

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
AUTEC PIER 1902 Repairs

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVTOR CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				REMARKS		
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		01 14 00.00 25	SD-01 Preconstruction Submittals														
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		01 35 26.00 25	Accident Reports	1.12.2													
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		01 57 19.00 25	Storm Water Inspection Reports for General Permit														
			Contractor 40 CFR employee training records	1.5.5													
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			Warranty Tags	1.6.4														
			Spare Parts Data	1.4														
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		02 41 00	Notification of Demolition and Renovation form														
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			Worker Qualifications	1.7.1.2	G												
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		03 01 32	SD-08 Manufacturer's Instructions														
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			Admixtures	1.7.6.2	G												
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			Application instructions	3.2.1													
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		26 05 33	SD-03 Product Data														
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			Minimum Tensile Strength	2.2													
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			Modulus at 400 Percent														
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			Maximum Compression Set	2.2													
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-- End of Project Table of Contents --

SECTION 01 11 00.00 25

SUMMARY OF WORK
10/11
NAVFAC SE VERSION

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 2114 (2008) Standard Terminology for Sustainability Relative to the Performance of Buildings

1.2 DEFINITIONS

Definitions pertaining to sustainable development are as defined in **ASTM E 2114**, Section **01 57 19.00 25** TEMPORARY ENVIRONMENTAL CONTROLS and as specified.

- a. "Environmentally preferable products" have a lesser or reduced effect on the environment in comparison to conventional products and services. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product.
- b. "Indoor environmental quality" is the physical characteristics of the building interior that impact occupants, including air quality, illumination, acoustics, occupant control, thermal comfort, daylighting, and views.
- c. "Operational performance" is the functional behavior of the building as a whole or of the building components.
- d. "Sustainability" is the balance of environmental, economic, and societal considerations.

1.3 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** SUBMITTAL PROCEDURES:

SD-07 Certificates

1.4 WORK COVERED BY CONTRACT DOCUMENTS

1.4.1 Project Description

The work includes repairs to the primary operational pier facility at Andros Island, Bahamas. Repairs include repairs to the substructure,

super-structure, deck, mooring/berthing system and appurtenances, and incidental with 100% of its design capability.work. After the repairs are completed the pier shall return to its original design condition.

1.4.2 PHASING

Project shall be phased and sequenced as indicatted so that pier is operational at all times. Each phase must be complete and useable upon completion.

1.4.3 Location

The work shall be located at the Atlantic Undersea Testing and Evaluation Center (AUTECH) where indicated.

1.5 PROJECT ENVIRONMENTAL GOALS

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

- a. Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion. Minimize offsite environmental impact.
- b. Use the minimum amount of energy, water, and materials feasible to meet the design intent. Select energy and water efficient equipment and strategies.
- c. Use environmentally preferable products and decrease toxicity level of materials used.
- d. Use renewable energy and material resources.
- e. Optimize operational performance (through commissioning efforts) in order to ensure energy efficient equipment operates as intended. Consider the durability, maintainability, and flexibility of building systems.
- f. Reduce construction waste through reuse, recycling, and supplier take-back.

1.6 EXISTING WORK

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

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.7 LOCATION OF UNDERGROUND FACILITIES

Obtain digging permits prior to start of excavation by contacting the Contracting Officer 15 calendar days in advance. Scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground, pier deck or paved surface where existing underground utilities or utilities encased in pier structures are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated to be specified or removed but indicated or discovered during scanning in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.7.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 14 00.00 25

WORK RESTRICTIONS
12/11
NAVFAC SE VERSION

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 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel; G

1.2 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 pier will remain in operation during the entire construction period. 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 Activity 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.

1.2.1 SPECIAL CONDITIONS FOR AUTEC

- (1) Coordinate closely with Contracting Officer to ensure minimal impact to ongoing mooring, berthing, and loading/unloading operations. The work will take place in the main facility for base supply and resupply, therefore it is imperative the construction effort minimize disruptions to the extent possible considering the nature of the work.
- (2) Due to security sensitive nature of the facility and ongoing operations, coordinate closely with Contracting Officer and Base Housing to ascertain availability of berthing for Contractor personnel, evolving security requirements, and possible alternatives.
- (3) All materials and products brought onto the island must be on the Authorized Use List (AUL). An Authorized Use List (AUL) is included electronically as part of the contract documents. Any items not on this list will not be allowed on the island.

- (4) The Contractor is not allowed to use the AUTECH main pier due to required repairs to the pier. The Contractor is required to use their own barge to transport equipment. The AUTECH barge cannot be utilized for this contract. For informational purposes, the AUTECH barge is a Roll on/Roll off type of barge which unloads at the Harrison Wharf.
- (5) Required export and entry documentation is required for ships and barges entering the port at AUTECH. Foreign flag vessels will require a longer notification time for clearance.
- (6) The Contractor shall provide their own crane for off-loading their barge. The AUTECH Crane is not available for the off-loading of Contractor barges.
- (7) The use of the AUTECH crane for pier repairs is not allowed. The AUTECH crane is on base to meet the needs of the AUTECH mission and their needs shall come before the Contractor's. The Contractor is allowed to bring their own Crane on Base provided it meets Navy Crane Center Requirements. The Contractor is required to submit their estimated Crane schedule 60 days prior to use and verify AUTECH operations will not be impacted at the weekly coordination meeting. Limited crane access or schedule delays due to crane availability will NOT be a reason for change orders.
- (8) All material handling devices shall be inspected and certified per the Navy Crane Center. All cranes, winches, specialty rigging, spreader bars, etc. brought on island by the Contractor shall be documented and certified by the Navy Crane Center prior to use, no exceptions.
- (9) The Contractor shall provide means for transporting equipment and supplies to the project site. There is a truck cab on island driven by base personnel which may not be used to deliver the equipment to the project site.
- (10) Backhoes, trenchers, graders, forklifts, concrete mixers, extended trailers, and all other equipment shall be provided by the contractor with operators licensed and certified in accordance with OSHA and US Navy Instructions.
- (11) All vehicles shall have a valid Bahamian Registration and Insurance.
- (12) Contractor shall be self-contained. They shall bring all their own equipment and spare parts, lubricants, tools, mechanics, etc. There are no mechanics and spare parts available to them on the base nor off the base.
- (13) Fuel is available for purchase from DESC at current Base prices.
- (14) The Contractor shall provide their own concrete materials, batch plant, and trucks.
- (15) Berthing will be made available on base for Contractor personnel at the prevailing rate (\$25/night per person). Berthing is expected to be limited to dual occupancy (two people per room) with one bathroom/shower per room. Meals are available from the

mess hall at \$3 for breakfast, \$6 for lunch, and \$6 for dinner.

(16) The Contractor is allowed to furnish their own housing trailers for the superintendent and management team.

(17) The Contractor will be able to purchase meals at the main mess at the current rate.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES

1.3.1 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. 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.

1.3.1.1 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.

1.3.1.2 Identification Badