seals to seal tightly in their seats. Additionally, the Caisson must operate with minimum clearances to allow seating and un-seating at low tide. Conform to the following tolerances for the Caisson dimensions and seal locations:
         a. Tolerance for Caisson 8 in the molded dimensions measured at 60 degrees F: overall length and overall height +/- 1/4 inch. The centerline of each seal shall be within +/- 1/4 inch from its designed centerline.
         b. The bearing surface of the seal (portion of seal that bears on the sill) when installed on the gate, shall be within +/- 1/8 inch of a vertical plane.
         c. Verify conformance with the specified tolerances on the completed Caisson 8 by use of laser measurement. Correct all dimensional deficiencies, verify dimensions and re-submit data to the Government.
   3.2. Caisson Performance
      3.2.1. Deliver Caisson 8 capable of service as a watertight seal, from either side, during normal docking evolutions, able to fill and remove ballast in tanks, and positioned or removed from both inner and outer seal of the dry dock positions at the entrance of the graving dock.
      3.2.2. Deliver Caisson 8 to the Government with no trim or list in all conditions, with permanent fixed ballast and with/or without liquid ballast. Provide a draft of 32’-6” (-2/+0 inches), with permanent fixed ballast and seawater piping full and with liquid ballast as required. The Contractor is responsible for achieving this draft and

a GM corrected for free surface greater than or equal to 1 foot at this lightship condition.

3.2.3. Perform an inclining experiment as the basis of the Contractor's responsibility in determining the values of displacement, Vertical center of gravity, list and trim of Caisson 8 at its Design Displacement, supplemented by the weight control program and amount of permanent concrete ballast, if necessary, to establish the required lightship draft and minimum GM at the lightship condition.

3.3. Requirements for Equipment and Machinery

3.3.1. Propose equipment, which meets all requirements regarding form, fit, and function specified herein and in the drawings. Prepare and submit to the Government for review equipment documentation, in order for the proposed item to be acceptable, prior to purchase. Identify equipment with long lead time in their submittal and coordinate delivery with the production schedule. Verify proper fit of proposed equipment prior to submission of documentation to the Government. In addition to these general requirements, specific requirements may be designated within the sections of these Specifications that relate to the item or equipment.

3.4. Workmanship

3.4.1. Provide plating that is fair, closely fitted and free from buckles or uneven sight edges. Form plates or shapes to be true to required alignment, shape or curvature. Ensure where flanges are used for attachments, the faying surfaces are free from hollows and beveled as required. Shims are prohibited to correct improper fit, except as indicated to correct for machinery misalignment resulting from normal construction tolerances.

3.4.2. Cut edges neatly and accurately, cleaned and prepared for welding. Grind sharp edges smooth to avoid injury to personnel. Prohibit the use of fairing cement. Fillet internal corners and round external corners.

3.4.3. Install fittings, such as railings, vent pipes, lighting, mooring chocks and bins, per the drawings, away from the edges, to avoid being damaged during the operation of Caisson 8.

3.4.4. Insure fair lines, smooth surfaces and sound welding with minimum warping or distortion in the workmanship on the hull and fittings throughout. Control fabrication and machining tolerances, fits and finishes to assure that alignment of all machinery is within manufacturers' allowable tolerances.

3.4.5. Repair all equipment, machinery and associated support systems leakage of oil, water, or other type of fluids under the environmental and operating conditions specified herein.

3.4.6. Install protective guards for machinery and personnel in accordance with OSHA guidelines 29 CFR 1910. Install protective guards as barriers to prevent personnel from inadvertently contacting energized circuits, components, and terminals, which present shock and high voltage hazards. Post signage warning against such hazards in conspicuously located areas.

3.5. Inspection and Material Identification

3.5.1. Inspect material and equipment purchased, manufactured, assembled, and work performed under the Contract to verify conformance with the Contract requirements prior to presenting to the Government. Offer to the Government only those supplies determined by the Contractor to conform to the Contract requirements.

3.5.2. Establish and maintain a system of material identification including handling and inspection that will insure the use of specified materials and retention of information concerning their quality and use. Conduct tests whenever the identity

of an item is in doubt, and provide a report to the Government to establish that it is in accordance with the Contract requirements.

3.5.3. Acceptance of materials and equipment, including those items accepted by a certificate of compliance and inspection, will not waive the rights of the Government to reject any item subsequently found not to be in accordance with the Specifications. Report to the Government any defective materials and equipment discovered via written correspondence.

3.5.4. Prohibit the substitution or diversion of materials and equipment from their intended purpose that have passed inspection without approval from the Government.

4. OPERATIONAL TEST

4.1. None

5. NOTES:

5.1. None

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 074
DESCRIPTION: Welding

1. SCOPE: Caisson 8 is to be fabricated of all welded construction. This specification governs applies to all welding processes.

2. GENERAL

2.1. REFERENCES:
- 2.1.1. AISC 335-89 Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design
- 2.1.2. AISC 316-89 ASD Manual of Steel Construction Allowable Stress Design
- 2.1.3. AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT) ASNT RPSNT – TC-1A Recommended Practice
- 2.1.4. AWS A2.4 Standard Symbols for Welding, Brazing and Nondestructive examination
- 2.1.5. AWS A3.0 Standard Welding Terms and Definitions
- 2.1.6. AWS A5.11/A5.11M Specification for Nickel and Nickel Alloy Welding Electrodes for Shielded Metal Arc Welding
- 2.1.7. AWS AS.14/AS.14M-97 Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods
- 2.1.8. AWS A5.34/A5.34M:2007 Specification for Nickel-Alloy Electrodes for Flux Cored Arc Welding
- 2.1.9. AWS D1.1/D1.1M Structural Welding Code – Steel
- 2.1.10. AWS Z49.1 Safety in Welding, Cutting and Allied Processes

2.2. SUBMITTALS
- 2.2.1. Qualifications and Procedures – Welding Procedure Qualifications for Welder, Welding Operator, And Tack Welder Qualification, Inspector Qualification: Previous qualifications, pre-qualified procedures, copies of the welding procedure specifications; the procedure qualification test records; and the welder, welding operator, or tack welder qualification test records.
- 2.2.2. Test Reports – Quality Control
- 2.2.3. A Quality Assurance plan and records of tests and inspections.

2.3. QUALITY ASSURANCE: Conduct testing using an approved inspection or testing laboratory or technical consultant or if approved by the Government, the Contractor's inspection and testing personnel may be used instead of the commercial inspection or testing laboratory or technical consultant. Perform visual and radiographic, ultrasonic, magnetic particle, and dye penetrant inspection to determine conformance with below paragraph "Standards of Acceptance". Utilize procedures and techniques for inspection in accordance with applicable requirements of AWS D1.1/D1.1M, except that in radiographic inspection only film types designated as "fine grain," or "extra fine," are permitted.

3. REQUIREMENTS:

3.1. General Requirements

3.1.1. Provide welded connections design in conformance to AISC 335 unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved by the Government prior to fabrication. Complete welding as shown on the drawings except where additional requirements are specified in this section or specified in other sections. Do not start welding until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tack welders have been qualified and the submittals approved by the Contracting Officer.

3.1.2. Conform to Work Item 505 for welding of mechanical piping.

3.1.3. Perform qualification testing at or near the work site. Maintain records of the test results obtained in welding procedures, and welder, welding operator, and tack welder performance qualifications for Contractor and Subcontractor(s).

3.1.4. Seal weld all structural welds.

3.2. Welding Procedure Qualifications

3.2.1. Except for pre-qualified (per AWS D1.1/D1.1 M) and previously qualified procedures, record in detail and qualify the welding procedure specification for all welding procedures followed in the fabrication of weldments. Conform to AWS D1.1/D1.1M and to the specifications in this section for qualification of welding procedures. Submit to the Government, for approval, copies of the welding procedure specification and the results of the procedure qualification test for each type of welding which requires procedure qualification. Approval of any procedure will not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the requirements of these specifications. Submit this information on the forms in Annex N of AWS D1.1/D1.1M. Individually identify and reference on the detail drawings and erection drawings, or suitably key to the contract drawings the welding procedure specifications. In case of conflict between this specification and AWS D1.1/D1.1M, this specification governs.

3.2.2. Previous Qualifications: Welding procedures previously qualified by test may be accepted for this contract without re-qualification if all the following conditions are met. An approved testing laboratory, technical consultant, other approved agency, or the Contractor's Government approved quality control organization performed testing. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract. The welder, welding operator, and tack welder qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

3.2.3. Pre-qualified Procedures:

a. Welding procedures, which are considered pre-qualified as specified in AWS D1.1/D1.1M, will be accepted without further qualification. Submit to the Government, for approval, a list or annotated drawing to indicate the joints not pre-qualified. Procedure qualification and approval is required for these joints.

b. Retests: Revise and re-qualify the welding procedure if it fails to meet the requirements of AWS D1.1/D1.1M, or at the Contractor's option, welding procedure may be retested in accordance with AWS D1.1/D1.1M. Submit the welding procedure to the Government, for approval, if the welding procedure is qualified through retesting, including all test results of those test welds that failed to meet the requirements.

3.2.4. Welder, Welding Operator, and Tack Welder Qualification – Qualify each welder, welding operator, and tack welder assigned to work on this contract in accordance

with the applicable requirements of AWS D1.1/D1.1M and as specified in this section. Welders, welding operators, and tack welders who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used.

3.2.5. Previous Personnel Qualifications – At the discretion of the Contracting Officer, welders, welding operators, and tack welders qualified by test within the previous 12 months may be accepted for this contract without re-qualification if all the following conditions are met:.

a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tack welder qualification test records are submitted to the Government and approved in accordance with the specified requirements for detail drawings.

b. An approved testing laboratory, technical consultant, other approved agency, or the Contractor's Government approved quality control organization performed testing.

c. The previously qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.

d. The welder, welding operator, and tack welder qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

3.2.6. Certificates – Submit to the Government the names of the welders, welding operators, and tack welders to be employed, and certification that each individual is qualified as specified before assigning any welder, welding operator, or tack welder to work under this contract. In the certification, state the type of welding and positions for which the welder, welding operator, or tack welder is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. Maintain the certification on file, and furnish 3 copies to the Government. Keep the certification current for the duration of the contract.

3.2.7. Renewal of Qualification – Re-qualify welder or welding operator under any of the following conditions:

a. It has been more than 12 months since the welder or welding operator has used the specific welding process for which qualified.

b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.

c. The welder or welding operator qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months.

d. Submit to the Government, as evidence of conformance, records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified.

e. A tack welder who passes the qualification test is considered eligible to perform tack welding indefinitely in the positions and with the processes for which qualified, unless there is some specific reason to question the tack welder's ability. Require the tack welder to pass the prescribed tack-welding test, in such a case.

3.2.8. Inspector Qualification – Qualify inspectors in accordance with AWS 1.1/D1.1M. Qualify nondestructive testing personnel in accordance with the requirements of ASNTRP SNTTC-1 A for Levels I or II in the applicable nondestructive testing method. Assistant welding inspectors who are not qualified to AS NT RP SNT –

TC-1 A may support the inspector and perform specific inspection functions under the supervision of the qualified inspector. Interpret inspection and test results via the qualified inspectors listed above. The following personnel are permitted on board during the inclining experiment to minimize "the weights to deduct": Contractor personnel performing the experiment and Government representatives.

3.3. Provide symbols in accordance with AWS A2.4, unless otherwise indicated.

3.4. Welding Equipment and Materials: Provide welding equipment, electrodes, welding wire and fluxes capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. Comply with the applicable requirements of AWS D1.1/D1.1 M for all welding equipment and materials. Conform to AWS A5.11, A5.14, or A5.34 for electrodes, as applicable for the weld procedure, in the case of welding nickel-copper alloy to carbon steel.

3.5. Welding Operations

3.5.1. Requirements: Conform to the requirements of AWS D1.1/D1.1M and AISC 335 for workmanship and techniques for welded construction. When AWS D1.1/D1.1M and the AISC 335 specification conflict, the requirements of AWS D1.1/D1.1 M govern. Sequence the welding to keep the thermal expansion of the structures to a minimum. Use welding electrodes appropriate for the steel or nickel alloys being joined. Utilize continuous welding for the hull and weather exposed structures.

3.5.2. Identification: Identify welds in one of the following ways:

a. Submit written records to the Government to indicate the location of welds made by each welder, welding operator, or tack welder.

b. Assign each welder, welding operator, or tack welder a number, letter, or symbol to identify welds made by that individual. The Government may require welders, welding operators, and tack welders to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. Mark, for seam welds the identification mark adjacent to the weld at 3-foot intervals. Prohibit identification with die stamps or electric etchers.

3.6. Standards of Acceptance – Comply with the applicable requirements of AWS D1.1/D1.1M and the contract drawings for dimensional tolerances for welded construction, details of welds, and quality of welds. Provide nondestructive testing by visual inspection and radiographic, ultrasonic, magnetic particle, or dye-penetrate methods. Visually inspect 100 percent of all welds. Examine by the magnetic particle or other appropriate nondestructive method 100 percent of all fillet welds. Provide radiographic examination on a minimum of 20 percent of butt joints welds, at random locations, in addition to the nondestructive testing indicated on the drawings.

3.6.1. Nondestructive Examination: Inspect and test welds in the mill, shop, and field. Inspection and tests in the mill or shop will not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

3.6.2. Destructive Tests: Make repairs when metallographic specimens are removed from any part of a structure. Employ qualified welders or welding operators, and utilize the proper joints and welding procedures, including peening or heat treatment if

required, to develop the full strength of the members and joint cuts and to relieve residual stress.

3.7. Government Inspection and Testing –In addition to the inspection and tests performed by the Contractor, the Government will perform inspection and testing for acceptance to the extent determined by the Government. The Contractor shall supply the required equipment for government tests. The costs of such inspection and testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the Government if the welds are satisfactory. The work may be performed by the Government's own forces or under a separate contract for inspection and testing. The Government reserves the right to perform supplemental nondestructive and destructive tests to determine compliance with paragraph 2.6 "Standards of Acceptance".

3.8. Corrections and Repairs – Conduct repairs, using a qualified welder or welding operator as applicable, when inspection or testing indicates defects in the weld joints. Repair the corrections in accordance with the requirements of AWS D1.1/D1.1 M and these specifications. Repair the defects in accordance with the approved procedures. Repair defects discovered between passes before additional weld material is deposited. Blend the affected area into the surrounding surface to eliminate sharp notches, crevices, or corners wherever a defect is removed and repair by welding is not required. Examine by required methods to ensure that the defect has been eliminated after a defect has been removed, and before re-welding. Provide repair welds in compliance with the inspection requirements for the original welds. Any indication of a defect is to be regarded as a defect, unless reevaluation by nondestructive methods or by surface conditioning shows that no defect is present.

4. OPERATIONAL TEST

4.1. None

5. NOTES:

5.1. Safety: Conform to AWS z49.1 for safety precautions during welding.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 076
DESCRIPTION: Threaded Fasteners

1. SCOPE: Provide threaded fasteners as required by drawings and manufacturers instructions. This specification applies to all threaded fasteners.

2. GENERAL

2.1. REFERENCES:
2.1.1. AISC 335-89 Specification for Structural Steel Buildings – Allowable Stress Design and Plastic Design

2.2. SUBMITTALS
2.2.1. Submit proof of compliance, where materials are specified to conform to industry and technical society reference standards.
a. Examples of such organizations are American National Standards Institute (ANSI) and ASTM International (ASTM).
b. The label or listing by the specified organization will be acceptable evidence of compliance.

2.3. QUALITY ASSURANCE: In lieu of the label or listing cited in 2.7, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Government. The certificate must state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

3. REQUIREMENTS:

3.1. General Requirements
3.1.1. Provide threaded fasteners in accordance with the applicable ANSI standards and FED-STD-H28 except as otherwise specified herein, on the drawings, or by the manufacturer. Utilize coarse thread series unless the component's design indicates a necessity to use the fine thread series. Provide a minimum of three full thread protrusions through bolts, unless otherwise specified for a particular application. Restrictions on the use of cadmium-plated fasteners are specified in Item 078. Do not exceed the diameters produced using standard size drill bits as shown herein.
a. For bolt diameters 3/4" and smaller; hole size shall be the bolt diameter plus 1/32"
b. For bolt diameters larger than 3/4"; hole size shall be the bolt diameter plus 1/16"
3.1.2. Provide fasteners sized to match the size of predrilled holes in parts, where hardware such as inclined ladders and hinges are predrilled for fasteners size less than 5/16 inch in diameter.
3.1.3. Provide fasteners for metal parts of a similar material as the part except that fasteners in aluminum are to be corrosion-resisting steel (CRES). Use of brass fasteners is prohibited. Utilize only self locking type fasteners for areas where fasteners are accessible only by disassembling a component. Fasteners immersed in sea water or used on sea water piping shall be of type 316L stainless material.
3.1.4. Unless otherwise noted, all fasteners shall be type 316L stainless material.

3.2. Bolt Torque

3.2.1. Install the fasteners with a preload equal to 75 percent (+5/-0 percent) of their proof strength. Preload, may be applied by direct hydraulic tensioning or torque. Calculate torque as follows, where torque is used to tighten fasteners:

3.2.1.a.1.1.1. T= K x Ft x D

3.2.1.a.1.1.2. Where:
3.2.1.a.1.1.3. T = required wrench torque
3.2.1.a.1.1.4. K=O.2
3.2.1.a.1.1.5. Ft = required fastener preload
3.2.1.a.1.1.6. D = nominal bolt diameter

3.2.2. Where anti-seize compounds are specified, use anti-seize manufacturer's data for K.

3.2.3. Provide bolt torque sequence in accordance with manufacturer's recommendation.

3.2.4. Except where specified for a particular application, mechanical thread locking devices and methods such as lock washers, either spring, tooth or tab type, peening, wiring, pinning or thread upset after assembly are prohibited.

3.2.5. Use stud bolts, tap bolts, or machine screws where through bolting is not possible. The use of powder metallurgy process fabricated fasteners is prohibited.

4. <u>OPERATIONAL TEST</u>

4.1. None

5. <u>NOTES</u>:

5.1. None

6. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

6.1. None.

ITEM # 078
DESCRIPTION: Material Requirements

1. SCOPE: This specification provides guidance on the selection of materials and prohibited materials.

2. GENERAL

2.1. REFERENCES:
2.1.1. None

2.2. SUBMITTALS
2.2.1. Submit proof of compliance, where materials are specified to conform to industry and technical society reference standards.
a. Examples of such organizations are American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratory (UL), Standards of the Hydraulic Institute and Institute of Electrical and Electronics Engineers (IEEE).
b. The label or listing by the specified organization will be acceptable evidence of compliance.

2.3. QUALITY ASSURANCE: In lieu of the label or listing cited in 2.7, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Government. The certificate must state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

3. REQUIREMENTS:

3.1. General Requirements
3.1.1. Provide only new materials for use. Provide materials as indicated on the drawings, unless noted otherwise. Purchase materials of such dimensions to fit in designed space without modifications to material or structure. Account for fit of purchased material and equipment in all construction drawings provided by Contractor detailer.

3.2. Materials
3.2.1. Galvanizing: Hot-dip after fabrication in accordance with the applicable requirements of ASTM A 123 and ASTM A 153 all galvanized materials.
3.2.2. Alternative Materials: The use of materials different from those specified for a given application will be considered when the Contractor presents in writing to the Government the necessity for such substitution and when the proposed material is a satisfactory alternative.
3.2.3. Prohibit the attachment of brass, bronze or copper base alloy fittings to aluminum alloy fittings. Use CRES bolts where such attachments are necessary.
3.2.4. Prohibit bronze, brass or copper base alloys fastenings to be used with aluminum alloys.

3.3. Material Prohibition

3.3.1. Electrolytically Dissimilar Materials – Except as specified herein or shown on the drawings (e.g. use of CRES fasteners in steel and aluminum). Direct contact of electrolytically dissimilar metals is prohibited without prior approval. Insulate dissimilar metals from each other with gaskets, washers, sleeves, and bushings insulating materials to prevent electrolytic corrosion.

3.3.2. Aluminum Alloys – Prohibit, unless authorized by the Government, threading directly into aluminum.

3.3.3. Asbestos –Prohibit the use of asbestos material. Polychlorinated Biphenyl (PCB) – Prohibit the use of PCB in any equipment, system or otherwise used aboard Caisson 8.

3.3.4. Magnesium – Prohibit the use of magnesium and its alloys for structural members or for equipment.

3.3.5. Cadmium – Prohibit the use of cadmium plated parts, fasteners and washers.

3.3.6. Mercury – Prohibit the use of mercury in equipment, sensors or gauges or any other component on Caisson 8.

3.3.7. Lead – Prohibit the use of lead for structural members, equipment or ballast.

4. OPERATIONAL TEST

4.1. Refer to individual work items for any testing pertaining to materials.

5. NOTES:

5.1. None

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 085
DESCRIPTION: Drawings

1. SCOPE: This specification governs the development and submittal of all drawings required for construction, delivery and operation of Caisson 8.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. UFC 1-300-09N, Design Procedures
      2.1.2. NCS, United States National CAD Standards for Architecture, Engineering & Construction

   2.2. SUBMITTALS
      2.2.1. Submit drawings, including one reproducible electronic format (AUTOCAD 2007) and two size 'D' copies. Submit these drawings 1 and any supporting calculations for review by the Government. Validate the proper function, fit, operation, safety, and performance of all systems and equipment of 'Caisson 8 depicted in the submitted Contract Drawings.
      2.2.2. Drawings, including reproducible and prints, that are required to be furnished by the Contractor to the Government or its authorized representatives, become the sole property of the Government

   2.3. QUALITY ASSURANCE
      2.3.1. Drawing development shall conform to the requirements of references

3. REQUIREMENTS:
   3.1. Definitions
      3.1.1. Contract Drawings: These drawings are furnished by the Government.
      3.1.2. Design Development Drawings: Prepare these drawings in order to depict additional design or engineering required to perform the work or to meet specific requirements of these specifications. These drawings include, but are not limited to, equipment foundations, pipe supports, and clearance diagrams. Any additional design shall be performed by a Registered Professional Engineer.
      3.1.3. Final Caisson 8 As-Built Drawings – Refer to these original drawings as the "as-built" set. Provide a complete and updated set of Contractor prepared Contract Drawings, and the Design Development Drawings which have been revised to illustrate the final Contractor's validated Caisson 8 systems arrangement, fabrication, and installation which accurately reflect the installed equipment aboard the Caisson 8. Accurately depict the final construction and onboard installations, including manufacturers' names and all data necessary to identify future replacement of structural, mechanical, and electrical material, equipment, and components in this set of drawings.
         a. As-Built Drawings shall be updated weekly and available for government review on the work site.
      3.1.4. Equipment Drawings – are prepared by the manufacturer of the Contractor furnished equipment, which is identified by a manufacturer's drawing number. Include, but do not limit to, the certifications, data sheets, drawing lists, outline drawings, assembly drawings, subassembly drawings and parts lists.
      3.1.5. Reproducible Drawings – are drawings from which clean and legible prints can be made.

3.1.6. Laminated Drawings for Use Onboard Caisson 8 – Develop and install two original drawings, referred to as “one line electrical” and “seawater piping schematic” diagrams. Provide drawings sized not less than 22” x 34” and laminated with heavy plastic for durability when used as an on-board ready-reference. Reflect the full extent of the as-built condition described above in these drawings.

3.2. General

3.2.1. Utilize the English system of measurements in all drawings.

3.2.2. Prepare the following drawings and data, and submit for review and/or approval by the Government:

a. Design Development Drawings
b. As-Built Drawings
c. Detailed Shop Design Drawings
d. Drawings specified herein
e. Purchase Specifications for selected equipment

3.2.3. Reflect the current status, in the latest revision, of all the as-built construction including changes, deviations, waivers and results of the validation process.

3.2.4. Revise or provide new drawings at the Contractor’s expense if defects develop in machinery or equipment during the Guarantee Period, and if corrections of such defects are determined to be the responsibility of the Contractor, and if the correction requires an engineering change.

3.2.5. Provide size D newly prepared drawings and material lists. Other lists may be size A or size D. Include horizontal and vertical bar scales on compartment, deck and other arrangement drawings to permit scaling of reproductions.

3.2.6. Prepare a Caisson 8 Drawing Index which will show all the final construction drawings and equipment drawings. Include in the drawing index all corresponding titles.

3.3. Correspondence and Drawing Forwarding Procedure

3.3.1. Direct all correspondence concerning drawings to the COR. List each drawing indicating its title, drawing number, and latest revision letter in correspondence forwarding drawings.

3.4. Caisson 8 Contract Drawings

3.4.1. The Government will furnish Caisson 8 Contract Drawings in electronic files (PDF) to the Contractor. These drawings include information regarding hull, outfitting, structure, machinery, electrical component system fabrication and installation.

3.5. Contractor Design Development Drawings

3.5.1. Develop any drawings, lofting and templates necessary to construct Caisson 8. Develop Design Development Drawings, which depict additional design and engineering, developing features or details not shown or defined on the Contract Drawings. Submit all Design Development Drawings to the Government for review and approval prior to construction. Stamp Design Development Drawings with the registered professional engineer’s approval.

3.5.2. Develop the detailed shop drawings necessary to construct Caisson 8 in accordance with these specifications and the Contract Drawings. Submit all detailed shop drawings to the Government for review and approval prior to construction.

3.6. Final Caisson 8 As-Built Drawings

3.6.1. Provide Final Caisson 8 As-Built Drawings consisting of a complete set of updated Contract Drawings and Design Development Drawings, which depict the Contractor’s final validated construction and installations, complete in detail and scope. Include in the set an updated version of all the drawings in the Contract

Drawing set. Incorporate into the Final Caisson 8 Construction Drawings the drawings issued in place of revisions to the Caisson 8 contract drawings. Stamp these drawings "Final As-Built," and submit to the Government for review and approval within 14 days of completion of acceptance trials. Include both size 'D' Mylar hard copies and AutoCAD Release 2007 electronic file copies on compact disk as specified below.

3.6.2. Insert Caisson 8 as the first line in the drawing title area of the title block. Print the distribution information for in-house use in the margin at the right-hand side of the title block.

3.6.3. The Public Works Department must be able to read and plot AutoCAD files from the compact disk provided by the contractor at final submittal. Conform to the following standards for the preparation of AutoCAD compatible engineering drawings:

a. Save in AutoCAD, Release 2007 format.
b. Incorporate the standard Public Works Color Table File (.ctb) to define line widths.
c. Use the current public Works drawing border ("D" size, 34" x 22").
d. Have the drawing border, containing drawing information, placed in paper space at 1:1 scale with the origin placed at 0,0. Insert the drawing border as a fully attributed block, as provided. Do not modify this border.
e. Have all applicable drawing border attributes completed (e.g., Public Works Drawing Number, Work Request Number, Key Drawing, CAD File Name, etc.}.
f. Limit the file to 1 drawing sheet.
g. Use standard AutoCAD text fonts in the drawing body. Use a minimum text size of 0.125". Prohibit the use of custom or non-standard AutoCAD text fonts. Use of a 0.8 width factor is preferable.
h. Have all reference files (Xrefs) bound to the drawing file.
i. Not contain raster files {.bmp, .jpg, etc.} or any other type of file format that cannot be bound to the base AutoCAD file.
j. Be purged of all unused blocks, layers, etc.
k. Have the display property of each viewport locked to prevent inadvertent movement.

3.6.4. The Public Works Color Table File (.ctb), standard "0" size drawing border and other standard CAD files can be obtained by contacting the project COR.

3.7. Design Development Drawings

3.7.1. Prepare at a minimum, the following Design Development Drawings:

a. Machinery Installation and Foundations: Drawings detailing the installation and foundations for the capstans, super-flood pumps, dewatering pumps, valve operators, and mooring fittings.
b. Launching Plan: According to the requirements of Work Item 045.
c. Plating Layout Plan: According to the requirements of Section 100.
d. Docking Plan – Incorporate actual dimensions taken before launching or taken in the building ways prior to delivery with plan, elevation and section details in a final docking drawing for Caisson 8.
e. Sounding Tables – Prepare for each main ballast tank, for each trim tank and for each combined main ballast tank and trim tank combination. Include the tank sounding, the number of gallons added, and the draft reading for each foot of tank capacity.

3.7.2. Caisson 8 Drawing Schedule

a. Prepare a drawing schedule which includes the drawings required by Work Item 085. Include, in the drawing schedule, the assigned drawing numbers and indicate planned submittal date for government review.

3.8. Specifications for Proposed Purchase Order

3.8.1. Submit specifications for proposed purchase orders for the following to the Government for review prior to equipment purchase:

a. Mooring Fittings, Capstan, Doors, Scuttles, Hatches, Concrete, Fenders, Caisson Seals, Pumps, Valves, Valve Actuators, Ventilation System Fans, Dehumidification System, Controls and Heaters, Tank Leveling Indicating System Equipment, Power Panels/Controls Equipment, Pump Motors and Cable Puller

b. See CDRL for complete list. Include catalog cuts or shop drawings.

4. OPERATIONAL TEST

4.1. None

5. NOTES:

5.1. None

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 092
DESCRIPTION: Trials

SCOPE: Conduct Builder's and Acceptance Trials to ensure proper function of the caisson and all systems and equipment provided with the caisson.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None

   1.2. SUBMITTALS
      1.2.1. None

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Conduct Builder's Trials at the Contractor's facility with the COR present. Builder's Trials consisting of all material inspections and tests specified in Section 095 of this specification, except for the seating tests and deflection test.
   2.2. Conduct Acceptance Trials of Caisson 8 prior to final acceptance. Government shipyard personnel will prepare Caisson 8 and properly position the caisson at the entrance of the graving dock. Assist the Government shipyard personnel in the entire operation to complete all testing evolutions.
   2.3. Demonstrate to the Government, at the Acceptance Trials, that Caisson 8 fully satisfies all the requirements of these Specifications. Conduct the material inspections and tests required in 095 of these Specifications.
   2.4. Submit Caisson 8 to the Government for final delivery when the Acceptance trials are completed, accepted and the caisson is ready for service.
   2.5. Conduct the Acceptance trials under the supervision of the Government. Satisfactory completion of the trials, combined with the satisfactory completion of discovered contractor responsible deficiencies, whether discovered before, during, or after completion of Caisson Acceptance Trials, and which are determined by the Contracting Officer to be necessary to avoid an adverse effect on the operational capability of the caisson, are conditions for final delivery of Caisson 8 to the Government.
   2.6. The delivery of the caisson shall take place no later than July 15, 2011. Dates for testing of the caisson are September 20 to October 20, 2011.

3. OPERATIONAL TEST
   3.1. None

4. NOTES:

   4.1. None

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 094
DESCRIPTION: Builder's and Acceptance Trials

SCOPE: Conduct Builder's and Acceptance Trials to ensure proper function of the caisson and all systems and equipment provided with the caisson.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None

   1.2. SUBMITTALS
      1.2.1. Prepare and submit a trials agenda to the Contracting Officer. Include any trials specified within this document in the Acceptance Trials Agenda.

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Conduct Builder's Trials at the Contractor's facility with the COR present. Builder's Trials consisting of all material inspections and tests specified in Section 095 of this specification, except for the seating tests and deflection test.
   2.2. Conduct Acceptance Trials of Caisson 8 prior to final acceptance. Government shipyard personnel will prepare Caisson 8 and properly position the caisson at the entrance of the graving dock. Assist the Government shipyard personnel in the entire operation to complete all testing evolutions.
      2.2.1. Acceptance trials of the caisson in Dry Dock 8 shall be conducted from September 20 to October 20, 2011.
      2.2.2. Notify the Contracting Officer of proposed date for the Acceptance Trials a minimum of 5 working days in advance of proposed trial date.
   2.3. Demonstrate to the Government, at the Acceptance Trials, that Caisson 8 fully satisfies all the requirements of these Specifications. Conduct the material inspections and tests required in Work Item 095 of these Specifications.
   2.4. Submit Caisson 8 to the Government for final delivery when the Acceptance trials are completed, accepted and the caisson is ready for service.
   2.5. Conduct the Acceptance trials under the supervision of the Government. Satisfactory completion of the trials, combined with the satisfactory completion of discovered contractor responsible deficiencies, whether discovered before, during, or after completion of Caisson Acceptance Trials, and which are determined by the Contracting Officer to be necessary to avoid an adverse effect on the operational capability of the caisson, are conditions for final delivery of Caisson 8 to the Government.

3. OPERATIONAL TEST
   3.1. None

4. NOTES:

   4.1. None

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 095-073
DESCRIPTION: Noise Testing

SCOPE: Conduct airborne noise testing to ensure protection of equipment and workers.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. ARI/ASHRAE Standard 885; Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets

   1.2. SUBMITTALS
      1.2.1. Submit a Noise Analysis Report for approval upon completion of testing.

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Conduct a noise test with the sensor located at 5 feet above the operations deck on centerline at amidships for the following set of conditions:
      2.1.1. Air handling unit operating with all pumps off and all valves in a fixed position. (i.e. all valve operators off)
      2.1.2. Air handling unit operating with both main tank pumps running, trim tank pumps off and valve operators off.
      2.1.3. Air handling unit operating with both main tank pumps off, both trim tank pumps running and valve operators off.
      2.1.4. Air handling unit operating with main tank pumps off, trim tank pumps off and two valve operators for 24-inch ballast inlet valves operating.
   2.2. Validate dB noise level in each octave band and the dBA and NC level designation for each of the operating conditions. Octave bands and NC levels are defined in ARI/ASHRAE Standard 885. Submit a report detailing the results of the noise test to the Contracting Officer for review and approval.
   2.3. Permissible airborne noise level is 70 dBA

3. OPERATIONAL TEST
   3.1. No additional information required.

4. NOTES:

   4.1. Resilient mounts shall be used to reduce noise levels. Refer to Work Item 180 for information on the application of resilient mounts.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 095-097
DESCRIPTION: Inclining Experiment

1. SCOPE: Conduct, in accordance with NAVSEA S9086-C6-STM-010, Chapter 096, an inclining experiment of Caisson 8 when caisson construction is complete and the caisson has been launched. Government representative(s) will witness the experiment.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. NAVSEA S-9086-C6-STM-010, Chapter 096, Weights and Stability

   2.2. SUBMITTALS
      2.2.1. A minimum of seven (7) days prior to the Inclining Experiment submit the test procedure and weight certificates.
      2.2.2. Within seven (7) days of completion of the Inclining Experiment submit preliminary report of the Inclining Experiment to the Government.
      2.2.3. Within seven (7) days of receipt of comments to the preliminary report submit a final report of the inclining experiment to the Government. Include in the final report all photographs taken at the time of the inclining experiment. All government comments shall be resolved in this submittal.

   2.3. QUALITY ASSURANCE
      2.3.1. The Inclining Experiment shall be accomplished under the supervision of a degreed Naval Architect experienced in conducting Inclining Experiments.

3. REQUIREMENTS:
   3.1. Furnish inclining weights and all other necessary materials and equipment required for the experiment. Provide equipment and personnel to handle lines and shift the inclining weights during the experiment. Submit the final results of the inclining experiment report to the Government for review and approval.
   3.2. Insure, at the time of the inclining experiment, Caisson 8 is substantially completed, and that all weight to complete, including all permanent ballast, is properly documented in the Weight Control report.
   3.3. The following personnel are permitted on board during the inclining experiment to minimize “the weights to deduct”: Contractor personnel performing the experiment and Government representatives.
   3.4. Avoid unnecessary movement, particularly while pendulums and inclinometers readings are being taken.
   3.5. Insure the weight of all personnel aboard and their equipment exclusive of the test weights does not exceed 2,500 pounds gross.
   3.6. Perform the experiment in calm weather, preferably during slack tide. Select a sheltered site with ample depth of water even at low tide and where Caisson 8 can be conveniently moored with adequate clearance around it.
   3.7. Slacken all mooring lines while shifting the inclining weights and readings are being taken.
   3.8. Insure that Caisson 8 general status is as specified by the drawings and specifications, all test equipment is in order and ready, and all personnel performing the test are at their assigned stations, prior to the start of the inclining experiment.
   3.9. Provide paper and electronic color photographs (8-1/2” x 11”) of Caisson 8 at the time of the inclining experiment. Utilize a digital camera with a minimum resolution of 4

megapixels, Digital image files, and prints become the sole property of the Government upon turnover of the files and are not to be utilized by the Contractor for any other purposes. Do not alter digital image files by use of photo editing software. Take photographs with zero inclining moment and include, as a minimum, test weights, pendulum stations, and draft readings.

4. OPERATIONAL TEST

4.1. None

5. NOTES:

5.1. Due to lightship draft requirements the inclining experiment may need to be conducted at Norfolk Naval Shipyard. The contractor shall notify the NAVFAC representative a minimum of 30 days prior to testing if the test is intended to be conducted at Norfolk Naval Shipyard.

5.2. Notify the government a minimum of seven (7) days prior to the inclining experiment of the intent to accomplish this work item.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 095-098
DESCRIPTION: Submergence Test

1. SCOPE: Conduct a submergence test of the caisson to validate the watertight integrity of the operations deck and provide guidance to trim ballast dip tubes to the appropriate length.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. United Facilities Criteria UFC 4-213-10, Dated 15 August 2002
      2.1.2. Drawing G-150, Tank Capacity Curves

   2.2. SUBMITTALS:
      2.2.1. Within seven (7) days of completion of the submergence test submit a final report of the submergence test to the Government. Include in the final report all the noted drafts and tanks levels in each condition, a record of added ballast, including the location and weight, and any noted leaks in the operations deck.

   2.3. QUALITY ASSURANCE
      2.3.1. Comply with the requirements herein.

3. REQUIREMENTS:
   3.1. Insure, at the time of the submergence test, Caisson 8 is substantially completed, and that all weight to complete, including all permanent ballast, is properly documented in the Weight Control report.
   3.2. The submergence test should be completed prior to the Inclining Experiment, WI 095-097.
   3.3. At no point shall the contractor allow the caisson to have a draft of less than 32’-6”. Drafts less than this depth will place the caisson in an unstable condition.
   3.4. Perform the test in calm weather, preferably during slack tide. Select a sheltered site with ample depth of water even at low tide and where Caisson 8 can be conveniently moored with adequate clearance around it.
   3.5. Slacken all mooring lines while conducting the submergence test.
   3.6. With the main ballast tank empty, fill the trim tanks to capacity and note the draft of the caisson in all corners. Hold that ballast condition for a period of 15 minutes before inspecting the hull, operations deck and tank bulkheads for any noticeable water entry.
      3.6.1. If any trim exists reduce ballast in the appropriate trim tank until even trim is achieved. Note the sounding of each tank and the draft in each corner once even trim is achieved.
      3.6.2. If water entry is detected the location shall be marked and the test halted until the leak is repaired. Notify the COR of any detected leaks.
   3.7. If so directed by COR, additional solid ballast may need to be added to a trim tank to permanently correct trim conditions.
   3.8. With the trim tanks full and the caisson in even trim condition, fill the main ballast tank and note the draft of the caisson in all corners. Hold that ballast condition for a period of 15 minutes before inspecting the operations deck and interior hull for any noticeable water entry or air leaks.
      3.8.1. If any trim exists reduce ballast in the appropriate tank until even trim is achieved. Note the sounding of each tank and the draft in each corner once even trim is achieved.

3.8.2. If water entry or air leaks detected the location shall be marked and the test halted until the leak is repaired. Notify the COR of any detected leaks.

3.9. If so directed by COR, additional solid ballast may need to be added to a tank to permanently correct trim or draft conditions.

4. OPERATIONAL TEST

4.1. None

5. NOTES:

5.1. The contractor will be directed to adjust the lengths of the sounding tubes upon completion of this test to ensure that adequate displacement exists at full load condition while providing adequate positive buoyancy in all cases.

5.2. Predicted drafts of the caisson are as shown below.

Condition	Predicted Draft	Predicted Trim	Predicted List (degrees)
Minimum Operating Condition	32’-6”	0.0	0.0
Trim Tanks Full	42’-8 5/8”	0.0	0.0
Full Load	55’-3”	0.0	0.0

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 095-180
DESCRIPTION: Foundations Testing

SCOPE: Test all foundations in accordance with the provisions of this specification.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None

   1.2. SUBMITTALS
      1.2.1. None.

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Accomplish a static test, for foundations of designed to handle and support weight, equal to the working load indicated on the drawings, unless noted otherwise in these specifications. Hold the load for 10 minutes without damage or permanent deformation of the equipment or supporting structures. In cases where the working load is not specified, the test load will be as specified by the Government.
   2.2. Install test label plates for all load handling equipment conforming to the requirements of Work Item 602 next to the foundation with the test date, safe working load, and name of activity performing testing.

3. OPERATIONAL TEST
   3.1. None

4. NOTES:

   4.1. Items that support equipment or apparatus that will be load tested under the guidance of other test specifications are exempt from this test requirement.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 095-192
DESCRIPTION: Structural Watertightness

SCOPE: Test all watertight compartments, hatches, doors, scuttles and manholes to ensure watertightness.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None.

   1.2. SUBMITTALS
      1.2.1. Submit a test report indicating the date, procedure, test personnel and results of the watertightness test.

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Perform individual compartment structural tightness tests to insure tightness of the Operations Compartment and each main ballast tank and trim tank unit. Accomplish the tightness tests prior to installation of paint and concrete ballast but after installation of all piping, fittings, pumps, motors, electrical cables and conduits.
   2.2. Test each main ballast tank and trim tank unit individually to 2 pounds per square inch (psi.).
      2.2.1. Test is satisfactory if there is no drop in pressure in 10 minutes.
      2.2.2. Test the two trim tanks by filling each with water to overflow with the drain valve closed and the ballast tanks empty. Wait 10 minutes and check for leakage. No leakage between tanks is allowed.
   2.3. Test the Operations Compartment to 2 psi, with an allowable drop in pressure of 2 ounces per square inch in 10 minutes.

3. OPERATIONAL TEST
   3.1. No additional information required.

4. NOTES:

   4.1. Resilient mounts shall be used to reduce noise levels. Refer to Work Item 180 for information on the application of resilient mounts.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 095-320
DESCRIPTION: Electrical Power Tests

SCOPE: Conduct Builder's and Acceptance Trials to ensure proper function of the caisson and all systems and equipment provided with the caisson.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None

   1.2. SUBMITTALS
      1.2.1. Prepare and submit a trials agenda to the Contracting Officer. Include any trials specified within this document in the Acceptance Trials Agenda. Submit all test reports of equipment and wiring.

   1.3. QUALITY ASSURANCE
      1.3.1. Provide materials and equipment listed by Underwriters Laboratories (UL) or approved by Factory Mutual Research Corporation (FM), when such equipment is listed by UL or approved by FM.

2. REQUIREMENTS:
   2.1. Conduct Builder's Trials at the Contractor's facility with the COR present. Builder's Trials consisting of all material inspections and tests specified in Section 095 of this specification, except for the seating tests and deflection test.
   2.2. Conduct Acceptance Trials of Caisson 8 prior to final acceptance. Government shipyard personnel will prepare Caisson 8 and properly position the caisson at the entrance of the graving dock. Assist the Government shipyard personnel in the entire operation to complete all testing evolutions.
      2.2.1. Notify the Contracting Officer of proposed date for the Acceptance Trials a minimum of 5 working days in advance of proposed trial date.
   2.3. Demonstrate to the Government, at the Acceptance Trials, that Caisson 8 fully satisfies all the requirements of these Specifications. Conduct the material inspections and tests required in 095 of these Specifications.
   2.4. Submit Caisson 8 to the Government for final delivery when the Acceptance trials are completed, accepted and the caisson is ready for service.
   2.5. Conduct the Acceptance trials under the supervision of the Government. Satisfactory completion of the trials, combined with the satisfactory completion of discovered contractor responsible deficiencies, whether discovered before, during, or after completion of Caisson Acceptance Trials, and which are determined by the Contracting Officer to be necessary to avoid an adverse effect on the operational capability of the caisson, are conditions for final delivery of Caisson 8 to the Government.

3. FIELD TEST: Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 working days notice prior to each test.
   3.1. Electrical Distribution: At the completion of the electrical distribution work, the Contractor shall perform field tests on all power wiring as described in the following paragraphs. All instrument and signal wiring shall be tested as specified by the manufacturer

3.2. 600-Volt Wiring Test: Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist and that wiring is electrically continuous from one end of the circuit to the other. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Smaller diameter wiring shall be tested using equipment and voltages commensurate with the wire rating. No control devices or instruments are to be included in the potential tests. Minimum resistance shall be 250,000 ohms.

3.3. Large circuit breakers (over 100 Amp rating): Contact resistance shall be measured and compared with the manufacturer's specifications. If found to be in non-compliance, the manufacturer shall repair or replace at no further cost to the Government.

3.4. Transformer Tests: Perform the standard, not optional, tests in accordance with the Inspection and Test Procedures for transformers, dry type, air-cooled, 600 volt and below; as specified in NETA ATS. Measure primary and secondary voltages for proper tap settings. Tests need not be performed by a recognized independent testing firm or independent electrical consulting firm.

3.5. Ground-Fault Receptacle Test: Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed. Check that all self-test buttons operate normally and properly trips the circuit to an open condition.

4. <u>OPERATIONAL TEST</u>

4.1. Electrical Distribution, Remote Operations and Instrumentation:

4.1.1. Devices Subject to Manual Operation: Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time.

4.1.2. Devices Subject to Remote Operation: All remote controls and indicating systems shall be demonstrated to function in its intended manner and indications are accurately portrayed. On, Off, Stop, Start, Remote and Local switches shall be demonstrated to function as intended. Valves shall properly transfer from manually operated to motor operated as specified by the manufacturer without conflicts.

4.1.3. Tank Level Indicators shall be calibrated and demonstrated to function accurately under all water level conditions likely to be encountered.

4.1.4. All alarms shall be tested in their operation as intended in the design and can be properly reset to normal condition.

5. <u>NOTES:</u>

5.1. None

6. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

6.1. None.

ITEM # 095-330
DESCRIPTION: Lighting Systems Tests

SCOPE: Test lighting system for proper installation and operation.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. E-100; Single Line Diagram
      1.1.2. E-300; Electrical Lighting Arrangement

   1.2. SUBMITTALS
      1.2.1. Provide documentation that all tests have been made with satisfactory results and that no "punch list" items are still to be resolved.

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Completed installation of the entire lighting system including switches and controls, interior and exterior lighting fixtures, and the UPS system.

3. OPERATIONAL TEST
   3.1. Interior: Operate switches at both ladderways and ensure that all interior fixtures turn on and off. With interior lights switched on, open main circuit breaker feeding lighting system and ensure that all emergency fixtures (fed by UPS system) remain on.
   3.2. Exterior: Operate weather-deck lighting (controlled by photoelectric cell) by covering and uncovering the photoelectric cell during daylight hours and ensuring that all weather-deck fixtures turn on and off. Test Console mounted H-O-A Switch in "Hand" position to ensure that the photocells can be bypassed to illuminate the lights and that when set to the "Off" position will lock out and de-energize the lights. With photocell covered and lights turned on, open main circuit breaker feeding lighting system and ensure that all emergency fixtures (fed by UPS system) remain on.
   3.3. General: Check all lighting fixtures to confirm that no units are missing, damaged or deformed and that all supports and connections are in place and performing their intended functions.
   3.4. Demonstrate the operability of the battle lanterns installed in the dog houses and on the operations deck.

4. NOTES:
   4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):
   5.1. None.

ITEM # 095-436
DESCRIPTION: Electrical Alarm, Safety and Warning Systems

1. SCOPE: Test the Alarm Safety and Warning Systems for Fire and Flooding Indication.

2. GENERAL

2.1. REFERENCES:
2.1.1. E-800 Fire and Flooding Notes, Legend & Abbreviations
2.1.2. E-801 Fire and Flooding BOM
2.1.3. E-802 Fire and Flooding System Diagram
2.1.4. E-803 Fire and Flooding System Layout
2.1.5. E-700 Tank Level Indicators, Notes and Legend
2.1.6. E-701 Tank Level Indicators BOM
2.1.7. E-702 Tank Level Indicators System Diagram
2.1.8. E-703 Tank Level Indicators System Layout
2.1.9. E-606 Control Panel Single Line Diagram
2.1.10. E-607 Control Panel Elevation

2.2. SUBMITTALS
1.2.1 Prepare and submit all test reports of the fire and flooding equipment and wiring.

2.3. QUALITY ASSURANCE
2.3.1. Comply with the requirements herein.

3. REQUIREMENTS:
3.1. Installing activity has certified that the alarm system, with the tank level indication and deck flood sensors have been installed and are ready for testing.
3.2. Perform visual inspections and circuit connectivity/continuity checks prior to testing the Fire Alarm System and Flooding Alarm Systems.

4. OPERATIONAL TEST
4.1. Fire Alarm Panel
4.1.1. Verify cleanliness of equipment and operating area.
4.1.2. Verify proper mounting and support of equipment and components.
4.1.3. Verify no ill-fitting, missing or loose hardware and hold-down bolts.
4.1.4. Verify that both internal and external cable connections are tight, and equipment grounded.
4.1.5. Verify Label and Identification Plates are correct and appropriate.
4.1.6. Verify the power source is 120VAC from the emergency power panel EP-1.
4.1.7. Verify location of the four (4) heat and four (4) smoke detectors.
4.1.8. Place a heat source near a heat detector to activate the alarm system and test the smoke detectors with an approved smoke generator. Verify that the visual (red beacon) and audible alarms are operating properly. Verify that the alarms can be manually shut-off and reset. Repeat the procedure for each detector.

4.2. Flood Level Alarm
4.2.1. Verify cleanliness of equipment and operating area.
4.2.2. Verify proper mounting and support of equipment and components.
4.2.3. Verify no ill-fitting, missing or loose hardware and hold-down bolts.

4.2.4. Verify that both internal and external cable connections are tight, and equipment grounded.

4.2.5. Verify Label and Identification Plates are correct and appropriate.
4.2.6. Verify the power source is 120VAC from the emergency power panel EP-1.
4.2.7. Press the test button in the flood alarm panel and verify alarms.
4.2.8. For each of the three tanks, simulate flooding condition by increasing the tank pressure for the sensor until the high alarm is actuated or by using other method approved by the manufacturer in writing. Verify that the visual (amber light) and audible alarms are operating properly. Verify that the alarms can be manually shut off or re-set.
4.2.9. Perform similar simulation for low-level condition. Verify that the visual (blue light) and audible alarms are operating properly. Verify that the alarms can be manually shut off or re-set.
4.2.10. Perform similar simulation for tank low-level condition. Verify that the visual (red light) and audible alarms are operating properly. Verify that the alarms can be manually shut off or re-set.
4.2.11. Repeat the procedures for each tank level indicator.
4.2.12. Verify cleanliness of equipment and operating area.
4.2.13. Verify proper mounting and support of equipment and components.

4.3. Deck Flood Alarm
4.3.1. Verify proper mounting and support of equipment and components.
4.3.2. Verify no ill-fitting, missing or loose hardware and hold-down bolts.
4.3.3. Verify that both internal and external cable connections are tight, and equipment grounded.
4.3.4. Verify Label and Identification Plates are correct and appropriate.
4.3.5. Verify the power source is 120VAC from the emergency power panel EP-1 and feeds the 24VDC power supply.
4.3.6. For each of the two (2) deck flood sensors, close the contact and verify that the visual (clear light) and audible alarms in the flooding alarm panel located in the Main Console are operating properly. Verify that the alarms can be manually shut off or re-set.

5. NOTES:

4.4.1 None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 095-437
DESCRIPTION: Indicating, Ordering and Metering Systems

SCOPE: Test all Indicating, Ordering and Metering System to ensure proper operation in accordance with this specification.

1. GENERAL
   1.1. REFERENCES:
      1.1.1 E-600 Ballast System Notes Legend and Abbreviations
      1.1.2 E-601 Ballast System Electrical BOM
      1.1.3 E-602 Ballast System Electrical - Single Line Diagram 1 of 2
      1.1.4 E-603 Ballast System Electrical - Single Line Diagram 2 of 2
      1.1.5 E-604 Control Panel Notes Legend and Abbreviations
      1.1.6 E-605 Control Panel Bill of Materials
      1.1.7 E-606 Control Panel Single Line Diagram
      1.1.8 E-607 Control Panel Elevation

   1.2. SUBMITTALS
      1.2.1 Prepare and submit all test reports of ballast control equipment and wiring.

   1.3. QUALITY ASSURANCE
      1.3.1 Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Installing activity has certified that the control, metering and indication (ballast control) have been installed and are ready for testing.
   2.2. Review safety precautions:
      2.2.1 Before opening any panel make sure feeder circuit is lockout/tagout, guaranteeing that energy source has been secured.
      2.2.2 Follow good working practices. Equipment shall be rated for the application and shall be protected for the use. Improper equipment, tools, cables, connectors, etc., shall not be used. Wherever possible, defective equipment or components shall be destroyed or discarded.

3. FIELD AND OPERATIONAL TEST
   3.1. Pump Starter Panels
      3.1.1 Secure electrical power to the pump starter panels from PP-2.
      3.1.2 Verify cleanliness of equipment and operating area.
      3.1.3 Verify accessibility for proper operation, maintenance and repair of the system components.
      3.1.4 Verify proper mounting and support of equipment and components.
      3.1.5 Verify no ill-fitting, missing or loose hardware and hold-down bolts.
      3.1.6 Verify that both internal and external cable connections are tight, and equipment grounded.
      3.1.7 Verify Label and Identification Plates are correct and appropriate.
      3.1.8 Remove connection to valve actuator interlock and jumper contacts in terminal block.
      3.1.9 Restore power.
      3.1.10 Measure Line Voltage
      3.1.11 Test local panel controls and indication, by quickly starting and stopping pump.

3.1.12 Verify heater circuit is energized when pump is off.
3.1.13 Test main control panel controls and indication (remote), by quickly starting and stopping pump.
3.1.14 Secure electrical power to the pump starter panels.
3.1.15 Remove jumper and reconnect interlock to corresponding valve actuator.
3.1.16 Verify that pump will not start when the associated dewatering valve is in the closed position.

3.2 Valve Controls and Instrumentation
3.2.1 Secure electrical power to each valve actuator fed from PP-4 and PP-5.
3.2.2 Verify cleanliness of equipment and operating area.
3.2.3 Verify accessibility for proper operation, maintenance and repair of the system components.
3.2.4 Verify proper mounting and support of equipment and components.
3.2.5 Verify no ill-fitting, missing or loose hardware and hold-down bolts.
3.2.6 Verify that both internal and external cable connections are tight, and equipment grounded.
3.2.7 Verify Label and Identification Plates are correct and appropriate.
3.2.8 Restore power.
3.2.9 Measure Line Voltage
3.2.10 Test the valve actuators locally.
3.2.11 Test main control panel controls and indication (remote), including valve percentage open indication.

3.3 Trim and List Inclinometer
3.3.1 Shop test the Trim and List inclinometers for accuracy prior to installation. Verify accuracy after installation relative to actual inclination of hull.

3.4 Tank Level Indicating System
3.4.1 Perform visual inspections and circuit connectivity/continuity checks for each unit of the Tank Level Indicating system prior to testing the system. Accomplish calibration of the system in accordance with the vendor's instructions. System testing may also be accomplished during tests per 095-503 PUMPS. Perform testing by opening each tank hatch and taking ullage readings, using the tank sounding data provided to determine the level depth at the point the alarm is activated. Alternatively, the measurement may be made by sounding directly.

4. NOTES:

4.4.1 None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 095-503
DESCRIPTION: Pump Testing

SCOPE: Test all pumps to ensure the proper operation.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. Hydraulic Institute Standards.

   1.2. SUBMITTALS
      1.2.1. Provide data from the tests conducted in paragraphs 2.7 and 2.8. Provide a written report to the Government including a curve plot for each pump showing GPM, head and horsepower.

   1.3. QUALITY ASSURANCE
      1.3.1. tbd

WARNING: It may be possible to sink Caisson 8 by over filling the ballast and trim tanks when the caisson is not seated in the graving dock. When testing pumps while not in position for seating in the graving dock, have a responsible person outside the caisson in good communication with personnel operating the pumps. Continuously monitor the trim and draft of the caisson. Do not ballast the caisson, during periods of operations outside of graving dock, to a draft exceeding 38 feet, nor to a trim exceeding 12 inches along the length of the caisson.

2. REQUIREMENTS:
   2.1. Prior to conducting on board tests, factory test one trim tank deballasting pump and one main tank deballasting pump at the manufacturer's plant in conformance with the Standards of the Hydraulic Institute. Utilize the actual driver to be provided by the pump manufacturer. Provide certified performance curves corrected to the expected field fluid (salt seawater specific gravity 1.013) and conditions of operation showing flow rate, total dynamic head (TDH), net positive suction head (NPSH), efficiency and horsepower to the Government for approval.
   2.2. Complete tests with certified efficiency and power factor at full, ¾ and ½ loads.
   2.3. Conduct an alignment check of each pump with the prime mover during installation. Validate alignment after filling tanks with water. Test each pump to prove its conformance to the specification requirements and to assure that it has been properly installed. Perform all pump tests in the presence of and under the supervision of the manufacturer's project engineer, and record the tests. Complete all tests in accordance with requirements of the Standards of the Hydraulic Institute. Insure the Contractor Quality Control representative reviews and approves all test data together with curves produced there from and submit a copy to the COR for records.
   2.4. Prior to seating Caisson 8, test dewatering pumps as installed. Test dewatering pumps by operating them together and separately to dewater the tanks from maximum to suction. Validate and document all control Instruments are current in calibration before running the tests to insure accuracy.
   2.5. Take and log readings of all pertinent instruments every 5 minutes. Check each pump for excessive temperature, vibration or noise during the test. Stop the test, should any unit fail to operate properly, and repair the unit or replace with a new unit. Repeat tests,

after replacement or repairs, until proper operation is achieved. Provide a written copy of remedial measures taken to eliminate faults to the COR. The intent of these tests is to check the pump installations and assure success of required tests.

2.6. Perform a second set of tests, during Acceptance Trails, to demonstrate the capability of the main tank dewatering pumps to lift the Caisson off its seat. Operate both main tank dewatering pumps simultaneously, one pumping into the dry dock, the other to the sea.

3. OPERATIONAL TEST

3.1. No additional information required.

4. NOTES:

4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 095-505
DESCRIPTION: Pipes, Valves and Valve Actuators

SCOPE: Test all Pipes, Valves and Valve Actuators to ensure the proper installation.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None.

   1.2. SUBMITTALS
      1.2.1. For all purchased valves and valve actuators provide the manufacturers testing and certification documents.

   1.3. QUALITY ASSURANCE
      1.3.1. tbd

2. REQUIREMENTS:
   2.1. Test all piping systems to demonstrate a watertight seal at 50 psi for 15 minutes with clean fresh water. Isolate piping from pumps during testing if pumps have a relief device installed. Allowable leakage is zero.
   2.2. Shop test all valves to 20 psi prior to installation, to demonstrate the seal using clean fresh water for three minutes. Allowable leakage rate is 10 cc/hr/inch valve size or less between gate and seat. Perform the test on each side of the valve.
   Perform a valve body joint test with the valve in the open position to test the valve body to bonnet connection to 20 psi for three minutes. Allowable leakage is zero.
   2.3. Hydrostatically test all check valves, in the direction tending to close the valve to demonstrate disc to seat seal and valve body to cover connection at 20 psi using clean fresh water for five minutes. Allowable leakage rate is 10 cc/hr/inch valve size or less between disc and seat and zero leakage at the valve body to cover connection.
   2.4. Cycle all valve actuators, manual and motor, after installation to valve, to validate smooth operation without binding, vibration, noise or other imperfections. Test actuators and valves with Caisson 8 dry and again when waterborne. Operate valves a minimum of twelve full cycles; six dry and six wet (immersed).
   2.5. Cycle each valve three times using the motorized actuator and three times using the manual override from fully closed to fully open to fully closed in dry condition and when immersed.
   2.6. Validate by actual observation, in the dry state only, each valve position, to the remote position indicator. Correct any detected deficiencies and retest until satisfactory results are obtained.
   2.7. Label all valves on the hull exterior at their penetration per Work Item 602.
   2.8. Conduct tests of the ballast tank inlet valves with divers (provided by the contractor) standing by with appropriate damage control equipment because of the possibility of sinking the caisson.
      2.8.1. Close the trim tank flood/drain valves prior to above testing.

3. OPERATIONAL TEST
   3.1. No additional information required.

4. NOTES:

4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM #095-512
DESCRIPTION: Ventilation Testing

1. SCOPE: Test ventilation and dehumidification systems in accordance with this specification.

2. GENERAL

2.1. REFERENCES:

2.1.1. None

2.2. SUBMITTALS

2.2.1. As Noted

3. REQUIREMENTS:

3.1. General

3.1.1. HVAC systems shall be operationally tested to verify conformance with the performance requirements of Work Item 512 in regards to the functionalism of all system related control devices; system, compartment, and terminal volumetric airflow; and system pressurization capability. Subsequent to these tests, an air conditioning load test and analysis shall be performed for all air conditioning systems. All ventilation and air conditioning systems and boundaries shall be complete prior to testing and balancing.

3.2. Control devices test

3.2.1. Prior to installation, all control devices shall be tested to the extent practical to verify compliance with applicable requirements and functionalism of the device. Additionally, watertight closures shall be watertight when tested under the same pressure and strength requirements specified for the compartment protected by the closure, unless an identical design has been previously accepted.

3.2.2. Prior to Pressurization tests the following in-place tests shall be performed:

3.2.2.1. Controls such as thermostats and humidistats shall be tested to ensure that they function properly upon passing control points. These tests can be conducted by changing control points instead of changing space conditions.

3.2.2.2. All other controls, such as fan motor controllers, heater controllers, manually or electrically operated closures and dampers, CPS pressure control valves (PCV), etc., shall be tested to ensure that they function in accordance with the requirements of Work Item 512.

3.2.3. Unless damage or modifications relating to the control device have occurred, these tests need not be repeated prior to the subsequent testing, if such testing is conducted within six months of the original in-place control test. After six months, retesting shall be required of those controls affecting the test, unless waiver approval is obtained.

3.2.4. Pressurization Tests

3.2.4.1. The caisson shall be brought up to an internal pressure of at least 3.0 inches water gage using the ship's ventilation fans. The Contractor shall prepare the zone for testing with a Contractor devised procedure that will be later used by

caisson's operators for periodic testing using the pressurization fans. This procedure shall be provided in the HVAC System Manual and referenced on the Test Diagram. The Contractor shall demonstrate that the pressure tests can be readily conducted by caisson's operators.

3.2.4.2. The ship's pressurization fans shall be activated throughout this test. All systems shall be aligned in the design condition.

3.2.4.3. The following steps shall be taken (in the sequence presented) until an internal pressure of at least 3.0 inches water gage is developed:

3.2.4.3.1. Secure all weather access openings.

3.2.4.3.2. Gradually throttle all PCVs, until secure.

3.2.4.3.3. Upon achieving and maintaining an internal zone pressure level of at least 3 inches water gage all boundaries of the zone shall be inspected for air leaks and leaks shall be sealed using acceptable Navy ship construction methods.

3.2.5. Zone, Systems, Compartments and Terminals Volumetric Airflow Tests

3.2.5.1. All ventilation system and air conditioning recirculation system testing and balancing shall assure delivery of clean system air quantities to all terminals served by the systems. The procedural outline shall address the following:

3.2.5.1.1. Check-off list of items to be accomplished prior to testing and balancing, with sequence of accomplishment.

3.2.5.1.2. Check-off list of items to be accomplished during testing and balancing, with sequence of accomplishment.

3.2.5.1.3. Proposed methodology of the recording of initial readings and engineering feedback provisions.

3.2.5.1.4. Proposed methodology of the recording of final data and measurements taken.

3.2.5.1.5. Proposed methodology of the recording of problems encountered, with solutions and discussions as applicable.

3.2.5.1.6. Proposed methodology of the recording of balancing device locations (orifices and dampers).

3.2.5.2. Systems shall be clean (cleanliness shall be verified by inspection).

3.2.5.3. All filters shall be clean and in place.

3.2.5.4. Weather accesses shall be closed and PCV's shall be functioning normally as expected in a pressurized mode.

3.2.5.5. Fans and motors shall be checked for proper rotation and speed.

3.2.5.6. Fans shall be operated at high speed.

3.2.5.7. Access to compartments having natural exhaust shall be closed unless the access is the natural supply or exhaust.

3.2.5.8. Heat producing equipment shall be secured.

3.2.6. Testing and balancing shall be conducted under the following conditions:

3.2.6.1. The pressure shall be maintained as close as practical to, but not less than, 2.0 inches water gage, during air sweep air quantity testing and balancing.

3.2.6.2. All system components installed (includes splitters, vaned turns, etc.).

3.2.6.3. Orifice plates may be installed before, or during, system testing and balancing. The locations of all orifice plates in balanced systems shall be recorded, and they shall be fabricated so that upon later dismantling and reinstallation of ducting all orifice plates removed can be reinstalled in their original positions.

3.2.6.4. Systems shall be clean (cleanliness shall be verified by inspection).

3.2.6.5. All filters shall be clean and in place.

3.2.6.6. All normally open closures, dampers and valves shall be open.

3.2.6.7. Weather accesses shall be closed, and all PCVs shall be secured. Natural exhaust may be direct to the weather. Alternate means to accomplish modulation of excess air from the pressurized zone during the tests shall be approved by the Supervisor.

3.2.6.8. Fans and motors shall be checked for proper rotation and speed.

3.2.6.9. Fans shall be operated at high speed.

3.2.6.10. If the system to be tested takes suction from, or discharges into, a duct or plenum chamber common to other systems, the other systems shall be operated at full capacity.

3.2.6.11. Other planned exhaust from the TP zone (such as antenna pressurization air provision) shall be open. If provided with a fan, the fan shall be operating during the tests.

3.2.6.12. Access to compartments having either natural supply or natural exhaust shall be closed unless the access is the natural supply or exhaust.

3.2.6.13. Heat producing equipment shall be secured.

3.2.6.14. Allowable differences between test measured clean system air quantities and design system air quantities are plus +10% and minus 0%.

3.2.6.15. Individual terminals shall be balanced so that the measured quantity of air in cubic feet per minute at each terminal is at least 100% of designed quantity but not more than 110% of designed quantity.

3.2.7. Air condition load operational test

3.2.7.1. After completion of ventilation and air conditioning systems air balancing and completion of CPS zone pressurization test, an operational air conditioning load test shall be conducted at an operational condition and ambient air condition which matches as closely as possible the condition of largest air conditioning load.

3.2.7.2. The air condition load operational test shall:

3.2.7.2.1. Determine the total ship air conditioning load at both the docked and in-place conditions. During this part of the test all electrical, electronic and all other heat producing equipment shall be operating as would be required by the readiness condition chosen. All ventilation and air conditioning systems required for the selected condition shall be operating, compartment lighting on, and the ship spaces manned as close as possible by the number of personnel for the condition selected. All other equipment and ship's systems shall be operating as expected during this condition. The results of this test shall indicate the actual total loads.

3.2.8. Self-contained refrigerating equipment

3.2.8.1. Pressure tests- Where the Contractor has connected refrigerant piping of units, such piping shall be pressure tested to 225 lb/in2 using dry nitrogen with a trace of refrigerant for detection of leaks.

3.2.8.2. Operating tests.- Each unit shall be automatically operated continuously for at least 4 hours under a simulated or induced load while maintaining specified operating temperatures and humidities.

3.2.8.3. Leak testings.- Where the contractor has connected refrigerant piping of units, refrigerant piping and joints shall be tested for leakage with an electronic halide leak detector during operating and pressure tests. Leakage shall be repaired and the system retested until found tight.

3.2.9. Test data - The following data shall be provided for each air conditioning or refrigeration plant:

3.2.9.1. Condition of equipment

3.2.9.2. Parts of the system which were pressure tested, and pressure used for testing.

3.2.9.3. Results of halide leak detection test.

3.2.9.4. Millimeters Mercury absolute pressure at which dehydration was concluded, and the time required to reach this point.

3.2.9.5. Description of equipment used for cleaning.

3.2.9.6. Quantity of refrigerant and oil put into system for the operating charge.

3.2.9.7. Operating and performance test summary

3.2.9.8. The following data, as applicable, shall be logged during the test period:

3.2.9.9. Compressor room temperature, degrees F.

3.2.9.10. Motor speed, r/min.

3.2.9.11. Compressor electrical power inputs - volts, amperes, frequency and kilowatts.

3.2.9.12. Refrigerant suction pressure, lb/in^2.

3.2.9.13. Refrigerant suction temperature, degrees F.

3.2.9.14. Refrigerant discharge pressure, lb/in^2.

3.2.9.15. Refrigerant discharge temperature, degrees F.

3.2.9.16. Refrigerant liquid temperature, degrees F.

3.2.9.17. Weather relative humidity

3.2.9.18. Relative humidity maintained inside the caisson

3.2.9.19. Temperature being maintained in the caisson, degrees F.

3.2.9.20. Condensate discharge rate, gal/min.

3.2.9.21. Weather temperature, degrees F.

3.2.9.22. Compressor oil pressure, lb/in2.

3.2.9.23. Compressor oil level.

3.2.9.24. Where installed instrumentation permits

3.2.9.24.1. Air pressure, lb/in2

3.2.9.24.2. Condenser liquid temperature, degrees F.

3.2.9.24.3. Control settings- Cut-in and cutout settings for all automatic pressure, temperature, and other operating controls. Controls shall be identified with the equipment they operate.

3.3. <u>NOTES</u>:

3.3.1. None

4. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

4.1. None.

ITEM # 095-582
DESCRIPTION: Fittings Testing

SCOPE: Test all hull fittings, padeyes, bitts, chocks and capstans in accordance with the provisions of this specification.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None

   1.2. SUBMITTALS
      1.2.1. None.
      1.2.2.
   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Accomplish a static test, for fittings designed to handle and support weight, equal to the working load indicated on the drawings, unless noted otherwise in these specifications. Hold the load for 10 minutes without damage or permanent deformation of the equipment or supporting structures. In cases where the working load is not specified, the test load will be as specified by the Government. Install test label plates conforming to the requirements of Work Item 602 next to the fitting with the test date, safe working load, and name of activity performing testing. For repetitive items such as ladder rungs, test 10 percent of the fittings. Prior to testing, obtain Government agreement on specific items selected for weight test when testing less than 100 percent of the items.
   2.2. Provide data verifying that all cleats and chocks meet the requirements of Work Item 582. Test one chock and one cleat of each size and type to the loads specified in the drawing at angles of mooring line pull. Attachment welds for all mooring fittings shall be dye penetrant or magnetic particle tested.
   2.3. Provide data verifying that all capstans meet the requirements of Work Item 582. Test one capstan to the static load in Work Item 582.
   2.4. Proof test all permanent pad eyes to 200 percent of design working load. Apply the test load in the plane of the eye for 10 minutes. No allowable damage or permanent distortion to the padeye or supporting structure is acceptable. Install label plates for all permanent padeyes in accordance with Section 507c attached to structure near padeye.

3. OPERATIONAL TEST
   3.1. None

4. NOTES:

   4.1. None

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 095-612
DESCRIPTION: Liferails and Guardrails

SCOPE: Test all Liferails and Guardrails to ensure the proper installation.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None.

   1.2. SUBMITTALS
      1.2.1. None.

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Test a minimum of ten percent of the life rail stanchions by a pull of 200 pounds at the top of the stanchion horizontally, applied outboard perpendicular to the fitting. Hold the test load for 10 minutes without any resulting damage, permanent deformation or distortion on any part of the installation and associated structures.

3. OPERATIONAL TEST
   3.1. No additional information required.

4. NOTES:

   4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 095-622
DESCRIPTION: Ladders, Catwalks and Hinged Ramps

SCOPE: Test all Ladders, Catwalks and Hinged Ramps to ensure the proper installation.

1. GENERAL
   1.1. References:
      1.1.1. None.

   1.2. Submittals:
      1.2.1. None.

   1.3. Quality Assurance
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Ladders: Statically test ladders with a concentrated load of 300 pounds on each tread or step. Hold the load for 10 minutes without any resulting damage, permanent deformation or distortion on any part of the ladder and associated structures.
   2.2. Catwalks: Statically test catwalks with a load of 50psf. Hold the load for 10 minutes without any resulting damage, permanent deformation or distortion on any part of the catwalk and associated structures.
   2.3. Hinged Ramp: Statically test hinged ramps with a load of 50psf. Hold the load for 10 minutes without any resulting damage, permanent deformation or distortion on any part of the hinged ramp and associated structures.

3. OPERATIONAL TEST
   3.1. No additional information required.

4. NOTES:
   4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):
   5.1. None.

ITEM # 095-633
DESCRIPTION: Cathodic Protection Tests

SCOPE: Inspect and test cathodic protection system for proper installation.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. MIL-HDBK-1004
      1.1.2. E-400 and 401; Cathodic Protection
      1.1.3. NACE RP0176

   1.2. SUBMITTALS
      1.2.1. Quality Control Test Certificates for anodes for all heats cast.

   1.3. QUALITY ASSURANCE
      1.3.1. Standard Products: Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.
      1.3.2. Alternative Qualifications. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
      1.3.3. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise
      1.3.4. Factory tests shall be submitted and approved prior to anode shipment.

2. REQUIREMENTS:
   2.1. Inspect all installed anodes for defects such as large casting flaws and to ensure anodes meet the requirements of MIL-HDBK-1004 and are installed in accordance with the drawings and specifications.
   2.2. Verify the location of all installed anodes comply with drawing E-400 and 401, Cathodic Protection.

3. OPERATIONAL TEST
   3.1. Field tests shall be witnessed by the Contracting Officer or his designated representative. Advise the Contracting Officer 5 days prior to performing each field test. Quality control for the cathodic protection system shall consist of the following:
      a. Initial field testing by the contractor upon construction and after the caisson is afloat.
      b. Final field testing by the Contractor after one year of service.
   3.2. Criteria: Potential tests shall be conducted to measure the relative potential between the steel hull and the surrounding seawater in accordance with NACE RP0176.Reference

cells used for the measurement shall be of the Ag-AgCl seawater type with the measured potentials corrected for the actual water resistivity encountered at the time of the tests. It is the Contractor's responsibility to accurately measure the water resistivity prior to performing the tests. Criteria used shall be that cited in NACE RP0176 including the alternative method of using the voltage shift method by comparing the native potentials with the final potentials after the cathodic protection system has been in operation.

3.3. Interior: Perform a native potential test before anodes are installed. Perform potential tests approximately 30 days after anodes have been installed and water levels are normal. Tests shall be taken at the top of the water column, at midpoint to bottom and at six inches above the concrete bottom. All tests shall be on a uniform grid no larger than 25-feet and at locations between anodes. Tests shall be repeated 12 months after the initial test with the interior water at normal levels. Prepare a complete report for submittal to the Contracting Officer and for approval.

3.4. Exterior: Perform a native potential test before anodes are installed. Perform potential tests approximately 30 days after anodes have been installed and water levels are normal. Tests shall be taken at the top of the water column when caisson is sunk to its operating depth, at midpoint to bottom and at its bottom. All tests shall be on a uniform grid no larger than 25-feet and at locations between anodes where the former tests were taken. Tests shall be repeated 12 months after the initial test with the hull positioned at its normal working elevation when all anodes are submersed. Prepare a complete report for submittal to the Contracting Officer and for approval.

4. NOTES:

4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 096
DESCRIPTION: Weight Control

SCOPE: The builder shall maintain a weight control program throughout the pre-fabrication and fabrication process to ensure stability upon launch and delivery.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. S9086-AA-STM-010 Chapter 096 Weights and Stability

   1.2. SUBMITTALS
      1.2.1. Weekly Pre-Fabrication Weight Reports
      1.2.2. Bi-Weekly Fabrication Weight Reports
      1.2.3. Pre-ballast Weight Report
      1.2.4. Dead Weight Survey

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
   2.1. Definitions
      2.1.1. Launch Condition – Caisson 8 is complete in every respect, including sufficient permanent solid ballast in the main and trim ballast tanks to provide minimum stability and any on board repair parts, but without seawater in the ballast tanks or solid ballast used for final adjustment in the main or trim ballast tanks.
      2.1.2. Empty Condition – Caisson 8 is complete and ready for service in every respect, including all permanent solid ballast and any on board repairs parts, but without seawater in the main or trim ballast tanks.
      2.1.3. Light Condition – Caisson 8 is complete and ready for service in every respect, including permanent solid ballast, trim tanks fully ballasted and any onboard repair parts, but without variable load.
      2.1.4. Full Load Condition – Caisson 8 is complete and ready for service in every respect. It is the light condition plus the full loads.
   2.2. General
      2.2.1. Institute a rigorous weight control program, in which actual weights are compared to the designed weights on the Weight Control Tabulations in each section of the drawings.
      2.2.2. Obtain actual weights for installed equipment, either by weighing or from certified data from the manufacturers, and provide best estimates of fabricated components based on actual metal and product quantities used. Submit Weight Control progress reports to the Government on a monthly basis during prefabrication and bi-weekly during assembly of Caisson up until the inclining experiment. Highlight and provide explanation for differences between the designed weights and the record or estimate of actual weight.
      2.2.3. Prepare a Pre-Ballast Weight Report for Government review and approval prior to installation of any concrete ballast. At that time, the Government may modify the amount and/or density of concrete required to correct for weight differences. Conduct a Deadweight Survey, after installation of the concrete and with the caisson afloat, and, on the basis of drafts or freeboards, determine the actual displacement of the caisson. Ensure that the ballast tank, trim tanks and piping are

dry at the time of the deadweight survey. Submit a report detailing the results of the Deadweight Survey to the Government for review and approval within 7 days of caisson launch.

2.2.4. The deadweight survey results will be the basis for selecting placement of concrete ballast in the forward and aft trim tanks to eliminate any trim or list. Base the values of displacement, KG, list and trim on the inclining experiment supplemented by the calculated values to bring Caisson 8 to its full load condition.

2.3. Install permanent ballast per Section 636.

3. OPERATIONAL TEST

3.1. Work Item 095-097 requires the execution of an Inclining Experiment.

4. NOTES:

4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 100
DESCRIPTION: Hull Structure

1. SCOPE: Fabricate the caisson hull structure in accordance with the provisions of this specification.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. Specification Section 00 01 15 Contract Design Drawings
      2.1.2. MIL-STD-1689 Fabrication, Welding and Inspection of Ship's Structure
      2.1.3. ABS Rules for Designing Steel Vessels under 90 Meters in Length
      2.1.4. International Building Code (IBC) Chapter 22, "Steel," 2000
      2.1.5. ASTM E2375 Standard Practice for Ultrasonic Testing of Wrought Products

   2.2. SUBMITTALS
      2.2.1. Submit shop drawings for Government review and approval. Include, but do not limit to, the following information: Erection Plan, including description of temporary supports, fabrication drawings, including description of product data, material specifications, welding, and connection details.
      2.2.2. Submit material certificates for Government review and approval including the following: Steel, bolts, nuts, washers, welding electrodes and rods.
      2.2.3. Submit a final UT report documenting the thicknesses of all structural elements surveyed in paragraph 3.11 documenting the location and recorded thickness at each location.

   2.3. QUALITY ASSURANCE
      2.3.1. See Work Item 070, General Requirements for Construction for further information.
      2.3.2. All welding, fabrication and inspections shall be in accordance with MIL-STD-1689. Deviation from the molded line shall not exceed the fabrication tolerances of Work Item 074.

3. REQUIREMENTS:
   3.1. General
      3.1.1. Provide the Caisson 8 hull structure of all welded construction, reversible and usable in both inner and outer seats. Ensure that Caisson 8 does not exceed the allowable stresses or deflections nor fail from a condition of elastic instability. Install additional local stiffening if necessary to prevent unwanted vibration, panting or springing of the structures.
   3.2. Stresses and Loads
      3.2.1. Design loads are provided on drawing S-001.
      3.2.2. If any changes are made to the structure as shown on the design drawings, ensure the stresses due to the load cases associated with the floating caisson condition conform to the American Bureau of Shipping (ABS) "Rules for Designing Steel Vessels under 90 Meters in Length," with Change Notices #1, #2, #3, and #4. If any changes are made to the structure as shown on the design drawings, ensure the stresses due to the load cases associated with the caisson in the dry dock seat are not be exceeded when corrosion has reduced structural component cross sectional areas by 25 percent.

3.2.3. The Caisson 8 will be designed such that allowable stresses will consider corrosion in addition to the required design thickness of any section using the following guidance:

a. Shell Plating shall be a minimum of 0.5” (12.5 mm) or $t_{req'd}$ + 0.17” (4 mm) whichever is greater.

b. Interior Plating shall be a minimum of 3/8” (9.5 mm) or $t_{req'd}$ + 0.12” (3 mm) whichever is greater.

c. Major Internal Structure shall a minimum of 3/8” (9.5 mm) or $t_{req'd}$ + 0.12” (3 mm) whichever is greater. This thickness applies to both the flange and web of any member including bents, girders, arches, longitudinals and transverses that comprise the primary structure of the caisson.

d. Minor Internal Structure shall be a minimum of 1/4” (6.5 mm) or $t_{req'd}$ + 0.07” (2 mm) whichever is greater. This thickness applies to both the flange and web of any member that does not comprise the primary structure of the caisson such as catwalk supports, foundations and hatch or opening framing

3.3. Structural Arrangement and Details

3.3.1. Provide the structural arrangement and details as indicated on the drawings. Avoid recesses, which would not be readily accessible for cleaning.

3.3.2. Openings: Openings in decks, bulkheads and shell shall have a minimum corner radius of 3 inches unless otherwise noted. Provide openings as indicated on the drawings and free of burrs, nicks, gouges, and sharp edges.

3.3.3. Drain Holes: Cut limber and vent holes in non-tight structures with smooth edges. Provide watercourses to prevent the accumulation and retention of liquids to permit their free flow to drains, scuppers, sumps, and suction pipes. Locate drain holes in non-tight portions of bottom longitudinal and vertical keel, to insure drainage of each bay formed by the longitudinal and transverse framing.

3.3.4. Changes in thickness of plating or scantlings of longitudinal stiffeners and highly stressed transverse members shall be gradual. Changes in plating thickness of more than 0.25 inch shall be tapered at a slope of at least 3 to 1.

3.4. Workmanship

3.4.1. Fabrication: Prevent discontinuities, undercutting, notches, nicks, or other mechanical damage which might initiate stress concentration, propagate cracks or points of weakness. Where members are notched out for frames, beams or other shapes, provide a corner radius not less than 1 inch. Make cut edges smooth.

3.4.2. Align intercostal members on opposite with a limit of error in offset not exceeding one-half the thickness of the continuous member. Where the intercostal member is a structural shape, align both webs and flanges.

3.4.3. Prohibit drilling or punching of flanges of shell, deck and watertight bulkhead stiffeners for attachments of gratings, platforms, foundations, fittings and hangers where they contribute to the structural strength of the hull girder or where they contribute to the strength of the structure affording watertight integrity of the hull. Remove sharp or ragged edges of exposed structures where likely to injure personnel or damage equipment.

3.4.4. Tightness: Insure a watertight seal wherever both ends of wiring trunks or pipe tunnels terminate at transverse watertight bulkheads or decks. Provide and install stuffing tubes, flanged joints or stuffing boxes to insure the tightness of the deck or bulkhead.

3.5. Plating

3.5.1. The plating thicknesses are as shown on the drawings. Prepare a Design Development Drawing of the plating layout. Stagger the plating layout so that the corners of four plates never intersect at a common point, unless otherwise

approved by the Government or as shown on the drawings. Avoid the interference of butts and seams with longitudinal, bulkheads, decks, structural members and fastenings attached to the shell plating wherever practicable. Plating seams shall be 6 inches from decks, bulkheads and stiffeners to the greatest extent possible.

3.6. Hull Framing

3.6.1. The hull framing is shown on the drawings. Modify stiffening and framing in way of foundations from that shown on the drawings in order to support foundations not detailed on the drawings.

3.6.2. Scallop or snipe non-tight transverse frames, web frames and longitudinal in way of through welds in adjoining structure.

3.6.3. Provide a 6-inch minimum clearance between transverse frames and butt welds on plating.

3.7. Longitudinals and Stringers

3.7.1. Install longitudinals located at shell and deck continuous through transverse structure unless indicated otherwise on the drawings

3.7.2. Install longitudinals and stringers normal to shell plating.

3.7.3. Provide a 6-inch minimum clearance between longitudinal and stringers and butt welds on plating.

3.8. Structural Bulkheads: Install the structural bulkheads as indicated on the drawings. Submit proposed revisions or modifications to the Government for approval. Conform to the following requirements for proposed revisions:

3.8.1. Provide structural bulkheads for purposes of watertight subdivision and structural integrity. Butt-weld bulkhead plating.

3.8.2. Fit stiffeners on only one side of a bulkhead and be continuous for the full depth or width of the bulkhead. Install intercostals cross stiffening normal to the main stiffening unless otherwise noted on the drawings.

3.8.3. Locate doors, arches and other openings so that as few stiffeners as practicable are cut, providing reinforcement as required, and ensuring that the efficiency of the bulkhead as a frame is not structurally impaired.

3.8.4. Install attachments to bulkheads for the purpose of supporting local weights to not impair the strength or water tightness of the bulkhead. Install insert, margin plates, special framing and stiffening to distribute local stresses. Make attachments to the special framing and not directly to the bulkhead plating.

3.9. Decks and Platforms

3.9.1. The operations deck (G3) shall be in a level plane normal to the centerline plane. No camber or sheer is required.

3.9.2. The weather deck (G5) shall have camber, but not sheer, as noted on drawings S-031 and S-032.

3.9.3. Ensure the top surface of weather and operation deck plating in way of walking areas is free of tripping hazards.

3.9.4. Provide local inserts or doublers to insure structural integrity.

3.10. Structural Tightness

3.10.1. The definitions and symbols for tightness are as follows:

a. Watertight, Symbol WT – Tightness such that structure is capable of preventing passage of water through the structure in any direction under the static head of water for which it is designed.

b. Fumetight, Symbol FT – Tightness such that there is no visible or discernible opening in the structure.

3.10.2. Ensure all compartments are watertight.

3.11. Ultrasonic Thickness Survey

3.11.1. Conduct an Ultrasonic Thickness Survey of the entire caisson principal structure in accordance with ASTM E2375. The survey shall be conducted after all structural fabrication is complete and prior to the placement of concrete ballast.

3.11.2. All plate members, including shell, bulkheads, decks and keel plating shall be measured on a three foot by three foot grid.

3.11.3. All structural shapes, including tees, wide flanges, flat bars, angles and bulb flats shall be measured every three linear feet.

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4. OPERATIONAL TEST

4.1. Perform structural tightness testing in accordance with Work Item 095-192.

4.2. Perform a deflection test in accordance with Work Item 095-842

5. NOTES:

5.1. None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 180
DESCRIPTION: Foundations

1. SCOPE: This specification applies to foundations for all mechanical, electrical or outfitting equipment.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. None.

   2.2. SUBMITTALS
      2.2.1. Noise Analysis Report
      2.2.2. Foundation Drawings shall be submitted no later than 7 days prior to installation of the foundation.

   2.3. QUALITY ASSURANCE
      2.3.1. All workmanship shall be in accordance with good fabrication practice and shall conform to the fabricator's quality assurance program.
      2.3.2. All welding, fabrication and inspections shall be in accordance with MIL-STD-1689. Deviation from the molded line shall not exceed the fabrication tolerances of Work Item 074.

3. REQUIREMENTS:
   3.1. GENERAL
      3.1.1. Provide the foundation design for the specific equipment installed by the Contractor. Prepare Foundation Drawings for all equipment and apparatus in excess of 50 pounds and submit the designs to the Government for approval. Conform to the following requirements of this section for proposed revisions.
      3.1.2. Provide foundations to transmit loading from the machinery and equipment to the deck supporting members for equipment weighing 50 pounds or more. Install foundations for units of machinery, deck fittings, and other heavy concentrations of weight or force. Ensure the strength and rigidity of foundations withstands the applied loads, such as gravity, inertia forces plus dynamic effects due to operation of the machinery or equipment itself. Consider wind load for machinery and equipment foundations exposed to the weather. Conform to the requirements of Section 100 for foundations.
      3.1.3. Prohibit piping connections to machinery and equipment in consideration as reducing the load to be supported by the foundations.
      3.1.4. Design foundations subjected to cyclically repeated or reversing loads to withstand fatigue.
      3.1.5. The Caisson 8 foundations will be designed such that allowable stresses will consider corrosion in addition to the required design thickness of any section using the following guidance:
         a. Foundations shall be a minimum of 1/4" (6.5 mm) or $t_{req'd}$ + 0.07" (2 mm) whichever is greater. This thickness applies to both the flange and web of any member that does not comprise the primary structure of the caisson such as catwalk supports, foundations and hatch or opening framing.

3.2. Arrangement

3.2.1. Provide continuity of structure so that loads will be evenly distributed into the hull structure. Prevent projecting corners and edges of structure by well rounding or padding to protect personnel.

3.3. Workmanship

3.3.1. Fabrication: Prevent discontinuities, undercutting, notches, nicks, or other mechanical damage which might initiate stress concentration, propagate cracks or points of weakness. Where members are notched out for frames, beams or other shapes, provide a corner radius not less than 1 inch. Make cut edges smooth.

3.3.2. Align intercostal members on opposite with a limit of error in offset not exceeding one-half the thickness of the continuous member. Where the intercostal member is a structural shape, align both webs and flanges.

3.3.3. Prohibit drilling or punching of flanges of shell, deck and watertight bulkhead stiffeners for attachments of gratings, platforms, foundations, fittings and hangers where they contribute to the structural strength of the hull girder or where they contribute to the strength of the structure affording watertight integrity of the hull. Remove sharp or ragged edges of exposed structures where likely to injure personnel or damage equipment.

3.3.4. Cut limber and vent holes in foundations with smooth edges. Provide watercourses to prevent the accumulation and retention of liquids to permit their free flow to drains, scuppers, sumps, and suction pipes.

3.4. Alignment

3.4.1. Align each foundation to support the equipment without distortion of equipment or resilient mounts. Securely attached shims or chocks may be used where necessary to prevent distortion due to bolting equipment to foundations and braces.

3.4.2. Make provision for maintaining the accurate alignment where essential for satisfactory operation of the machinery or equipment.

3.5. Attachment of Equipment to Foundations

3.5.1. Fit coamings, liners, gaskets, bolts, foundation blocks and other material and fastenings for the attachment of the machinery and equipment to foundations.

3.6. Noise, Vibration and Resilient Mountings

3.6.1. The Contractor is cautioned to pay particular attention to the design and construction of the vessel in order to minimize vibration and noise, both structural and airborne.

3.6.2. Prepare and submit a Noise Analysis Report for approval. The airborne I noise acceptable limit is 70dBA. See Section 095-073 for testing requirements.

3.6.3. Locate and correct unsatisfactory vibration conditions arising during tests or trials, or subsequently during the guarantee period, which can be attributed to the design or construction of those elements accomplished by the Contractor.

3.6.4. Resilient Mountings – Resiliently mount the air handling units and condenser units. Provide clearance to prevent the units from striking immediate structures, adjacent fixed or resiliently mounted units or other fixed objects during maximum deflections of the unit.

4. <u>OPERATIONAL TEST</u>

4.1. Conduct load testing in accordance with Work Item 095-180.

4.2. Conduct noise testing in accordance with Work Item 095-073.

5. <u>NOTES</u>:

5.1. None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 320
DESCRIPTION: Electrical Power Systems

1. SCOPE: Install Electrical Power System in accordance with this specification. All power on Caisson 8 is shore power supplied.

2. GENERAL

2.1. REFERENCES:
- 2.1.1. Contract Drawings (See Specification 00 01 15)
- 2.1.2. ABS-Steel Vessel Rules (Part 4)
- 2.1.3. IEEE Standard 45
- 2.1.4. NFPA 70
- 2.1.5. MIL-DTL-24643/6E
- 2.1.6. MIL-STD-1310G
- 2.1.7. DOD-STD-2003-1(NAVY)
- 2.1.8. OPNAVINST 11310.3B
- 2.1.9. Title 46 CFR Subchapter J – Electrical Engineering
- 2.1.10. UL 508
- 2.1.11. UL 489.

2.2. SUBMITTALS
- 2.2.1. Provide equipment and material specifications, catalog cuts, envelope dimensions, and actual weight of the proposed equipment. All equipment and materials specified herein and in other sections of the Electrical Specifications shall be submitted in sufficient detail to allow a review to determine if they are in conformance with these specifications and the intent of the design.

2.3. QUALITY ASSURANCE
- 2.3.1. Regulatory Requirements. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
- 2.3.2. Standard Products Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.
- 2.3.3. Alternative Qualifications. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less

than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

2.3.4. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise

3. REQUIREMENTS:

3.1. Perform all work under this section in accordance with the drawings, Title 46 CFR Subchapter J – Electrical Engineering, IEEE STD 45, and NFPA 70.

3.2. Bond and ground all electrical equipment in accordance with MIL-STD-1310G.

3.3. The entire caisson is considered a “wet location.”

3.4. Provide all wiring, switchboard current carrying parts and transformers and motor windings constructed of copper.

3.5. Provide a watertight connection box installed in each wet location and for those installed as specified in 46 CFR Subchapter J with brass terminal tube to weather or nylon stuffing tube (non-weather) for the cable entrance containing external mounting feet.

3.6. Provide splice boxes in lighting and branch circuit homeruns near their source to avoid having to secure multiple conductors under one terminal. When entering panelboards or relays, or control cabinets, etc.

3.7. Electric Motors and Electrical Equipment: All new motors and associated controllers shall be provided by the mechanical equipment manufacturer (pumps, motor operated valves, HVAC equipment, etc), and manufactured in accordance with this section of the Specifications. Controllers shall be suitable for marine use and meeting all cognizant regulatory body requirements. Each motor controller and protective device shall conform to the National Electrical Code and UL 508, including the marine supplement for marine applications and the following:

3.7.1. Provide integral horsepower motor controllers for motors (requiring remote operators) of the combination type with local push button operators as shown in drawing with an external reset button mounted in the controller door. Provide controllers of the Low Voltage Protection (LVP) and “Soft Start” type for motors 10 horsepower and larger. Controllers shall contain a “red” run indication light and a “green” off indicator light mounted in the controller door. Large motors shall be provided with equipment and circuitry to operate them from a remote location and to provide remote indication of motor operation.

3.7.2. Provide motor overload protection by solid-state overload relays in the motor controller. Size motor overloads in accordance with motor nameplate data and controller manufacturer’s guidelines.

3.7.3. Provide a complete schematic wiring diagram, specific to the application, of each controller (or control panel) inside the controller and protected by a waterproof covering.

3.7.4. Provide each controller with the necessary circuits and auxiliary contacts for energizing indicating lights, alarms, and remote control devices indicated. Provide a minimum of 2 NO and 2 NC contacts.

3.7.5. Terminate all field wiring for pilot devices, indicating lights and/or alarm points at terminal blocks with ring terminal solder-less wire terminations. Use no more than two terminal rings on any one terminal screw.

3.7.6. Motorized gate valve operators and their integrated controllers as shown on the drawings shall be furnished by the valve manufacturer sized and configured to coordinate with the valve actually provided and shall be in accordance with these specifications. Gate valve operators shall include provisions for “open”, “close”

and "stop" operations and shall include equipment and circuitry for remote operation and indication of valve position.

3.7.7. UPS Specifications: Provide UPS equipment that is suitable for and complies with the following:

a. The equipment shall be arranged for a 3-phase, 208/120 Volt, 60 Hertz input and deliver a similar 3-phase output. Voltage Regulation shall be within ± 2% NL to FL; Frequency Regulation shall be within ± 0.5% NL to FL with Harmonic Distortion no more than 5% THD. The equipment shall accommodate loads up to 8.0 kVA with Power Factors between 0.7 lead to 0.7 lag and have an efficiency at full load of 75-80%. All electronic elements shall be conformal coated and be removable for servicing. The equipment shall be suitably designed for reliable service in shock, vibration, high humidity, and EMI environments onboard a military vessel. Operating Temperature of the environment is specified as between -5˚ to +50˚C maximum. Audible Noise shall be less than 55 dbA at 5 ft.

b. The equipment shall include a Low Battery Shut Off; have an Overload and Thermal Protected Input, be Under and Overvoltage Protected, and have an Audible Alarm with Silence Switch. Provide an "Emergency Power Off" trip on the battery circuit breaker by means of a remote switch to disconnect the battery from the UPS circuit when the caisson is intentionally powered down without the need for the UPS supply. The remote switch is to be mounted in the Control Console panel, connected to a 24-V power source, and labeled "UPS Shutdown". The Contractor shall coordinate this provision with the Control Console requirements to result in a workable system.

c. Run time shall be three hours.

d. The UPS batteries shall be mounted in Deep Rack battery drawers and consist of sealed, maintenance-free, user replaceable batteries rated for a 3-5 year lifetime at a 25˚C ambient temperature. Battery cabinets and racks shall be designed to be easily accessible and be thoroughly protected against corrosion from battery chemicals or leakage. Cabinets shall be esthetically compatible with the UPS equipment cabinet.

e. UPS and Battery Cabinets shall be integral with each other, be freestanding, floor mounted with feet or metal channels to support the equipment off of the floor to allow cable entry and cleaning beneath the cabinets. A single stainless steel drip shield shall be provided at the top of the cabinets to prevent any condensation from falling on the equipment. The exterior cabinets shall be steel, coated with a corrosion resisting paint conforming to IEEE C57.12.29 and be of a light grey or tan color. Cabinets shall be suitably ventilated to coordinate with the input and output connections which shall enter through the bottom of the cabinets. Provide insulated and sealed ports to accommodate the incoming and outgoing cables. The UPS and battery cabinets together shall be approximately 44" wide by 31-1/2" deep by 63" high, exclusive of the drip shield.

f. UPS equipment and ancillary equipment shall be the Jupiter Series as manufactured by NOVA ELECTRIC, Bergenfield NJ or an approved equal.

3.7.8. Dry-Type Transformer: General purpose, dry-type, self-cooled, sealed. Provide transformers in NEMA 4X enclosure. Transformer shall have 220 degrees C insulation system with temperature rise not exceeding 80 degrees C under full-rated load in maximum ambient of 40 degrees C. The transformer shall be capable of carrying continuously 130 percent of nameplate kVA without exceeding

insulation rating. Transformers shall be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for the transformer rating indicated

3.8. Protective Devices for Electrical Circuits

3.8.1. Ensure short circuit and over current protection for electric circuits and cabling is in accordance with IEEE Std. 45.

3.8.2. Provide circuit breakers in accordance with IEEE Std. 45 and UL 489.

3.8.3. Energy isolating devices (e.g. Power Switches, Safety Switches, Circuit Breakers, valves, motors, etc. including mechanical devices) shall be provided to protect personnel from the release of hazardous energy. The devices shall be designed and manufactured such that they can be padlocked “on’, or “off” or “open” or “closed” to prevent inadvertent or unauthorized change. All energy isolation devices shall be installed in accordance with 29CFR Part 1910, Subpart J 1910.147 and Subpart R 1910.259.

3.9. Electrical Cable: Provide all electrical power, lighting, alarm and monitoring distribution cable in interior areas and protected exterior areas of MIL-DTL-24643/6E or approved equivalent low smoke cable.

3.9.1. Size all cables as per USCG rules and meeting the recommendations of IEEE STD 45 and ABS-Steel Vessel Rules (Part 4).

3.9.2. Ensure conformance to MIL-DTL-24643/6E for all communication cables in interior areas and protected exterior areas.

3.9.3. Prohibit routing of cables of different voltages together.

3.9.4. Maintain the level of protection associated with the zone penetrated for cable penetrations.

3.9.5. Where cable is to penetrate the weather deck, provide a 6-inch high, schedule 80 kick pipe with stuffing box welded to the deck and sealed after cable installation or as indicated.

3.9.6. Band all cable to the wire way hangers with stainless steel banding.

3.9.7. Provide cable/wire lugs of ABS approved, ring terminal type.

3.10. Electrical Shore-Tie Cable: Provide two sets of shore-tie cable terminated with male and female connectors at opposite ends made up with three individual conductors of the length and size as indicated. Each set of cables shall be Single Conductor (1/c), 500MCM conforming to MIL-C-24643/6E, Type LSSHOF-500 BLK. Each cable shall be supplied with a 316 stainless steel basket weave cable support that will be hooked to the end-edge of the caisson when the cables are in place to accommodate the weight of the cable dropping approximately 50-feet with a safety factor of 2X. Cables shall be as manufactured by General Cable Catalog Number 560850 or an approved equal.

3.10.1. Shore-Tie Connectors: Provide connectors at each end of each 1/c cable. Connectors shall be polarized Industrial Grade, Single Pole In Cam Type UL Rated 690 amperes continuous, 600 Volts AC/DC or as indicated. Connectors to be Cam Lok TPE Rubber per OPNAVINST 11310.3B. Leviton Series 22 or similar by Crouse-Hinds; other than these, no other type or manufacturer will be approved as a substitute. Provide additional three male connectors at each shore-tie station on the caisson as described elsewhere in this Specification. Color code phases to match existing connectors on shore station.

3.11. Caisson Shore-Tie Station: Provide a Shore-Tie Station at each end of the caisson located as indicated and shall not be less than three feet tall and width and depth as indicated. The station shall house three, single pole male receptacles with caps of the type specified above with the ends point downward to avoid the collection of rain, water and dirt. The receptacles are to be located near the top of the assembly. The phase rotation of the two shore tie sources shall be the same as measured at the Main Panel. Enclosure shall be UL 50 listed, type 3R, fabricated entirely of ASTM A 167

type 304 or 304L stainless steel. All interior and exterior covers and doors shall be minimum 12 gauge stainless steel sheets. Unit shall have fixed top and open bottom. Side covers shall be bolt-on and removable. Rear covers shall be hinged. Optional doors shall have full height continuous hinge and door stop to allow door to be secured open at 90 degrees. Paint enclosure ASTM D 1535 light grey No. 61. Paint coating system shall comply with NEMA C57.12.29.

3.12. Provide a heavy duty, stainless steel, single eye, split mesh and lace closing support grip for the caisson end of each single conductor shore-tie cable. The grip shall accommodate the O.D. of the cable actually installed. Contractor shall fasten the support grip to the cable with a Punch-Lok band or stainless steel clamp to prevent the grip from shifting position on the cable when tension is removed. The cable grip should be positioned such that it can be easily anchored by one person while another is pulling and supporting the entire weight of the vertical cable which is suspended over the roller. The stainless steel eye must have sufficient slack to allow one person to fasten it to the anchor without requiring assistance (like shifting the cable position) from the person holding the cable. When the grip is anchored and the cable is released it should lay on deck with no tension and with sufficient slack that it can be easily plugged into the shore-tie receptacle by one person.

3.13. The Manual Transfer equipment shall mechanically prevent the paralleling of shore power. The normal mode of operation will be for one shore power inlet to serve the entire caisson. The transfer equipment shall be configured to allow both circuit breakers to be turned off and locked out for maintenance.

3.14. Electrical Designation and Marking

3.14.1. Tag all power and lighting cable with its unique circuit designation using embossed aluminum tags on each side of a penetration, into and out of connection boxes and/or equipment.

3.14.2. Identify all low voltage systems cabling with floaters into and out of connection boxes and/or equipment. Include the unique circuit designation, keyed to a drawing or an owner approved nomenclature, on the tag.

3.14.3. Provide panel schedules in electrical panels showing circuit designations, description of equipment controlled and rating of circuit breaker elements and connected loads. Neatly type and laminate schedules.

4. <u>OPERATIONAL TEST</u>

4.1. Perform in accordance with Section WI-095-.20.

5. <u>NOTES:</u>

5.1. None

6. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

6.1. None.

ITEM # 330
DESCRIPTION: Lighting Systems

SCOPE: Install Lighting System in accordance with this specification.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. Drawing E-100 Single Line Diagram
      1.1.2. Drawing E-300 Lighting System Arrangement
      1.1.3. ABS Rules Part 4, Chapter 6, Section 2,

   1.2. SUBMITTALS
      1.2.1. Provide equipment and material specifications, catalog cuts, envelope dimensions, and actual weight of the proposed equipment. All equipment and materials specified herein and in other sections of the Electrical Specifications shall be submitted in sufficient detail to allow a review to determine if they are in conformance with these specifications and the intent of the design.
   1.3. QUALITY ASSURANCE
      1.3.1. Regulatory Requirements. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
      1.3.2. Standard Products Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.
      1.3.3. Alternative Qualifications. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
      1.3.4. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise

2. REQUIREMENTS:
   2.1. Install lighting system on the operational deck and weather deck as shown on Drawing E-300. All lighting fixtures shall conform to ABS rules.
      2.1.1. Provide edge-of-deck lights on the Weather Deck as indicated and complying with the following specifications. Contractor shall provide a metal box enclosure for each weather deck lighting fixture. The box shall be sized by the Contractor to accommodate the deck penetration “stuffing tube”, fixture cable and housing of the

fixture actually installed. It shall be made of cast iron, hot dip galvanized, with an "outside" flange cover and minimum ¼" wall thickness. The cover will not be used and the outside flange will allow the box to be bolted face down, directly to the steel weather deck. Provide a gasket to make a water-tight seal between the box flange and the deck surface. Use stainless steel bolts and washers to secure the box to the deck. As the box bottom will serve as the top of the housing it shall be a smooth surface (not ribbed) to allow for water runoff. All outside edges and corners of box shall be ground down to provide a ¼" radius. These areas shall be coated with a zinc-rich primer and coated to match the color and type of the main deck appurtenances.

2.1.2. A rectangular cut-out shall be made in one side of the cast box to contain the fixture and shall be oriented toward the main deck of the caisson. The size of the opening shall be coordinated with the dimensions of the fixture actually installed. The flange of the fixture housing shall be fastened directly to the cast box with stainless steel screws and washers. A gasket shall be provided for a watertight seal. The fixture housing and outside flange shall be stainless steel with all stainless steel hardware. The face plate shall be plain frosted glass with no louvers in front. Lamp shall be 32W compact fluorescent. Fixture shall be by Pauluhn Cat# F816AS32L or engineer approved equal.

2.1.3. Lighting circuit shall be spliced in a junction box below deck. Cable shall be routed up to the fixture and terminated inside the fixture housing as directed by manufacturer. Sufficient cable shall be provided in cast box to allow removal of the fixture for easy maintenance or replacement. Stuffing tube shall be provided in accordance with "Typical Watertight Penetration" detail shown on drawings. Extend top of tube a minimum of two inches above steel deck. If higher than two inches Contractor shall allow sufficient space to top of cast box for the minimum bend radius of cable. Position tube so as not to interfere with back side of fixture housing.

2.1.4. Contractor shall provide a detailed shop drawing of all parts described above with dimensions and equipment clearly called out.

2.1.5. Install switching and control for lighting systems as indicated on the drawings and as further described below.

2.1.6. Install indicated fluorescent fixtures with UPS operated lighting circuits derived from the Emergency Panel as shown on the drawings.

2.1.7. Comply with NEMA WD-6 for general-purpose 120-volt AC receptacles, and be installed at 50-foot maximum intervals on perimeter of the Operating Deck. Install one receptacle located near the access enclosure as shown on the drawings on the weather deck. Install a fourplex receptacle behind the Control Console for small tools. Provide duplex type, weather proof and GFI protected receptacles.

2.2. Lighting Controls: General lighting throughout the caisson shall be controlled as follows:

2.2.1. Operations Deck: Both the emergency and the normal lights shall be controlled from a common Lighting Control Relay (LCR) with a suitable number of contacts and terminals to accommodate all circuits. The LCR shall in turn be controlled by two three-way wall switches mounted at a convenient location just below the weather deck entrance to the ladderway. One switch will be located at the north end and the other at the south end of the caisson. Either switch will turn all of the lights on or off each time either switch is operated.

2.2.2. Level G4 Deck, Catwalk: All catwalk emergency and normal lighting circuits shall be turned on and off by the wall switch controls described above. At the operation

of either the north or south switch, all of the catwalk lights will be energized from the same LCR as the Operations Deck.

2.2.3. Weather Deck: Both the emergency and the normal lights on the Weather Deck shall be controlled from a common Lighting Control Relay (LCR) with a suitable number of terminals to accommodate all circuits. The LCR shall in turn be controlled by two Photo Cells, each in series with the other in order that both must be activated by a lowering light level. In addition, a manual hand-off-automatic (H-O-A) switch located on the Main Control Console shall be provided to override the photocells or lock out the LCR to prevent the Weather Deck lights from being turned on.

2.2.4. Dog house: Provide one exterior door light above or alongside each dog house entry controlled by an integral photocell. Provide a second light within the Dog house directed down the ladderway controlled by a wall switch just inside the doorway. Both lights will be served by a portable cord and plug that will be plugged into an unswitched receptacle located just below the hatchway so that when the Dog house is removed, the electrical connection can be unplugged. The unswitched receptacle is to be connected to an emergency circuit. No further controls are required for these two lights at each Dog house.

2.3. Install battle lanterns conforming to Mil-F-16377 in each dog house at the Weather Deck level immediately inside of the watertight door and one battle lantern on the operations deck in vicinity of the operations console.

3. <u>OPERATIONAL TEST</u>

3.1. Refer to Work Item 095-330 for lighting system test requirements.

4. <u>NOTES:</u>

4.1. None

5. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

5.1. None.

ITEM # 436
DESCRIPTION: Fire and Flooding Alarm System

1. SCOPE: Install Fire and Flooding Alarm Systems in accordance with this specification.

2. GENERAL

2.1. REFERENCES:
2.1.1. E-800 Fire and Flooding Notes, Legend & Abbreviations
2.1.2. E-801 Fire and Flooding BOM
2.1.3. E-802 Fire and Flooding System Diagram
2.1.4. E-803 Fire and Flooding System Layout
2.1.5. E-700 Tank Level Indicators, Notes and Legend
2.1.6. E-701 Tank Level Indicators BOM
2.1.7. E-702 Tank Level Indicators System Diagram
2.1.8. E-703 Tank Level Indicators System Layout
2.1.9. E-606 Control Panel Single Line Diagram
2.1.10. E-607 Control Panel Elevation

2.2. SUBMITTALS
1.2.1 Provide equipment and material specifications, catalog cuts, envelope dimensions, and actual weight of the proposed equipment. All equipment and materials specified herein and in other sections of the Electrical Specifications shall be submitted in sufficient detail to allow a review to determine if they are in conformance with these specifications and the intent of the design.

2.3. QUALITY ASSURANCE
2.3.1. Regulatory Requirements. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
2.3.2. Standard Products Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.
2.3.3. Alternative Qualifications. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

2.3.4. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

3. REQUIREMENTS:

3.1. Install a Fire and Flooding Alarm systems in accordance with drawings E-800, E-801, E-802 and E-803.

3.1.1. An approved fire detection system shall be installed to monitor all areas of the Operations Deck.

3.1.2. The fire detection system shall be of a type and manufacture commonly used and approved for use in the marine environments. Provide the fire alarm with a stand-alone panel meeting the requirements of 46 CFR 113.10.

3.1.3. The fire detection system shall be an analog addressable type and consist of a central alarm operator panel, four (4) heat detectors, four (4) smoke detectors, and audible and visual (red rotating beacon) alarms located on both the panel and on the weather deck to signal the presence or indication of fire. Smoke detectors shall be of the combination ionization and IR type.

3.1.4. The fire Alarm System shall be designed to be activated by heat or smoke detectors located on the Operations Deck with visual and audible alarms. Type and spacing of the detectors shall be in accordance with recommendations from the manufacturer/ vendor and shall take into account ventilation systems and other relevant factors.

3.1.5. Provide 120-volt AC for the alarm and warning systems derived from the Emergency Panel.

3.1.6. Common cabling and terminal boxes may be used for alarm systems.

3.1.7. Interconnect the Fire alarm system to the Ventilation Control System (see Section 512), such that in case fire alarm is activated, the UV trip shall disconnect power to the air handling units from Power Panel PP-3.

3.2. Install a Flooding Alarm system for the Tank Level Indication, integrated with the Main control panel as indicated on the reference drawings and as further specified in WI-437.

3.2.1. An approved Bubbler type liquid level measurement system shall be installed to monitor the liquid levels in each of the three (3) tanks (Trim Tank Aft, Trim Tank Forward and Main Ballast Tank).

3.2.2. Each compact bubble level system sensor shall be provided with a process control unit, power supply, battery, three relay contacts for interfacing with the Alarm System and an LCD display.

3.2.3. Each compact bubble system sensor shall be programmed and configured for each of the tanks, with alarm triggers at the following different set points:

a. High Level
b. Low Level (pump looses suction)
c. Tank Low Level (loss of adequate seating pressure on caisson seal)

3.2.4. The tank level system alarms shall be displayed in the main control console alarm panel.

3.2.5. Provide the Flooding Alarm System with an audible signal and visual amber and blue rotating beacons, actuated at high level and low level respectively, on weather deck.

3.2.6. System installation shall follow manufacturer’s instructions, with particular attention when installing the bubbler chambers in the tanks.

3.3. Provide a Deck Flooding Alarm System capable of monitoring the Operations Deck for flooding with a visual and audible alarm located on the Main Control Panel.

2.3.1 Provide two (2) GEM liquid sensors to be installed on the operations deck, one starboard forward and the other port aft.

2.3.2 Provide 24VDC power supply for the deck liquid sensors.

2.3.3 Provide a relay per sensor to interface with the Alarm system

2.3.4 Sensors shall be installed following manufacturer's instructions.

4. OPERATIONAL TEST

4.1. Test the alarm systems in accordance with Sections 095-436 and 095-437.

5. NOTES:

5.1. None

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 437
DESCRIPTION: Indicating and Metering Systems

SCOPE: Install a ballast control system in accordance with this specification.

1. GENERAL
   1.1. REFERENCES:
      1.1.1 E-600 Ballast System Notes Legend and Abbreviations
      1.1.2 E-601 Ballast System Electrical BOM
      1.1.3 E-602 Ballast System Electrical - Single Line Diagram 1 of 2
      1.1.4 E-603 Ballast System Electrical - Single Line Diagram 2 of 2
      1.1.5 E-604 Control Panel Notes Legend and Abbreviations
      1.1.6 E-605 Control Panel Bill of Materials
      1.1.7 E-606 Control Panel Single Line Diagram
      1.1.8 E-607 Control Panel Elevation

   1.2. SUBMITTALS
      1.2.1 Provide equipment and material specifications, catalog cuts, envelope dimensions, and actual weight of the proposed equipment. All equipment and materials specified herein and in other sections of the Electrical Specifications shall be submitted in sufficient detail to allow a review to determine if they are in conformance with these specifications and the intent of the design.

   1.3. QUALITY ASSURANCE
      1.3.1 Regulatory Requirements. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
      1.3.2 Standard Products Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.
      1.3.3 Alternative Qualifications. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
      1.34. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise

2. REQUIREMENTS:

2.1. Install a ballast control system in accordance with drawings E-600 TO E-607.

2.2. Provide a control panel with control and instrumentation on the operations deck of Caisson 8 that is freestanding, Uni-Strut mounted, and having a NEMA 12 gasketed enclosure. Ensure the housing is constructed of not less than 12-gauge sheet steel, rigidly braced with structural steel members with continuous hinged, gasketed front panel. Prime the inside and outside of cabinet and paint the cabinet with one coat of lacquer on the inside and two coats of lacquer on the outside. Interconnect the control panel components and wire through separate wireways and channels (one for power and control, and one for analog signals) to the pump motor starter panels and valve actuator components. Provide a Mimic Panel as shown on Drawing No. E-607.

2.3. Pump controller/starters

2.3.1 The two (2) 70 HP Main Ballast Tank pumps shall be controlled via their respective starters, located in the vicinity of each of the pumps.

2.3.2 The two (2) trim tanks 50.0 HP pump motors shall be controlled via their respective starters, located in the vicinity of each pump.

2.3.3 Each pump motor shall be provided with space heaters, interlocked and fed from the corresponding pump motor controller 120VAC control power.

2.3.4 Each pump motor controller shall be of reduced voltage starting, non reversing, low voltage protection, with start/stop pushbuttons and both a red (run) and green (stop) indication lights.

2.3.5 Remote pump control and indication components shall be provided and installed in the control console panel and shall include:

a. Start/Stop Pushbuttons
b. Pump Run/Stopped Indication Light.
c. Motor Current Ammeter

2.3.6 Each of the pumps shall be interlocked with its respective discharge valve actuator, such that the pump cannot be started unless the valve is in the open position.

2.4. Valve Controls and Instrumentation

2.4.1 Valve Controls and Instruments for operation and indication of the valves shall be provided at the Control Console

2.4.2 Valve control and indication at the Control Console shall include:

a. Open/Stop/Close Control Pushbuttons.
b. Open/Close Position Indication Light.
c. Position Indication (via feedback transmitter), sized 2-1/2 inches E square; each graduated in 10 percent increments with an accuracy of not less than 2 percent and an input current of 4-20mA, with a 90-degree scale.

2.4.3 Valve control actuators close limit switch is to provide an inhibit interlock to prevent its associated de-watering pump from starting if the valve is closed.

2.5. Trim and List Inclinometer

2.5.1 Install bubble-type trim and list inclinometer mounted above the Control Panel, conforming to commercial item description A-A-59308. The trim inclinometer is to be a Type I with Class “A” tube; the list inclinometer is to be a Type II with Class “A” tube. Mount the inclinometers at right angles (90 degrees) to each other, square to the baseline and easily readable from in front of the Control Panel

2.6. Terminal Block:

2.6.1 Wire the control panel with terminal blocks provided for external control and Instrument wire connections. Provide terminal blocks of standard design with pressure-type connectors and provided with 25 percent spares. Identify each terminal and group of terminals to correspond to the control switch or instrument that it serves. Provide din rail mounted terminal blocks accessible from the front and UL listed.

2.6.2 Small Wiring: Provide control and other wiring inside the control panel from terminal blocks to equipment of stranded type SIS wire not less than 16 AWG.

2.6.3 Nameplates: Provide a nameplate identifying each instrument and control immediately above each item on the control console panel. Provide a nameplate for each item of auxiliary equipment mounted inside the console constructed of laminated phenolic compound suitably molded, with white engraved letters showing against a smooth dull background (type size minimum 14 pt).

2.7. Tank Level Indicating System: Provide a Tank Level Indicating system to monitor the main ballast tank and the two trim tanks, accurate to within 0.5 percent of actual levels or better and having the following requirements:

2.7.1 Provide the Tank Level Indicating system for the main ballast and trim tanks of the bubbler type. Test tank level indicators in accordance with Section 095-437.

2.7.2 Level Indicators: The requirements for the Tank Level Indicating System are as follows:

a. Locate tank level indicator readouts in the Control Panel as shown on E-607.

b. Install tank level indicators capable of operating in the depth range of zero to 35 feet to read from concrete level to the Operations Deck level.

c. Provide digital read out type indicators.

d. Insure the digital process indicators are continuous reading with 3 internal alarm relay field sets for High Level/Flooding, Low Level and Tank Low Level.

e. High Level/Flooding will alarm when ballast water level reaches a set distance from the tank top; Low Level will alarm when water level approaches a depth where pump suction is about to be lost; and Tank Low Level will alarm when water level approaches a point where adequate seating pressure on the caisson seal will be lost. Alarm levels shall be set up following equipment manufacturer's instructions and Caisson stability calculations. Alarms are further specified in Section WI-436

f. Install bubbler chamber per manufacturer's instruction manual.

g. Provide for suitable accessibility for the indicator units.

3. <u>OPERATIONAL TEST</u>

3.1. Test the alarm systems in accordance with Sections 095-437.

4. <u>NOTES</u>:

4.1. None

5. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

5.1. None.

ITEM # 505
DESCRIPTION: Pumps and Piping Systems

1. SCOPE: Install Pumps and Piping Systems in accordance with this specification.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. ABS Rules for Building and Classing Steel Vessels Under 90 Meters in Length.
      2.1.2. MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture
      2.1.3. MSS SP-69 Pipe Hangers and Supports - Selection and Application
      2.1.4. MIL-STD-769 Thermal Insulation Requirements for Machinery and Piping
      2.1.5. ASME B36.19M Stainless Steel Pipe
      2.1.6. ASTM A403 Standard Specification for Wrought Austenitic Stainless Steel Fittings
      2.1.7. ASME B16.5 Standard for Pipe Flanges and Flanged Fittings, NPS ½ Through 24
      2.1.8. ASTM F594 Standard Specification for Stainless Steel Nuts
      2.1.9. ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
      2.1.10. ASME B16.47 Large Diameter Steel Flanges: NPS 26 Through NPS 60

   2.2. SUBMITTALS
      2.2.1. Manufacturer's Information Sheets, Certifications, and Data Sheets

   2.3. QUALITY ASSURANCE
      2.3.1. tbd

3. REQUIREMENTS:
   3.1. Pumps
      3.1.1. Provide pumps designed for maximum efficiency under normal operating conditions and having non-overloading horsepower characteristics, Hydraulic Institute designation S, complete with suction bells and below deck discharge elbows as indicated. Pump characteristics are as follows: Single-stage with extended enclosed shafting, intermediate steady bearings, columns, and sole plates for metal-to-metal assembly. Vertical mounted, motor driven, axial-flow type. The pump base plate and deck seal designed for a maximum pressure of 10 psi. Discharge nozzles of standard design with flanged ends faced and drilled to ANSI B16.5 150 class standard, sized to match the piping indicated. Insure overall dimensions are such that the pump is capable of being removed through the operations deck and weather deck hatches and fit within the tank structure.
      3.1.2. Pumps shall be balanced dynamically and be equipped with thrust bearings to absorb any primary or residual thrust that may occur during operation or when the pump loses suction.
      3.1.3. Vertical motor driven units shall carry the thrust load and the entire weight of all moving parts by a thrust bearing located in the hollow shaft as described below. Pumps shall be equipped with sleeve type bearings contained in the housing and removable as a unit with the pump shaft. Sleeve type bearings shall use grease lubrication only.
      3.1.4. The fluid in which the pumps will be submerged and/or which they will transfer is seawater. The total heads stated herein are based on seawater at a specific gravity of 1.013.

3.1.5. Pump columns and elbows below the operating deck level shall be coated inside and outside as specified in Work Item 631. Pump equipment located above the operations deck, including the motor shall be painted as specified for interior structures above the operations deck.

3.1.6. The lineshaft enclosing tube shall be extra heavy steel designed to support the lineshaft bearings and prevent leakage of lubrication being pumped into the lineshaft assembly. All lineshaft sleeve bearings shall be bronze and removable. The design shall be such that no damage will occur in the event of reversed rotation caused by backflow through the pump.

3.1.7. Each impeller shall be of 316L stainless steel, fabricated, finished all over to a smooth surface, correct in shape and contour. Means shall be provided for locking the impeller to the shaft in such a manner as to prevent damage from reverse rotation or provided with a self release coupling.

3.1.8. Pumps shall have suction side strainers of type 316L stainless steel. Strainers shall be removable for cleaning using studs and self-locking nuts with anti-seize compound compatible with sea water. The strainer plates shall be free of all burrs and sharp edges and have a total free area of at least 3 times the pump suction.

3.1.9. The pump bowls shall be of Cor-Ten steel ASTM A-242 or 316L stainless steel. Pump shafts and line shafts shall be 316L stainless steel. All column bolts and nuts shall be 316L stainless steel.

3.1.10. Waterproof, pressure grease lubrication to the lineshaft and suction bowl shall be provided. Grease fittings shall be above the operations deck with stainless steel tubes extended to the bearings.

3.1.11. Pump Motors shall be:

a. Provided with the pump
b. Provided by the pump manufacturer
c. Continuous duty, drip proof, squirrel cage type conforming to NEMA MG1
d. Wound for three phase, 60 Hertz, 460 Volt power.
e. Sized to provide no overload at any point on the pump curve
f. Connected to the pump lineshaft through a hollow motor shaft with a vertical thrust bearing within the motor and with provision for vertical shaft adjustment. Adjustment shall be above the motor by a non-reverse ratchet or self-release coupling.

3.1.12. Trim tank pumps shall be sized to allow the deballasting of the trim tanks within 60 minutes.

3.1.13. Main tank pumps shall be sized to allow the deballasting of the main tanks within 20 minutes, with both main tank pumps operating concurrently.

3.2. Piping Systems

3.2.1. Provide each piping system complete with valves, fittings and pipe leads as required to complete the respective installation.

3.2.2. Piping and fittings over 1 inch nominal pipe size shall use welded or flanged connections. Piping and fittings of 1 inch nominal pipe size and less may use NPT threaded connections unless otherwise indicated on the drawings. Threaded connections shall be sealed with PTFE tape conforming to A-A-58092.

3.2.3. Flood through tubes shown on the drawings are for information only and are not to be installed on this contract. Nothing installed on this contract shall interfere with the future installation of these flood-though tubes, valves, and valve operators.

3.2.4. Unless otherwise specified, pipe shall be Schedule 80 ASTM A106 Grade B or A53 Grade B Type S between hull terminations and the first valve; Schedule 40 at all other locations unless otherwise indicated on the drawings. Piping 20 inch NPS and larger may be AP15L.

3.2.5. Tank vent piping shall be seamless SAE Grade 316L stainless steel, conforming to ASME B36.19M. Associated fittings shall be SAE Grade 316L and shall conform to ASTM A403. Flanges shall be SAE Grade 316L and shall conform to ASME B16.5.

3.2.6. Washdown pumpout piping shall be seamless SAE Grade 316L stainless steel, conforming to ASME B36.19M. Associated fittings shall be SAE Grade 316L and shall conform to ASTM A403. Flanges shall be SAE Grade 316L and shall conform to ASME B16.5.

3.2.7. Piping shall not be routed above pumps in such a manner that would impede their removal.

3.2.8. Slip on flanges shall be AWWA steel ring class B sized to match piping or valves indicated. Weld neck flanges shall be ANSI Class 150.

3.2.9. Ballasting pipes, de-ballasting pipes, flood through pipes, and crossover pipes shall be configured so that a blind flange may be attached to their ends.

3.2.10. Butt weld fittings shall be ASTM A234 grade WPB.

3.2.11. All gaskets shall be AWWA C111 full face rubber cloth inserts.

3.2.12. Install piping with a minimum number of bends and with sufficient joints to facilitate removal of piping system components. Provide protection to all piping subject to mechanical injury. Make provisions for complete draining of piping systems.

3.2.13. Install pipe hangers and supports as required. Pipe hangers and supports shall meet the requirements of MSS SP-69 and MSS SP-58.

3.2.14. Except as otherwise stated, valves assemblies shall be ductile iron butterfly valves with aluminum bronze trim and 460 Volt, 3 phase modulating electric actuator, deck stand, and reach rod components.

3.2.15. Butterfly valves shall be flanged ductile iron A536 or A395 with bronze or aluminum bronze trim. Bronze shall contain no more than 6 percent zinc, if any.

3.2.16. Butterfly valves shall be resilient type, be bi-directional and shall be of the wafer type.

3.2.17. Angle valves shall be of stainless steel or bronze with stainless steel components.

3.2.18. Ball valves of 1” nominal size shall be of bronze or stainless steel construction.

3.2.19. All valves shall be suitable for salt water immersion.

3.2.20. Valve bolts, studs, and nuts shall be 316L stainless steel.

3.2.21. Valve dimensions shall conform to ANSI B16.10.

3.2.22. Valve actuators shall be driven by reversible, high torque electric motors through a reduction gear consisting of high quality heat treated steel and/or gear bronzes.

3.2.23. Actuator motors shall be IP 67 construction, high torque, squirrel cage, reversible type with moisture proof windings designed for 460 Volt, three phase, 60 Hertz supply. The actuator and motors shall be sized using a 1.25 service factor to open or close the valve at rated pressure when the voltage is plus or minus ten Volts throughout. The motor have a minimum duty cycle of 15 minutes per hour. Full travel limit switches shall be provided to stop motion in both open and closed positions. A torque limiting device or control shall be provided which will prevent damage to equipment by disconnecting the source of power if a valve should be obstructed in either the open or close direction of travel or if the limit switches fail to function.

3.2.24. Actuators shall operate the valve through valve stem extensions and flexible couplings. Where valve stem extensions pass through lower support bearings the journal areas shall be free of tool marks and polished. Do not paint machined surfaces.

3.2.25. Flexible couplings shall be flex-jaw type with stainless steel hubs. Spider material shall be bronze or other material suitable for continuous sea water immersion and intermittent operation at maximum operating RPM, at rated torque, without lubrication.

3.2.26. Each valve operator shall be provided with an integral controller. Each controller shall be of the reversing duty type, completely internally wired, enclosed in a cast metal, NEMA 4 enclosure conforming to NEMA ISC-6. Each controller shall be equipped with switches, buttons, and indicator lights to allow for local or remote operation.

3.2.27. Each motorized valve operator shall be equipped with a manual operating wheel such that the valve can be operated by one person. Manual operating wheels shall be constructed of steel and have a maximum possible seating force at the rim of 80 pounds for the standard size. Manual operating wheels shall be automatically de-clutched so as to not rotate during powered operation. The rotational axes of the manual operating wheels shall be located 32” to 42” above the operations deck and the rotation of the manual operating wheels shall be in the vertical plane. Manual operating wheels shall operate such that the valves closes when the wheel turns in the clockwise direction when facing the wheel, and such that the valve opens when the wheel turns in the counter-clockwise direction when facing the wheel.

3.2.28. Each valve operator shall have a cast iron gear housing.

3.2.29. Each valve operator shall include a mechanical type valve position indicator.

3.2.30. Each valve operator shall have outputs for providing valve position remotely.

3.2.31. Ensure all butterfly valves on intake pipes have sufficient flow coefficients so that when they are open to a 45 degree angle, the tanks will still be filled within the required time frames. (20 minutes for main tank and 60 minutes for trim tank)

3.2.32. Check valves over 1” nominal size shall be flanged ductile iron ASTM A395 or ASTM D2000BG, BUNA-N flexible disc hinge for non-lubricated service. Check valve bodies shall have flow area equal to normal pipe diameter at all points with a full size bolted top access port allowing disc replacement without removing the valve from the line. All check valves shall be rated for at leas 50 psig salt water working pressure, ANSI B16.5 class 150 standard. All valves shall be suitable for salt water immersion. Check valves 1” nominal size or less may be bronze and may be threaded to NPT standards.

3.2.33. Install all pumps, piping, valves and other equipment and appurtenances in strict conformance with the manufacturer’s recommendations. Do not subject pumps to springing or strain from connecting piping. Provide all necessary support, whether indicated or not. Insure all concrete support used is fully cured before being loaded. Seal piping and valve stems passing through watertight decks or the hull of Caisson 8.

3.2.34. Thoroughly clean all piping prior to installation and maintain cleanliness throughout construction.

3.2.35. Provide all piping on Caisson 8 with the same protective coating system as the hull.

3.2.36. Conform to the requirements for Group II Piping per ABS Section 2-4-2 for welding, fabrication, quality control and testing of seawater piping, as defined for vessels built per ABS Rules for Building and Classing Steel Vessels Under 90 Meters in Length.

3.2.37. Dripless seals are face seal type consisting of lapped carbon/graphite against a stainless steel rotor, and preloaded by a reinforced bellows to seal against 4 psig when loaded dry at 40 RPM or less.

3.3. Materials

3.3.1. Install pipe, flanges, valves, cover plates, pipe supports and threaded fasteners as shown in the drawings.

3.3.2. Provide weld filler material per ABS Rules for Building and Classing Steel Vessels Under 90 Meter Part 2, Chapter 4, Section 3/3, unless otherwise indicated.

3.4. Remote Valve Actuators

3.4.1. Operate all butterfly valves with motorized remote valve actuators via fabricated valve stem extensions and flexible couplings as shown in the drawings.

3.5. System Cleaning

3.5.1. Clean all piping, piping appurtenances, and applicable equipment after fabrication and prior to installation to remove loose particles, grease, dirt and oil. After complete installation, clean and flush each system of foreign matter with the applicable system's medium, including dead-ended portions of system piping.

3.5.2. Flush and maintain clean all piping systems until caisson delivery.

3.6. Air Escapes (Vents)

3.6.1. Fit the main ballast tank with one 8" vent pipe per the drawings. Top these vents with an inverted end-of-line air cap with a ball float to prevent the back flow of water through the vent. Screens are required on vent pipes.

3.6.2. Fit the trim ballast tank one 3" vent pipe each per the drawings. Top these vents with an inverted end-of-line air cap with a ball float to prevent the back flow of water through the vent. Screens are required on vent pipes.

3.7. Weather Deck Drains

3.7.1. Provide Weather Deck drains to prevent pocketing of water by structure or foundations of deck equipment. Drain water overboard through scuppers in the Weather Deck toe rail.

3.8. Machinery and Piping Designation and Marking

3.8.1. Label and Information Plates: Provide identification, information, operating instruction and safety instruction plates for all machinery, piping, hull fittings, and equipment in accordance with Section 602. Attach label plates to valves or adjacent to the valves in accordance with ASTM F992. Install label plates, in locations exposed to the weather, constructed of CRES and prepared by the "Metal-Photo" process, Fed. Spec. GG-P-455. Manufacture and install interior label plates of aluminum or plastic material.

a. Installation – Locate label plates to assure maximum visibility. Attach label plates with CRES screws or adhesive. Prepare surfaces, where adhesive is used, in accordance with the adhesive manufacturer's instructions. Seal label plates, installed in locations exposed to the weather or areas exposed to seawater to exclude moisture between the plate and the mounting surface.

3.8.2. Piping System Identification: Stencil piping identification with block lettering, sized to a minimum height of half the nominal pipe size, except that where pipe sizes are too small. Install label plates on smaller piping and secure in place. Provide piping identification consisting of the system function and direction of flow arrows.

3.8.3. Test Label Plates: Attach test label plates conforming to the requirements of 507a on or adjacent to all equipment or components tested in accordance with Section 095. Identify, on the label plate, the equipment or component, the test load, the dynamic load if applicable, the rated load and date and place of testing.

3.9. Insulation: Insulate refrigerant suction lines per MIL-STD-769

3.10. Fasteners

3.10.1. Bolts: Unless otherwise indicated, all bolts installed under this section shall be hex-head and constructed of SAE 316L stainless steel and shall conform to ASTM F593.

3.10.2. Studs: Unless otherwise indicated, all studs installed under this section shall be constructed of SAE 316L stainless steel and shall conform to ASTM F593.

3.10.3. Nuts: Unless otherwise indicated, all nuts installed under this section shall be hex-head and constructed of SAE 316L stainless steel and shall conform to ASTM F594.

3.11. Flanges: Flanges up to and including 24 inches in nominal size shall conform to ANSI B16.5. Flanges over 24 inches in nominal size shall conform to ASME B16.47.

3.12. Bulkhead, Deck or Tank Top Penetrations: Where pipes pass through bulkheads, decks or tank tops, the penetrations are to be made by methods which will maintain the watertight, fire-tight or smoke-tight integrity of the bulkhead, deck or tank top. Welded connections are to be welded on both sides or with full-strength welds from one side.

4. OPERATIONAL TEST

4.1. Test piping systems per Work Item 095-505.

4.2. Test pumps per Work Item 095-503.

5. NOTES:

5.1. None

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 512
DESCRIPTION: Ventilation

1. SCOPE: Install ventilation and dehumidification systems in accordance with this specification.

2. GENERAL

2.1. REFERENCES:
2.1.1. UL1995 Heating and Cooling Equipment
2.1.2. SMACNA Standard Practice in Sheet Metal Work
2.1.3. AWS Z49.1 Safety in Welding, Cutting, and Allied Processes
2.1.4. AMCA Standards 300-08 Reverberant Room Method for Sound Testing of Fans
2.1.5. AMCA Standard 210-07 Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating
2.2. SUBMITTALS
2.2.1. Manufacturer's Data Sheets, and Certifications

2.3. QUALITY ASSURANCE:
2.3.1. Air Handling Unit and Condenser Manufacturer Qualifications: Company specializing in manufacturing marine duty ventilation equipment specified in this section with minimum of five years documented experience, and units manufactured in a facility registered to ISO 9001:2000 manufacturing quality standards.
2.3.2. Provide equipment having UL 1995 certification for safety, including use with electric heat.
2.3.3. Provide products requiring electric connection that are listed and classified by ETL (Intertek Testing Services) and CSA (Canadian Standards Association) as suitable for the purpose specified and indicated.

3. REQUIREMENTS:

3.1. Provide a factory-supplied air handler with factory-installed components as indicated on the drawing. Install ductwork as indicated on the drawing and comply with SMACNA HVAC Duct Construction Standards.
3.2. Delivery Stowage and Protection
3.2.1. Ensure fans, electric unit heaters and mushroom ventilators are shipped from the factory completely shrink-wrapped for protection during shipment. Tarping of bare unit is unacceptable.
3.2.2. Inspect for transportation damage and store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
3.3. Start Up Requirements: Do not operate fans and unit heaters until ductwork is clean, bearings lubricated, belts aligned and tensioned, all shipping braces have been removed, and fan has been test run under observation.
3.4. Air Handling Unit
3.4.1. Units shall be marine duty units built to American Bureau of Shipping standards, and the Manufacturing facility has been ABS Certified.
3.4.2. Units shall be supplied with a Dehumidification Cooling Coil Module.

3.4.3. The motors shall be designed for direct drive fan application and shall be totally enclosed, air stream rated.
3.4.4. The sound level shall not exceed the scheduled Sound Power level in any octave band when tested in accordance with AMCA Standards 300-08.
3.4.5. The fan shall deliver the volume and pressure in accordance with AMCA Standard 210-07.
3.4.6. The complete fan shall be electrically tested to ensure compliance with nameplate data.
3.4.7. The air handling unit shall include:
3.4.7.1. Circuit breaker protected transformer for 24 Volt controls
3.4.7.2. High temperature limit controls
3.4.7.3. Discharge temperature low limit
3.4.7.4. Vibration/Noise isolated blowers and blower motor with rubber insulators.
3.4.7.5. Reverse airflow limit switch
3.4.7.6. Integral air filter compartment
3.4.7.7. Over/under voltage or phase loss protection
3.4.8. Each air handling unit shall contain a blower capable of 3” w.c. of static pressure at 3500 cfm.
3.4.9. The heater in each air handling unit shall be between 20 kW and 60kW.
3.4.10. Flexible joints shall be used on all fan-duct or fan-plenum connections and shall be flanged rubber spools of 40-durometer hardness to Mil. Spec. MIL-R-6855, class 2. The spool material shall be at least 3/16-inch thick and at least 2 inches long in the direction of air flow. The joint shall be able to deflect sufficiently to allow free travel of equipment under shock and shall be airtight.

3.5. Condenser
3.5.1. Shall utilize R-410A non-ozone depleting refrigerant.
3.5.2. Shall utilize a dual compressor system to provide 1/3, 2/3, or 3/3 cooling capacity.
3.5.3. The condenser shall include:
3.5.3.1. 24 Volt controls
3.5.3.2. 75VA transformer with manual reset
3.5.3.3. Isolation relay on control circuit
3.5.3.4. High and low pressure switches
3.5.3.5. Service valves on liquid and suction lines
3.5.3.6. Corrosion resistant micro-channel coil
3.5.4. The condensers shall be manufactured to USCG, IEEE45 and UL standards.
3.5.5. When operating together with the air handling units the condensers must be capable of conditioning the air to 55% relative humidity, given an outside air state of 90 degrees F dry bulb and 81 degrees F wet bulb and an air flow rate of 3500 cfm each using 100% outside air.
3.5.6. The condensers shall be attached using resilient mounts meeting the requirements set forth in Work Item 095-073 and Work Item 180.

3.6. Mushroom Ventilators
3.6.1. The mushroom ventilator shall be marine grade watertight closure ventilator.
3.6.2. The standard construction shall be 316 stainless steel.
3.6.3. The coaming shall be ¼” thick with external gusset supports.
3.6.4. The mushroom cover plate shall be 316 stainless steel, minimum 3/16” thick.
3.6.5. The blade shall be minimum 10 gauge steel.
3.6.6. The mushroom ventilator shall be provided with 1/2” x 0.063 stainless steel rat screen.

4. OPERATIONAL TEST

4.1. Test per Work Item 095-073 Noise Testing
4.2. Test per Work Item 095-512 Ventilation Testing

5. NOTES:

5.1. Safety: Conform to AWS z49.1 for safety precautions during welding.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 555
DESCRIPTION: Fire Extinguishers

SCOPE: Install Fire Extinguishers in accordance with this specification.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. G-100 General Arrangement Operations Deck
      1.1.2. MIL-E-24269, Portable Fire Extinguisher, Carbon Dioxide, 15 Pound, Permanent Shut-off.

   1.2. SUBMITTALS
      1.2.1. Manufacturer's Data Sheets and Certifications.

   1.3. QUALITY ASSURANCE
      1.3.1. None.

2. REQUIREMENTS:
   2.1. Install approved hand-portable fire extinguishers in accordance with Regulatory Body requirements and herein. Install fire extinguishers in visible and readily accessible locations on the Operations Deck.
   2.2. Provide two fire extinguishers of the 15-pound, ABC dry chemical type, conforming to MIL-E-24269, and mount with manufacturer provided brackets in the quantity and locations shown on the drawings.
   2.3. Label each fire extinguisher as directed by the Navy with a 2" high by 3" wide red and white laminate with double back tape, ½" red letters on a white background.

3. OPERATIONAL TEST
   3.1. No additional information required.

4. NOTES:

   4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 582
DESCRIPTION: Mooring Fittings

1. SCOPE: Install Mooring Fittings in accordance with this specification

2. GENERAL
   2.1. REFERENCES:
      2.1.1. Conform with requirements of project design drawings
      2.1.2. MIL-C-17944 Capstans, Electric
      2.1.3. MIL-M-17060G Motors, Alternating Current, Integral-Horsepower, Shipboard Use
      2.1.4. American Welding Society (AWS) D1.1 (2008; Errata 2009) Structural Welding Code – Steel

   2.2. SUBMITTALS
      2.2.1. Vendor's standard coating data sheets.
      2.2.2. Mill test certificates.
      2.2.3. Certificate of conformance and test results for line pull rating.

   2.3. QUALITY ASSURANCE
      2.3.1. Vendor shall provide test results verifying that the proposed cleat/bitt/chock meet or exceed the load ratings specification herein.
      2.3.2. Welding shall be performed in accordance with AWS D1.1.

3. REQUIREMENTS:
   3.1. Cleats, Bitts and Chocks
      3.1.1. Provide cleats, bitts, and chocks as shown on the drawing. Material to be cast steel conforming to ASTM 216 WCA suitable for deck installation. Prepare design development Drawings for cleats and bitts and their attachment to the deck. Utilize design criteria in Section 100 and Working Load shown on the drawings. Calculate moments for the load applied at ½ the height of cleats or 1.2 times bitt diameter for bitts. Design chocks and their attachment to the deck to the Safe Working Load shown on the drawings, using AISC/ASD criteria. Calculate moments for the load applied at ½ the height of the chocks. The Safe Working Load is based on use of mooring and towing lines with a breaking strength of 70,000 pounds.
      3.1.2. Provide cleats as shown on the project drawings of cast steel weld on type, safe working load 70,000 pounds.
      3.1.3. Provide open chocks of cast steel weld on type as shown on the project drawings, with a safe working load to resist line with breaking strength of 70,000 pounds wrapped at any angle around the chock.
      3.1.4. Provide double bitts of cast steel weld on type as shown on the project drawings, with a safe working load 140,000 pounds.
   3.2. Capstans
      3.2.1. Two two-speed capstans shall be provided for mooring and for handling lines on the deck. The capstans and machinery shall be arranged in accordance with the drawings and shall comply with Mil. Spec. MIL-C-17944. Clear access and working areas shall be maintained around the capstan.
      3.2.2. The capstans shall be in accordance with the following:
         a. The capstan head shall be mounted on the deck with the motor and reduction gear mounted in an underhung position.
         b. The capstan head shall be designed for 5.5-inch circumference polyester line.

c. When the capstan is used as a bitt, the capstan head, bed plate, shafting, bearing, gears, and supporting structure shall be designed to withstand a static load 72,000 lbs.
d. Finished surfaces of capstan head in contact with mooring lines shall have a surface roughness of 125 microinches or less.
e. The warping capstan shall develop a line pull of 7,500 pounds at 45 feet per minute and a 3,750 pounds line pull at 90 feet per minute.
f. Each capstan shall be powered by a 15 horsepower, 460 Volt, 3 phase motor.
g. Each motor shall be in accordance with MIL-M-17060E.
h. The brake shall have a capacity to stop and hold a load equal to 150 percent of the rated load as defined in this paragraph.

3.2.3. Provide underdeck stiffening and foundations for all cleats, bitts, chocks and capstans installed by this drawing. Submit foundation drawings in accordance with Work Item 085.

3.2.4. An instruction chart shall be provided for the capstan in accordance with Work Item 602. Charts shall be mounted at locations conveniently near the equipment concerned. The instruction chart shall show all operating features and shall clearly show the functions of the equipment and shall include safety precautions.

3.3. Life Rings

3.3.1. One USCG approved life ring shall be mounted on each dog house, subject to the approval of the COR.

4. <u>OPERATIONAL TEST</u>

4.1. Test all Cleats, bitts, chocks, and capstans in accordance with Section 095-582.

5. <u>NOTES</u>:

5.1. None

6. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

6.1. None.

ITEM # 602
DESCRIPTION: Hull Designation and Markings

1. SCOPE: Install hull designation and markings in accordance with this specification.

2. GENERAL:
   2.1. References:
      2.1.1. Conform with the requirements of the project design drawings.
      2.1.2. Work Item 631 "Paint and Preservation"
      2.1.3. American Welding Society (AWS) D1.1 (2008; Errata 2009) Structural Welding Code – Steel

   2.2. Submittals
      2.2.1. Submit as-built drawings documenting any deviations from the contract drawings within 30 days of completion of installation of items covered by this work item.

   2.3. Quality Assurance
      2.3.1. All workmanship shall be in accordance with good fabrication practice and shall conform to the fabricator's quality assurance program.
      2.3.2. Welding shall be performed in accordance with AWS D1.1.

3. REQUIREMENTS:
   3.1. General:
      3.1.1. Provide clear and concise designations, numbering, nameplates, notices, markings and lettering with a minimum of abbreviations. Prohibit mounting any nameplates, labels and markings (with the exception of draft marks and designations on the exterior hull) until mounting surfaces have been coated as specified in Work Item 631.
      3.1.2. Install label plates, constructed of CRES and prepared by the "Metal-Photo" process, Fed. Spec. GG-P-455. Manufacture and install interior label plates of aluminum or plastic material.
         a. Installation – Locate label plates to assure maximum visibility. Attach label plates with CRES screws or adhesive. Prepare surfaces, where adhesive is used, in accordance with the adhesive manufacturer's instructions. Seal label plates, installed in locations exposed to the weather or areas exposed to seawater to exclude moisture between the plate and the mounting surface.
   3.2. Distinguishing Figures
      3.2.1. Provide labeling for PORT and STARBOARD as shown on drawing S-101.
   3.3. Hatch, Scuttle and Manhole Markings
      3.3.1. Label all hatches, scuttles, and manholes entrances to clearly indicate the compartment being entered.
   3.4. Special Markings
      3.4.1. Label all fittings and equipment for handling weights and taking strains showing the static and working load test applied and the date they are tested.
      3.4.2. Mark all hull penetrations controlled by valves with the corresponding valve designation using hull paint with a contrasting color.
      3.4.3. Contractor's Nameplate – Provide a Contractor's nameplate stating design agent recognition of anodized aluminum with the legend imbedded in the anodized layer photographically. Locate the nameplate as designated by the Government and include the Caisson 8 hull number and builder's name for identification.

3.5. Warnings, Operating Instructions and Precautions

3.5.1. Install danger, warning, caution, operating, instruction plates, charts and signs as follows:

a. Where necessary to minimize the possibility of injury to personnel or damage to machinery, equipment or system due to faulty operation resulting from lack of posted instructions.

b. Where necessary to insure proper use of stowage compartments and fittings. Include plates and charts with operating instructions, maintenance instructions, lubrication charts, diagrams, warnings or safety instructions, load limitations and capacities as locations of operating equipment.

3.5.2. Danger Signs – Utilize danger signs to indicate location, equipment or system where imminent hazard exists. Install a "DANGER – HIGH VOLTAGE" sign and artificial respiration instructions in compartments containing 450-volt distribution power panels or equipment.

3.5.3. Warning Signs – Utilize warning signs to indicate location, equipment or system where a potential hazard exists which is capable of producing injury or death to personnel if certain procedures are not followed.

3.5.4. Caution Signs – Utilize caution signs to indicate where hazard exists that could severely damage equipment or system if approved procedures are not followed.

3.5.5. Operating, Maintenance and Safety Instruction Signs – Install instruction plates for electrical, mechanical, heating and ventilation equipment including shore connections on or adjacent to the equipment. Provide instructions on the plate for each piece of equipment to cover the following, as applicable:

a. Safety precautions.

b. Operating instructions.

c. Emergency procedures.

d. Maintenance instructions.

3.6. Draft Marks

3.6.1. Locate draft marks near the four corners of the Caisson 8, prior to the vertical knuckle as shown on the drawing S-101.

3.6.2. Provide draft marks of block-type Arabic numerals.

3.6.3. Place the centerline of each set of draft marks in a plane perpendicular to the centerline plane and to the molded baseline. Draft marks must be separated so that the projections of the marks onto a vertical plane are of uniform height equal to the vertical spacing between consecutive marks.

3.6.4. Install draft marks prior to launching and paint in accordance with Work Item 631.

3.7. Interior Frame Numbers

3.7.1. Provide frame numbers on interior of caisson at G1, G2, G3, G4 and G5 levels. Frame numbers shall be 6" high, ¼" thick steel plate welded to 25" x 10" fabricated tee (at G1, G2 and G3) and WT18 x 75 (at G4 and G5) and painted white.

4. <u>OPERATIONAL TEST:</u>

4.1. None

5. <u>NOTES</u>:

5.1. None.

6. <u>GOVERNMENT FURNISHED MATERIAL (GFM):</u>

6.1. None.

ITEM # 611
DESCRIPTION: Hull Fittings

1. SCOPE: This specification applies to the requirements for hull fittings.

2. GENERAL

2.1. References:
- 2.1.1. Drawing S-101 Elevation and Detail
- 2.1.2. AWS D1.1 (2008; Errata 2009) Structural Welding Code – Steel
- 2.1.3. ASTM D 256 (2006) Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
- 2.1.4. ASTM D 638 (2008) Standard Test Methods for Tensile Properties of Plastics
- 2.1.5. ASTM D 696 (2008) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 Degree C and 30 Degree C with a Vitreous Silica Dilatometer
- 2.1.6. ASTM D 790 (2007) Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- 2.1.7. ASTM D 792 (2008) Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- 2.1.8. ASTM D 1894 (2008) Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
- 2.1.9. ISO 868 Plastics and Ebonite - Determination of Indentation Hardness by Means of a Durometer (Shore Hardness)
- 2.1.10. MIL-PRF-907 (Rev F) Antiseize Thread Compound, High Temperature

2.2. Submittals:
- 2.2.1. Shop/Assembly Drawings
- 2.2.2. Product Data
  - a. Fender
  - b. Hardware
- 2.2.3. Test Reports confirming that tests have been performed on the specified fenders within 5 years of submittal of the reports for approval. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material is of the same type, quality, manufacturer and make as that specified herein.
- 2.2.4. Mill Test Certificates
- 2.2.5. Manufacturer's Installation Instructions

2.3. Quality Assurance:
- 2.3.1. Fender elements shall be homogeneous and free from any defects, impurities, pores and cracks.
- 2.3.2. The steel used in fabrication shall be free from kinks, sharp bends and other conditions which would be detrimental to the finished product. Manufacturing processes shall not reduce the strength of steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately.
- 2.3.3. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected to the weld are subjected to loading.

3. REQUIREMENTS:
   3.1. Fenders shall be undamaged when delivered and shall be handled and stored so as to prevent damage, such as bending or abrading, cutting of rubber, or damage to hardware in accordance with manufacturer's instructions. Protect fenders from exposure to damaging liquids, oils, greases and extended exposure to sunlight.
   3.2. Install low friction sliding fenders to provide protection to the caisson exterior in accordance with the referenced drawings.
   3.3. Fender anchor bolts and method of anchorage shall be of the size and spacing required by the manufacturer's design and testing.
   3.4. Welding shall be continuous and of the size and spacing required by the manufacturer's design and testing, and shall be performed in accordance with AWS D1.1
   3.5. Coat threads of bolts with antiseize prior to applying washers and nuts. Recoat bolt thread projection with antiseize beyond nut after tightening.
   3.6. Fenders shall be black throughout the entire thickness.
   3.7. Materials
      3.7.1. Mounting plates shall be ASTM A 572 Grade 50 steel.
      3.7.2. Nuts, bolts and washers shall be ASTM F 593/F 594 Grade 316 stainless steel.
      3.7.3. Welds shall be 70ksi, low hydrogen.
      3.7.4. Antiseize thread compound per MIL-PRF-907.
      3.7.5. Plastics shall conform to the following material properties:

Test Method	Standard	Typical Value	Unit
Density	ASTM D 792	0.93 – 0.95	g/cm^3
Molecular Weight	Viscosimetric	~4,000,000	g/mol
Dynamic Function	ASTM D 1894	≤ 0.15	–
Yield Strength	ASTM D 638	≥ 17 / ≥ 20	MPa
Tensile Break	ASTM D 638	≥ 40	MPa
Elongation at Break	ASTM D 638	≥ 50 / ≥ 350	%
Flexural Modulus	ASTM D 790B	≥ 800	MPa
Shore Hardness	ISO 868	60	15 seconds
Single V-Notched Impact	ASTM D 256A	≥ 130/ No Break	Kj/m^2
Abrasion Index	Sand Slurry (steel = 100)	10 – 15	–
Operating Temperature	–	-80 to 80	°C
Thermal Expansion	ASTM D 696	$\sim 2x10^{-4}$	K^{-1}

3.8. Manufacturing Tolerances

Fenders shall be manufactured within the following manufacturing tolerances:

Dimension	Tolerance
Cross-Section	±4%
Length	3/8in
Drilled Hole Centers	±0.1in (non-cumulative)
Counterbore Depth	±0.1in (under-head depth)

4. OPERATIONAL TEST

4.1. Comply with the requirements of Work Item 095-180, Foundation Testing.

4.2. Comply with the requirements of Work Item 095-582, Fittings Testing.

5. NOTES:

5.1. None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 612
DESCRIPTION: Life Rails and Guard Rails

1. SCOPE: Install Life Rails and Guard Rails in accordance with this specification and as shown on the drawings.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. Conform to requirements of project design drawings.

   2.2. SUBMITTALS
      2.2.1. Furnish shop fabrication drawings for Life Rails and Guard Rails including all sockets, fasteners and weld details.

   2.3. QUALITY ASSURANCE
      2.3.1. Furnish reports of all operational test results as required herein.

3. REQUIREMENTS:
   3.1. Definitions
      3.1.1. Life rails – Life rails are fixed or removable safety barriers of pipes installed along the deck edges.
      3.1.2. Guard rails – Guard rails are fixed or removable safety barriers of pipe or flat bar stanchions and rails installed in machinery or equipment compartments.
      3.1.3. Fixed Components – Fixed components do not require removal or an alternate position and are welded or bolted in place.
      3.1.4. Removable Components – Removable components may be readily detached and moved to another location.
      3.1.5. Temporary Components – Temporary components are installed only when needed, such as around hatches when they are open. When not installed, they are stowed.
   3.2. General
      3.2.1. Install life rails and guard rails along the deck edges and where there is danger of personnel falling overboard, or to protect personnel from dangers of operating machinery or equipment. Provide removable life rails and stanchions that interfere with handling and stowage of equipment.
   3.3. Life Rails
      3.3.1. Install life rails in accordance with the drawings.
      3.3.2. Insure opening between life rail sections, life rails and bulkheads or life rails and inclined ladder hand rails does not exceed 5 inches. Where this is not possible, install pipe structure to minimize the opening.
      3.3.3. Fabricate the rails in removable sections, secured to the deck by pins in pipe sockets welded to the deck as shown on the drawings. Provide pipe sockets with weep holes at deck edge to prevent water accumulation. Secure the pins to the sockets with chain lanyards to avoid loss when not installed.
      3.3.4. Construct life rail systems and associated fittings in exterior areas of steel as indicated. Provide convenient stowage location for removable life rail sections. Use raised stanchion sockets as indicated for removable life rails.
   3.4. Guard Rails
      3.4.1. Prepare and submit Design Development drawings for guard rails. Submit Guard Rail Design Development drawings for approval in accordance with Work Item 085. Design stanchions for an outboard working load of 150 pounds at the top with

a safety factor of 4 on the material yield strength and spaced no more than 5 feet apart.

4. OPERATIONAL TEST

4.1. Test life rails and guard rails in accordance with Section 095-612.

5. NOTES:

5.1. None

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 622
DESCRIPTION: Ladders, Catwalks and Hinged Ramps

SCOPE: Install Ladders, Catwalks and Hinged Ramps in accordance with this specification.

1. GENERAL:
   1.1. References
      1.1.1. Conform with the requirements of the project design drawings.
      1.1.2. American Welding Society (AWS) D1.1 (2008; Errata 2009) Structural Welding Code – Steel

   1.2. Submittals
      1.2.1. Ladders
         a. Shop drawings
         b. Ladder Product Data and Material Specifications
         c. Hardware Product Data and Material Specifications
      1.2.2. Catwalks
         a. Shop drawings
      1.2.3. Hinged Ramps
         a. Shop Drawings
         b. Hardware Product Data and Material Specifications

   1.3. Quality Assurance
      1.3.1. Welding shall be performed in accordance with AWS D1.1.

2. REQUIREMENTS:
   2.1. Ladders
      2.1.1. Provide inclined ladders as shown on the drawings. Make interior ladders removable and construct of steel. Provide the inclined ladder capable of supporting a concentrated load of 300# in addition to the self weight of the ladder.
      2.1.2. Provide vertical ladders as shown on the drawings. Vertical ladder shall be capable of supporting a concentrated load of 300# at midspan of rung, in addition to the self weight of the member.
   2.2. Catwalks
      2.2.1. Install catwalks as shown on the drawings. The catwalks shall be capable of supporting a load of 50psf. Catwalks shall be installed on an even horizontal plane at the G-2 and G-4 levels to prevent any trip hazards. Install catwalks in a manner that facilitates removal. Coordinate catwalk requirements with WI 612.
   2.3. Hinged Ramps
      2.3.1. Install hinged ramps as shown on the drawings. The ramps shall be capable of supporting a load of 50psf.
      2.3.2. Provide steel hinges, screws and hex nuts as shown on the drawings.

3. OPERATIONAL TEST:
   3.1. Test ladders, catwalks and hinged ramps in accordance with Section 095-622.

4. NOTES:
   4.1. None

5. GOVERNMENT FURNISHED MATERIAL (GFM):
   5.1. None

ITEM # 624
DESCRIPTION: Watertight Doors, Hatches, Scuttles and Manhole Covers

1. SCOPE: Install Watertight Doors, Hatches, Scuttles and Manhole Covers throughout the caisson.

2. GENERAL
   2.1. REFERENCES:
      2.1.1. Drawing G-100 General Arrangement
      2.1.2. Drawing S-105 Access Hatch Details Sheet 1 of 2
      2.1.3. Drawing S-106 Access Hatch Details Sheet 2 of 2
      2.1.4. Drawing S-107 Dog House Structural Details

   2.2. SUBMITTALS
      2.2.1. Submit as-built drawings documenting any deviations from the contract drawings within 30 days of completion of installation of items covered by this work item.

   2.3. QUALITY ASSURANCE
      2.3.1. All workmanship shall be in accordance with good fabrication practice and shall conform to the fabricator's quality assurance program.
      2.3.2. All welding, fabrication and inspections shall be in accordance with MIL-STD-1689. Deviation from the molded line shall not exceed the fabrication tolerances of Work Item 074.
      2.3.3. Where certificates of compliance are presented as quality evidence, such certificates shall indicate that the material or equipment was previously tested and met all requirements and shall contain test data, refer to witnessing inspectors, or present other verifiable quality data.

3. REQUIREMENTS:
   3.1. Provide steel hatches and flood through closures and install at locations as shown on the drawings. The tightness is to be tested to the same tightness as the structures in which they are installed. Exact locations may be minimally adjusted to accommodate access and space arrangements.
   3.2. Provide access hatches with devices to secure in the open position. Provide self-engaging latches for hatches opening against bulkheads. Provide braces for other hatches.
   3.3. Install hatches and scuttles as follows:
      3.3.1. Operations Deck
         a. Four raised watertight, 15" x 23" four-dog manholes.
         b. One flush bolted hatch for equipment removal.
      3.3.2. Weather Deck – Two flush bolted hatches for equipment removal.
      3.3.3. Dog House
         a. One Six Dog WT Door for each dog house
         b. The dog house is designed to be unbolted to allow pump removal. The flange base of the dog house will also be treated as a watertight hatch.

4. OPERATIONAL TEST
   4.1. Operationally test the equipment installed by this work item to demonstrate adequate operation and range of motion.

4.2. Conduct a watertight testing in accordance with 095-192.

5. NOTES:

5.1. None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

6.1. None.

ITEM # 631
DESCRIPTION: Paint and Preservation

SCOPE: Prepare and provide corrosion preventing and cosmetic coatings for the attachments of the entire Caisson, except as otherwise specified in this section.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. NSTM Chapter 631 Preservation of Ships
      1.1.2. ASTM F718 - 07 Standard for Shipbuilders and Marine Paints and Coatings Product/Procedure Data Sheet

   1.2. SUBMITTALS
      1.2.1. Product Data Sheets and MSDS for each coating system.
      1.2.2. Acceptance Documentation prepared by Coating Inspector for Government Approval
      1.2.3. SSPC QP1 Qualifications
      1.2.4. SSPC Marine Plural Component Applicator Certificates (MPCAC) C-14
      1.2.5. Provide completed Quality Control Forms to the Government representative at checkpoints and provide a final QA package delivered upon completion of preservation for each compartment or area.

   1.3. QUALITY ASSURANCE
      1.3.1. Obtain the on-site services of the paint manufacture's technical representative to insure compliance with the manufacturer's preparation and application instructions and the specifications contained herein. Provide a NACE International Certified Coating Inspector Level 3 (Peer Review), as the Contractor's representative responsible for all surface preparation and all painting operations quality assurance. Coating Inspector shall be responsible for and be present at all check-points presented to the Government for acceptance and sign for compliance on all preservation and painting documentation provided to the Government.

2. REQUIREMENTS:
   2.1. GENERAL
      2.1.1. Provide coatings from the same manufacturer. Provide a copy of the product data sheets (ASTM F718) and material safety data sheets (MSDS) for each coating to be used on Caisson to the Contracting Officer, prior to start of preservation process.
      2.1.2. The firm responsible for all preservation operations, including surface preparation and painting, shall be a Steel Structures Painting Council (SSPC) QP1 certified industrial painting contractor. Provide certified blasters in accordance with SSPC C-7. Provide coating applicators using plural component spray equipment holding SSPC Marine Plural Component Applicator Certification (MPCAC) C-14.
      2.1.3. Maintain and provide auditable records of blaster and painter certification, all tests and inspections, current calibrated test equipment, and all objective quality evidence (OQE) for surface preparation and painting processes. The Government may provide observers for preservation and painting of the Caisson. These observers may be present at the inspection-points detailed below during the preservation and painting process to verify that Contractor Quality Control and

record keeping systems are maintained. These observers have no authority to change contract terms and/or conditions.

2.1.4. Contractor processes and documentation will be observed and inspected as follows:

a. Training and Certification Records
b. Material Receipt and Inspection
c. Material Stowage
d. Paint Mixing
e. Environmental Data taken prior to and during surface preparation and coating application
f. Calibration of Monitoring and Measuring Equipment.

2.1.5. Notify the Government, with the time and location, a minimum of 48 hours prior to accomplishing inspection-points for each area being prepared and coated. Inspection-points are defined as a stopping point in the preservation process to ensure quality standards are being met prior to the follow-on process being initiated. The below listed inspection-points are the required minimum for each area being prepared and coated on Caisson 8.

a. Surface Preparation Test Methods

2.1.5.a.1. Abrasive blast surface preparation visual condition achieved in accordance with SSPC-VIS 1, “Visual Standard for Abrasive Blast Cleaning Steel” or SSPC-VIS 3, “Visual Standard for Power- and Hand-Tool Cleaned Steel.”

2.1.5.a.2. Surface Profile achieved, in accordance with the requirements of ASTM D4417 and these specifications.

2.1.5.a.3. Chloride/water soluble salt sampling in accordance with the requirements of ISO 8502-6 and these specifications.

b. Paint Application – Test and Inspection Points

2.1.5.b.1. Environmental Readings

2.1.5.b.2. Paint Mixing

2.1.5.b.3. Initial check for all coats

2.1.5.b.3.1. Prime Coat (DFT. Holiday. Workmanship. Cure Time)

2.1.5.b.3.2. Stripe Coat (Holiday Inspection. Workmanship. Cure Time)

2.1.5.b.3.3. Final (DFT, Holiday, Workmanship, Cure Time)

2.1.5.b.3.4. Anti-fouling application between anticorrosive coating and antifouling , coating

2.1.6. Application Environment Conditions: Apply coatings, either temporary or permanent, to prevent corrosion during material stowage and Caisson construction. Apply coatings on hull, tanks, and compartment interiors and main deck only when all production work has completed and temperature of the substrate is greater than 50 degrees Fahrenheit and a minimum of 5 degrees above the dew point unless deviation is approved by the Government in writing. Record the ambient and surface metal temperatures, relative humidity, and dew point readings at a minimum of every 4 hours during the preservation process. Take recordings on-site, in close proximity to the surfaces being preserved.

2.1.7. Blast and Profile: For steel plates, shapes, and ferrous piping, abrasive blast to NACE 2/SSPC SP-10 surface condition. Take a minimum of 5 profile readings for the first 1,000 square feet (SF), and a minimum of 2 profile readings taken for each additional 1,000 SF. Insure each group of readings average is 2 to 4 mils with no individual reading less than 1 mil nor greater than 5 mils. If the paint manufacturer’s instructions are more stringent than specified herein, the paint manufacturer’s requirements supersede this paragraph.

2.1.8. Soluble Salts: Obtain chloride/soluble salt samples for steel plates, shapes, and ferrous piping. Obtain a minimum of 5 samples for the first 1,000 SF, and a minimum of 2 samples for each additional 1,000 SF (of the area being worked). Obtain 30 percent of the samples at welds divided equally between vertical and horizontal welds. Acceptable chloride/soluble salt test results for an immersed area (Main & Trim Ballast tanks and underwater hull below the waterline) is not to exceed 3 ug/cm2. For non-immersed areas (Weather decks, hull above the waterline) acceptable chloride/soluble salt test results are not to exceed 5 ug/cm2. Wash all failed surfaces with deionized water, as necessary; allow drying, and then retesting. If unable to meet minimum chloride/soluble salt requirements additional blasting may be required.

2.1.9. Joining Aluminum to Dissimilar Metals: Protect all aluminum surfaces, where aluminum will be joined with other metals, including galvanized steel, by application of two coats (4-8 mils DFT per coat) marine epoxy primer between the surfaces. Where aluminum-to-dissimilar metal joints are exposed to the weather, seawater or wet compartments, install 20 mils (2 thicknesses) of plastic electrical insulation tape between the faying surfaces extending approximately 6 millimeters (1/4 inch) beyond the edge of the joint in addition to the marine epoxy primer. For joints in dry compartments, apply two coats of marine epoxy primer without the insulation tape on each faying surface.

2.2. Limitations

2.2.1. Paint is prohibited on the following items:

a. Cathodic sacrificial zinc anodes
b. Gasket seats
c. Lubricating fittings
d. Nameplates, labels, tags, and signs
e. Threads and working surfaces
f. Rubber and other elastomers
g. Isolation mounts
h. Galvanized bolts and hinged aprons
i. Motor control centers and control console
j. Alarm bells and horns
k. Thermostats and humidistats
l. Valve handwheels
m. Chain
n. Electrical cables
o. Caisson seal

2.2.2. Remove paint inadvertently applied or spilled on these types of items or replace the item at Contractor’s expense.

2.2.3. Prohibit the use of the following hazardous materials:

a. Paint containing lead in excess of 0.06 percent
b. Coal tar paint
c. Paint containing tin
d. Paint containing chromate

2.2.4. Delay painting of weld joints, tanks, compartments and internal piping until tightness testing has been satisfactorily completed.

2.3. Pre-Surface Preparation

2.3.1. Clean all surfaces to be coated/recoated in accordance with SSPC SP-1. Prior to proceeding, the SP-1 condition must pass Government inspection. If oil/grease is present, perform solvent cleaning per SSPC SP-1. Potable water used for water jetting may contain soluble salts that remain on the surface after draining. Surfaces

prepared after such washing may not meet prepared surface soluble salt requirements. Check the potable water supply and pre-treat water as necessary to meet all surface preparation requirements.

2.4. Surface Preparation

2.4.1. Prepare surfaces as specified by the manufacturer's instructions or as specified in this Section and inspect in accordance with ASTM F 941.

2.4.2. Cover, mask or remove, prior to abrasive blasting, items or surfaces that may be damaged by the abrasive contact or ingestion, or are not to be blasted.

2.4.3. Remove coatings applied to prevent corrosion during material storage or Caisson 8 construction, to bare metal prior to application of the final system.

2.4.4. Surface-prepare in accordance with SSPC-SP-11 areas deemed inaccessible to abrasive blasting equipment, as mutually agreed upon by both the Contractor and COR. Document the change in surface preparation on the appropriate appendix form, regarding location and square footage.

2.4.5. Repair blast damage to any unprotected items at Contractor expense.

2.5. Application

2.5.1. Utilize only equipment for paint application as recommended by the coating manufacturer. Apply a minimum of two coats to satisfy the Dry Film Thickness (DFT) unless specifically permitted otherwise by the manufacturer's instruction. Apply a "stripe" coat of un-thinned paint of the next paint coat between paint coats to all edges, welds and cutouts. Take and record all DFT measurements in accordance with SSPC PA-2.

2.6. System Locations

a. Exterior Hull Surfaces: Preserve exterior hull surfaces, including surfaces below the waterline, the surfaces behind the rubber seal, the lower 1" of monel studs including stud welded connection to plate, and piping supports exterior to the hull, as per Table 1 – EXTERIOR HULL SURFACE, in accordance with the paint manufacturer's instructions and the requirements of NSTM 631.

Table 1 – EXTERIOR HULL SURFACE

SURFACE PREP	PRIMER (AC)	ANTI-FOULING COAT (AF)	DRAFT MARKS COATING
Near white metal abrasive blast (NACE-2/SSPC-SP-10)	One Coat MIL-PRF-23236 (non-high solids) Red color, 4-8 MILS DFT and One coat MIL-PRF 23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24647, Black color, 4-6 MILS DFT and One coat MIL-PRF 24647, Red color, 4-6 MILS DFT and One coat MIL-PRF-24647, Black color, 4-6 MILS DFT 23 MILS Total Minimum DFT (AC and AF Coats combined)	One coat MIL-E-24635, White color, 2-3 MILS DFT

b. Ensure the anticorrosive coating is in a slightly tacky condition, whereby it is soft to a thumbprint, prior to over-coating the anti-corrosive coating with anti-fouling coating. Allow a minimum of 24 hours drying time after the last antifouling coat prior to undocking.

2.6.2. Main Ballast and Trim Tanks – Preserve interior surfaces and all other surfaces therein, including structural, mechanical, piping, and electrical per the requirements of Table 2 - MAIN BALLAST AND TRIM TANKS, in accordance with the paint manufacturer's instructions and the requirements of NSTM 631.

Table 2 – MAIN BALLAST AND TRIM TANKS

SURFACE PREPARATION	PRIMER	STRIPE COAT	FINAL COAT
Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Amber color, 4-8 MILS DFT	One coat MIL-PRF-23236 (non-high solids) Haze Gray color, 6-10 MILS DFT	One coat MIL-PRF-23236 (non-high solids) White color, 10-12 MILS DFT

2.6.3. Note: Apply coating system from keel to six inches above top of permanent concrete ballast prior to installation of the permanent concrete ballast. Complete remaining coating system after installation of concrete ballast.

2.7. Weather Deck Walkway Surface – Preserve weather Deck walkway surface' and deck area of Operations Deck Access Hatch Enclosure per the requirements of Table 3 – WEATHER DECK WALKWAY, in accordance with the paint manufacturer's instructions and the requirements of NSTM 631

Table 3 – WEATHER DECK WALKWAY

SURFACE PREPARATION	PRIMER	FINAL COAT
Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-24667, Red color, 4-8 MILS DFT	One coat MIL-PRF-24667, Type I Comp G, Grey color (Non-skid)

2.7.1. New deck covering shall be applied as a complete system (primer, non-skid and color topping) from the same manufacturer. Accomplish the above applications in accordance with the manufacturer's written instructions and this section.

2.8. Weather Deck Non-Walkway Surfaces – Preserve surfaces, including interior/exterior bulkheads and overhead of Operations Deck Access Hatch Enclosure, exterior and interior surfaces of air supply enclosures, deck fittings and ; their supports, pipe posts, deck areas not receiving non-skid and the inside faces of deck edge coaming, per Table 4 – WEATHER DECK SURFACES, in accordance with the paint manufacturer's instructions and the requirements of NSTM 631.

Table 4 – WEATHER DECK SURFACES

SURFACE	SURFACE PREP	PRIMER	FINAL COAT
Removable Hand Rails	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, Yellow color, 2-3 MILS DFT and One coat MILPRF24635, Black color (stripe to indicate hazard-4 inches wide every 12 inches), 2-3 MILS DFT
Cleats, Padeyes	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, Yellow color, 2-3 MILS DFT
Chocks, Bitts	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, Yellow color, 2-3 MILS DFT
Ventilation Enclosures	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, Haze Gray color, 2-3 MILS DFT
Coaming (Interior/Exterior)	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, Yellow color, 2-3 MILS DFT
Operations Deck Access Hatch Enclosure Interior	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, White color, 2-3 MILS DFT
Operations Deck Access Hatch Enclosure Exterior Boarding Ramp	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, Haze Gray color, 2-3 MILS DFT

2.9. Operations Compartment Interior Surfaces: Preserve interior structural surfaces, including bulkheads and overhead per Table 5 – OPERATIONS COMPARTMENT INTERIOR, in accordance with the paint manufacturer's instructions and the requirements of NSTM 631.

Table 5 – OPERATIONS COMPARTMENT INTERIOR
BULKHEADS AND OVERHEAD (INCLUDING STRUCTURAL MEMBERS)

SURFACE	SURFACE PREPARATION	PRIMER	FINAL COAT
Overhead, Bulkheads and other interior surfaces except deck, galvanized and factory- finished surfaces	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Red color, 3-5 MILS DFT	Two coats MILPRF-24596, White color, 10-12 MILS DFT
Galvanized and factory-finished surfaces			One coat MIL-PRF-24596, 2-4 MILS DFT, color to match surrounding areas or factory finish, as required
Operations Deck	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 3-5 MILS DFT	Underlayment: MIL-PRF-3135G Type II Class 2, to fair out decking irregularities Top Coat: MIL-PRF-24613 (SH) Type II Class 2, Desert Beige color with White color chips
Machinery and Valve Operator Stands	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 3-5 MILS DFT	One coat MIL-PRF-24596, Machinery Gray color, 3-5 MILS DFT
Hatches & Manholes	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Buff color, 3-5 MILS DFT	One coat MIL-PRF-24596, Desert Beige color, 3-5 MILS DFT

2.10. Piping

2.10.1. Piping System Surfaces – Preserve piping System surfaces per Table 6 PIPING SURFACES, in accordance with the paint manufacturer's instructions and the requirements of NSTM 631.

Table 6 – PIPING SURFACES

SURFACE	SURFACE PREPARATION	PRIMER	FINAL COAT
External surfaces of non-galvanized ferrous metal piping, fittings, and valves	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat F-84 Alkyd Zinc Molybdate, TT-P-645, 1.5-3 MILS DFT	Two coats MIL-DTL-15090, White color, 2-3 MILS DFT
Internal surfaces of piping 12 inches and larger within the ballast tanks (not internals of valves)	Near White Metal Blast (NACE-2/SSPC-SP-10)	One coat MIL-PRF-23236 (non-high solids) Gray color, 4-8 MILS DFT	One coat MIL-PRF-24635, White color, 2-3 MILS DFT

3. OPERATIONAL TEST

3.1. None.

4. NOTES:

4.1. None

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 632
DESCRIPTION: Metallic Coatings

1. SCOPE: This specification governs the galvanization of any material to be installed on the caisson.

2. GENERAL

2.1. REFERENCES:
2.1.1. A123M - 09 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2.1.2. ASTM A153 / A153M - 09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

2.2. SUBMITTALS
2.2.1. None

2.3. QUALITY ASSURANCE
2.3.1. Comply with the requirements herein.

3. REQUIREMENTS:
3.1. General
3.1.1. Zinc for galvanizing shall be at least 98 percent pure.
3.2. Prohibitions
3.2.1. Prohibit finishing by galvanization, or repair with heat applied galvanizing repair compounds, or application of inorganic zinc coatings to the following:
a. Corrosion-resisting steel
b. Non-magnetic steel
c. Non-ferrous metals other than copper-zinc alloys
d. Caisson 8 structures
3.3. Extent
3.3.1. Galvanize ordinary strength steel, except as prohibited herein, at the following locations:
a. Plating, bars and shapes exposed to seawater or to the weather where the scantlings of the material are 1/8 inch or less.
b. Piping, as required by Work Item 505.
c. Where required elsewhere herein.
3.4. Application
3.4.1. Apply galvanizing by hot-dip process to meet the requirements of ASTM A 123 or ASTM A 153 as applicable. Prefabricate to maximum extent possible prior to hot-dip galvanizing components.
3.4.2. Provide inorganic zinc coating in accordance with Work Item 631. Galvanize piping, where bending or welding is to be accomplished, after bending or welding is completed.
3.5. Removal and Repair
3.5.1. Removal: Remove zinc coating in way of welds, and areas to be formed prior to repair.
3.5.2. Repair: Paint welds and damaged surfaces in accordance with Work Item 631.

4. OPERATIONAL TEST
   4.1. None

5. NOTES:

   5.1. None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):

   6.1. None.

ITEM # 633
DESCRIPTION: Cathodic Protection

1. SCOPE: Provide a cathodic protection system of the sacrificial zinc anode type for protection of the specified metallic areas from corrosion.

2. GENERAL

2.1. REFERENCES:
2.1.1. E-400 Exterior Cathodic Protection Plan, Elevation and Details
2.1.2. E-401 Interior Cathodic Protection Plan, Elevation and Details

2.2. SUBMITTALS
2.2.1. Foundry Chemical and Electrical Analysis Reports for Anodes. Submit all factory test results of anode composition and electrical efficiency for approval prior to anode shipment.

2.3. QUALITY ASSURANCE
2.3.1. Anode material shall conform to Military Specification MIL-A-1801J & ASTM-B-418-73, Type 1.

3. REQUIREMENTS:
3.1. Anodes: Install zinc anodes on the exterior hull, main tanks and trim tanks.
3.2. Hull Protection: Exterior anodes shall be per MIL-A-18001K Type ZHC-42, zinc hull slab (core strap), submarine application. Fasten anodes to hull with pre-installed steel studs either arc welded to the hull or friction welded to the hull by the Contractor. Stud dimensions and anode installation details shall be according to manufacturer's instructions for hull mounted anodes. The location and quantity of anodes shall be as indicated on the drawings.
3.3. Tank Protection: Interior anodes shall be as indicated. Install zinc anodes on the interior structure (hull, bulkheads, catwalk and members of the main tanks and trim tanks). Fasten anodes to structure with 1-1/2" pre-installed steel studs either welded to the structure or friction welded to the structure by the Contractor. Fasten anode straps tightly to the structure with standard steel nuts and provide a secure electrical connection by means of a pointed mild steel screw driven through the anode strap nut until the pointed end has displaced all coating and other material and has mushroomed against the steel of the structure. The location and quantity of anodes are as indicated on the drawings.

4. OPERATIONAL TEST
4.1. Refer to Work Item 095-633 for testing of cathodic protection system.

5. NOTES:
5.1. None.

6. GOVERNMENT FURNISHED MATERIAL (GFM):
6.1. None.

ITEM # 634
DESCRIPTION: Deck Coverings

SCOPE: This specification governs the installation of deck coverings.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. ASTM D178 – Standard Specification for Rubber Insulating Matting

   1.2. SUBMITTALS
      1.2.1. None

   1.3. QUALITY ASSURANCE
      1.3.1. Comply with the requirements herein.

2. REQUIREMENTS:
      2.1.1. Prior to the application of any deck covering ensure that the deck is free of moisture, rust, grease, oil, scale, loose and deteriorated paint and other extraneous matter. Complete attachments to and penetrations of the structure to be covered before any deck covering is installed. Test structure, prior to application of decking products, as required by Work Item 095.
      2.1.2. Application of Paint and Non-skid coatings are addressed in Work Item 631.
      2.1.3. Install electrical grade rubber mats in accordance with ANSI/ASTM D178 on decks located in compartments with electrical equipment. Install the mats in way of operating and servicing areas of electrical panels and switchboards. Provide mat of not less than 36 inches wide and install over a minimum area necessary to prevent the hazards of electrical shock. Round off exposed corners.

3. OPERATIONAL TEST
   3.1. None

4. NOTES:

   4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

   5.1. None.

ITEM # 636
DESCRIPTION: Permanent Concrete Ballast

SCOPE: Install permanent cast-in-place concrete ballast at the locations indicated in the drawings to adjust the required weight and stability of the caisson.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. Drawing G-200 Fixed Ballast Arrangement
      1.1.2. ACI 318-05 Building Code Requirements for Structural Concrete
      1.1.3. ACI 211 Proportioning Concrete Mixtures
      1.1.4. ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete
      1.1.5. ASTM C150 Portland Cement
      1.1.6. ASTM C260 - 06 Standard Specification for Air-Entraining Admixtures for Concrete
      1.1.7. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
      1.1.8. ASTM C637 Standard Specification for Aggregates for Radiation-Shielding Concrete
      1.1.9. ASTM C638 Standard Descriptive Nomenclature of Constituents of Aggregates for Radiation-Shielding Concrete

   1.2. SUBMITTALS
      1.2.1. Furnish submittals as required below and as indicated elsewhere in this document.
      1.2.2. Shop Drawings indicating placement, sequences, pour stops and lifts.
      1.2.3. Details of proposed concrete mix including, mix proportions in accordance with ACI 318.
      1.2.4. Concrete supplier's density test reports and final quality report.
      1.2.5. Test Reports:
         a. Concrete Mix Proportions
         b. Aggregates
         c. Admixtures
         d. Cement

   1.3. QUALITY ASSURANCE
      1.3.1. Furnish Quality Assurance requirements as listed below and as indicated elsewhere in this document.
      1.3.2. Concrete Mix Design: Submit a complete list of materials and proportions. Mixture shall be prepared by an accredited laboratory experienced in this field and under the direction of licensed registered engineer.
      1.3.3. Concrete Placement and Design: Submit technical literature for equipment and methods proposed for use in placing concrete. Include pumping or conveying equipment including type, size and material for pipe, value characteristics, and maximum length and height concrete will be pumped. Submit technical literature for equipment and methods proposed for vibrating and compacting concrete.

2. REQUIREMENTS:
   2.1. General: The permanent ballast consists of cast-in-place concrete. Provide concrete material specification and method of installation in accordance with the drawings and this specification. Ensure that the structure and plating is adequately braced or shored

to maintain their position and not be subject to unacceptable stresses due to the placement of the permanent ballast concrete.

2.2. Materials and Mix design

2.2.1. Materials: Unless indicated otherwise, concrete materials strength and density is as indicated on the drawings.

a. Heavyweight concrete shall conform to the requirements of ACI 211 and ACI 304.

b. Cement – Provide Type II Portland cement conforming to ASTM C 150. (The use of Type III cement is prohibited.)

c. Aggregates – Concrete Aggregates shall conform to ASTM C 637 and ASTM C 638.

d. Admixtures:

2.2.1.d.1. Water Reducing Admixtures – Water reducing admixtures may be used conforming to the requirements of ASTM C 494, Type A, for water reducing; Type D for water reducing and retarding; and Type F for water reducing and high range.

2.2.1.d.2. Air Entraining Admixtures – Air entraining admixtures may be used conforming to the requirements of ASTM C 260.

2.2.1.d.3. Prohibit the use of admixtures containing calcium chloride or other water soluble chloride ions containing more than 0.05 percent chloride ions (per weight of cement).

2.2.1.d.4. Incorporate concrete admixtures in accordance with the manufacturer's written recommendations and as approved by the Government. Submit proposal to use admixtures from different admixture manufacturers containing evidence that the admixture will be compatible and not adversely affect the concrete.

e. Bonding Agents: Epoxy Bonding Agents – Use epoxy bonding agents to bond permanent ballast concretes to the caisson steel structure. Provide epoxy bonding agents from the same manufacture that supplied the coating system used for the steel in the Main Ballast and Trim Tanks.

f. Cement Bond Grout – Unless otherwise noted, utilize cement bond grout to bond previously placed and cured permanent ballast concrete to fresh permanent ballast concrete. Mix cement bond grout with potable water to a consistency of heavy cream.

g. Concrete Mix Design – Proportion the concrete mix such that it will work readily into the corners and angles of the caisson with the least possible segregation of the material and preventing excess free water to collect on the surface.

h. Insure the mix designs conform to the strength and density requirements indicated on the drawings.

i. Choose slump to enhance workability without violating the specified maximum admixtures may be used to obtain the desired workability and water/cement ratio of the mix.

2.2.1.i.1. Note: Determine density of the concrete mix based on the pre-ballast weight report. See Work Item 096. Required density of concrete is estimated at 219 pounds per cubic foot.

2.2.2. Submit details of proposed concrete mix including, mix proportions in accordance with ACI 318. Deviations from any approved mix design without written authorization will not be permitted.

2.2.3. Proportion concrete ballast mix to the concrete supplier's written specifications.

2.3. Formwork

2.3.1. Design and construct all necessary formwork in accordance with the applicable parts of ACI 347. Insure forms are sufficiently tight to prevent leakage of grout or cement paste.

2.3.2. Remove all temporary formwork upon completion of concrete curing including weld remnants.

2.4. Welded Studs

2.4.1. Provide welded studs conforming to ASTM A 108 and installed in the location shown on the drawings in accordance with AWS D1 .1 , Chapter 7.

2.5. Execution

2.5.1. Preparation: Prior to placing permanent concrete ballast, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where concrete installation may properly commence.

2.5.2. Verify that all items to be imbedded in concrete are in place, properly oriented, located and secured.

2.5.3. Thoroughly clean all areas that will receive concrete to remove all debris and deleterious materials.

2.5.4. Coat the steel surfaces, to receive epoxy-bonding agent, according to the requirements of Work Item 631. Apply the epoxy-bonding agent at 6 to 8 MIL WFT. Cast the permanent ballast concrete against epoxy bonding agent that has been cured to a tack-free surface condition.

2.5.5. Clean and roughen construction joints on existing cured concrete from a previous placement to provide a ¼-inch minimum amplitude surface to provide a bondable surface. Remove all loose concrete and laitance. Unless otherwise noted, wet and thoroughly coat all cleaned joints with neat cement bond grout immediately prior to placing fresh concrete.

2.5.6. Batching and Mixing Concrete: Batch concrete according to the manufacturer's written recommendations.

2.5.7. Placing Concrete: Carefully place concrete deposited in its final position by tremie, pumping, conveyor, or other approved method and distributed after being deposited. The use of an aluminum tube is prohibited. Provide shoring of the caisson steel plating or carefully control the rate of placing the concrete to prevent buckling of the steel plating or structures.

2.5.8. Consolidating Concrete: Compact all concrete, with the exception of concrete 4 inches, or less in depth, with high frequency, internal mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete, 4 inches or less in depth by wood tampers, spading and settling with a heavy leveling straight edge. .Provide hand tamping wherever necessary to secure a smooth and dense concrete in the outside surfaces. Provide vibrators designed to operate with vibratory element submerged in the concrete, and having a frequency of not less than 6,000 impulses per minute when submerged. Insure that the concrete becomes uniformly plastic through vibration. Insert vibrators to a depth sufficient to vibrate the bottom of each layer effectively, but do not allow vibrator to penetrate partially hardened concrete. Prohibit application of vibrators directly to steel, which extends into partially hardened concrete. Space points of insertion not less than 2 feet nor more than 3 feet apart. Insure the vibrating equipment is adequate at all times in number of units and power of each unit to consolidate the concrete properly. Prohibit vibration of forms and reinforcement except when authorized specifically by the COR. Discontinue vibration when the concrete has been compacted thoroughly and ceases to decrease in volume.

2.5.9. Cold Weather – ACI 306R. Provide and maintain 50 degrees F minimum concrete temperature. Do not place concrete when the ambient temperature is below 40 degrees F. Cover concrete and provide with a source of heat sufficient to maintain 50 degrees F minimum while curing.

2.5.10. Hot Weather – ACI 305R. Concrete temperature from initial mixing through final cure shall not exceed 90 degrees F, Cool ingredients before mixing, or substitute chip ice for part of required mixing water or use other suitable means to control concrete temperature to prevent rapid drying of newly placed concrete. Start curing as soon as the surface of the fresh concrete is sufficiently hard to permit curing without damage.

2.5.11. Finishing Concrete: Broom finish the top surface of the concrete, unless noted otherwise. Intentionally roughen concrete construction joints according to the requirements for Preparation in this section.

2.5.12. Curing Concrete: Refer to ACI 308 for recommended practices for curing concrete. Commence curing as soon as possible on completion of final finishing operations. Cure freshly placed concrete using absorptive mats or fabric keeping it continuously wet for a minimum of 7 days.

3. OPERATIONAL TEST

3.1.1. Testing of concrete material is the responsibility of the Contractor. Perform testing using an accredited testing agency approved by the Government. Perform field inspection, sampling, evaluation, testing and acceptance in conformance with the requirements of ACI 301 Chapter 16. Perform two additional tests for determining the unit weight of the concrete permanent ballast per 50 cubic yards or fraction thereof placed per day. Perform the following tests:

a. Consistency of Concrete: Determine slump in accordance with ASTM C 143. Take samples for slump determination from the concrete during placing in the caisson. Insure slump conforms to the submitted concrete mix design and the tolerance for slump conforms to ASTM C 94.

b. Air Content: Measure the amount of entrained air at the discharge end of the hose during placing in the caisson in accordance with ASTM C 173.

c. Unit Weight: Determine unit weight in accordance with ASTM C 567. Reject concrete that has unit weights outside the tolerances provided on the drawings. Make changes, at Contractor expense, or modifications necessary to make the structure adequate.

d. Strength: Test concrete compressive strength specimens in accordance with ASTM C 39.Conduct a watertight testing in accordance with 095-192.

4. NOTES:

4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.

ITEM # 691
DESCRIPTION: Caisson Seals

SCOPE: Install the caisson seals on both sides of the keel and stem in accordance with this work item.

1. GENERAL
   1.1. REFERENCES:
      1.1.1. None.

   1.2. SUBMITTALS
      1.2.1. Provide manufacturer's or fabricator's procedures (FP), material testing and certification (MT), catalog data (CD), shop drawings (SD), installation drawings (ID), installation instructions (II), and weld and welder qualifications (WQ) for the following, showing that the items and procedures for use in the contract are in compliance with the contract documents.
         a. Elastomer (MT)
         b. Joint filler (CD, II)
         c. Caisson seals (FP, SO, 10, II)
         d. Steel plates (MT)
         e. Monel studs, nuts and washers (CD, MT, WQ)
         f. Load/deflection curve (MT)
         g. Cyclic testing (MT)
      1.2.2. Submit written test results to the COR for approval.

   1.3. QUALITY ASSURANCE
      1.3.1. Seal shall be installed within manufacturer's tolerances. Prior to launch the seal shall be inspected for installation tolerances and any defects. Noted discrepancies shall be corrected prior to launch.

2. REQUIREMENTS:
   2.1. Materials
      2.1.1. Provide seal material and embedded steel plates as indicated on the drawings.
      2.1.2. Provide Monel 400 threaded studs, hex nuts and washers as indicated on the drawings.
      2.1.3. Mold seals to the shape and length indicated on the drawings. Gaps between seal segments must be less than 1/8 inch with no load on the seal. The gap must close to water tight as demonstrated in the seal tests specified in Section 095-842a. Permanently bond the steel plate inside each seal section. Provide corrective action for leaking seals as indicated in Section 095-842b and once approved, implement corrective action at no additional cost to the Government. Conduct additional acceptance testing only after validation that a leak-free installation is achieved.
      2.1.4. Provide seals with smooth surfaces; however, normal mold machining grooves are allowed. Limit defects to a maximum length of 2 inches and a maximum depth of 1/8 inch.
      2.1.5. Utilize a polyurethane-based, fast-cure marine adhesive and sealant approved by ABS and having properties similar to the following to seal joints between individual lengths of seals and between seals and hull plating:

Chemical Base:	1-C polyurethane
Color:	Black
Cure Mechanism:	Humidity-curing
Density (uncured):	10.8 lb/gal depending on color
Non-sag properties:	Good
Application Temperature product:	40F to 105F (5C to 40C)
Tack free time:	60 min
Open time:	45 min
Shrinkage:	5%
Shore A-hardness (ASTM D 2240):	40
Tensile Strength (ASTM D 412):	260 psi
Elongation at Break (ASTM D 412):	500%
Tear Propagation Resistance (ASTM D 624):	34 psi
Glass Transition Temperature:	-50F (-45C)
Movement Accommodation Factor:	12.5%

2.2. Welding Monel Studs

2.2.1. Welding the Monel 400 studs to the hull plating is critical to a proper installation of the seals. Develop and qualify a weld procedure in accordance with AWS D1.1 and NCEL TM No M-42-92-05 Appendix C ("Improved Seals for Graving Drydock Caissons," dated December 1992) that will result in sound, full-strength welds compatible with both the studs and the carbon steel or low-alloy carbon steel base metal. Consider the dissimilarity of metals, relative shrinkage rates, presence of deleterious levels of sulfur and phosphorus in the base metal, whether pre- and post-heating is required, and the use of appropriate filler metal as specified in Section 074.

2.2.2. Successfully complete testing to qualify the proposed procedure and welder(s) in addition to the qualification testing required by AWS D1.1. Permit only welders qualified by performing this test to weld Monel studs.

2.2.3. Locate studs with a template taken from the preassembled seal panels. Weld studs in the proper location, square to the hull plating, and to each other. Proof all studs with a sharp hammer blow to the nut after welding and prior to installation of seal.

2.3. After installation and testing of Monel studs and before installation of rubber seal, the bottom 1" of the monel studs and adjacent steel surfaces should be cleaned and coated with the same coating as the caisson exterior surfaces. The upper 1-1/2" of the stud should not be coated. Coating is required to prevent corrosion where dissimilar metals are welded together.

2.4. Testing and Inspection

2.4.1. Insure the seal fabricator performs the following tests and prepares the submittals required therein:

a. Load test a 12-inch section of the seal to determine the load/deflection characteristics of the seal. Apply the load in 10,000-pound increments to a total load of 150,000 pounds. Measure the deflection of the seal at each load increment. Plot the load deflection curve and submit to the COR increment. Plot the load deflection curve and submit to the COR for approval prior to

fabricating any seals. Target values for this test are listed in Table 9 – SEAL LOAD TEST CRITERIA.

Table 9 – SEAL LOAD TEST CRITERIA

LOADING CONDITION	DEFLECTION (INCH)	LOAD (POUNDS)	LOAD VARIANCE (POUNDS)
Frequent	1.16	105,000	+/- 5,000
Occasional	1.32	130,000	+/- 6,500

b. If the load/deflection curve falls outside of the variance of these two values, the COR (at his/her discretion) may require that the durometer of the rubber be modified and a new section of seal fabricated and retested at no additional cost to the Government.

c. Test for compliance, the rubber seal material with the physical tests listed in the drawings. Conduct the tests in an independent laboratory approved by the COR.

d. Load the test seals for a minimum of 20 cycles to a load of 150,000 pounds for each cycle following completion of the load/deflection test. Inspect the sides of the seal (not the ends) for any cracks or deterioration of the rubber material. Submit, following completion of the cyclic testing, a report (with pictures of the sides) to the COR for approval prior to fabricating the seals.

2.4.2. Testing welding procedures for Monel stud: Include welding a test specimen up from 12 studs and a steel base made from the same lot of plate as the hull plating the seals are to be mounted on as part of qualification of the Contractor's proposed procedure for welding Monel studs to carbon steel or low-alloy carbon steel, for each of the welder(s). Provide plate of the same thickness and width and at least 1 foot longer on each end than the stud pattern. Provide studs of the same diameter and length as the seal attachment detail on the drawings and locate in a pattern identical to the seal bolt holes on a typical piece. Weld studs to the base plate with the work in the same orientation as it will be fabricated in the yard. After the welds have been cleaned and have cooled, verify and report that all studs are square to the plate and parallel to each other. Visually inspect all welds. Subject all studs to a 30-degree bend test. Insure all studs are square and parallel when completed and pass both visual inspection and bend testing to qualify the procedure. If one or two studs do not pass, remove, re-weld, and retest them. If more than two studs fail to pass, weld up another specimen with 12 studs and repeat the test and inspection. Report results in accordance with AWS requirements for qualification testing.

2.5. Dimensional Tolerances: The dimensional tolerances for the molded seals are as follows:

2.5.1. Flange thickness: ± 1/16 inch

2.5.2. Overall height: ± 1/8 inch

2.5.3. Overall width: ± 3/16 inch

2.5.4. Height difference: ± 1/32 inch when measured at any two points that are 2 inches apart along the length of the seal.

2.5.5. Surface flatness: ± 1/8 inch over any 8-foot-long segment of the seal at the sealing surface, with no load on the seal. Measure offsets using an 8-foot straightedge approved by the COR.

2.6. Verification of the Seal Layout

2.6.1. Before shipping the seals from the manufacturing facility to the caisson fabrication site, assemble sections of the seal in the final arrangement to be installed on each side of the caisson. Verify that alignment of each seal matches the final location of the seal on the caisson. Adjust sections of the seal and joints between sections to provide a continuous seal with no gaps, bulges, or other discontinuities. Physically

mark each seal section to identify its final location for final placement on the caisson. Install Monel studs using a template taken from the preassembled seal.

2.7. Seal Installation

2.7.1. Install the seals in their marked location in accordance with NCEL TM No M-42-92-05, "Improved Seals for Graving Drydock Caissons," Appendix C, dated December 1992.

2.7.2. Verify that alignment of each seal matches the location required to install all of the seals in their proper final location to provide a continuous seal with no gaps, bulges, or other discontinuities. Prohibit grinding of the seals. Insure variations in seal flatness are no more than 1/8 inch in any 8-foot segment measured at any location along the completed seal. Tighten the adjacent seals sequentially to squeeze out any excess joint filler to provide a final seal between sections and to compress bulb at backside of seal a minimum of ¼ inch against caisson to form a tight seal. In addition to these directions, follow any further recommendations from the seal manufacturer to achieve a watertight joint.

3. OPERATIONAL TEST

3.1. Refer to Work Item 095-691 for testing of caisson seal.

4. NOTES:

4.1. None.

5. GOVERNMENT FURNISHED MATERIAL (GFM):

5.1. None.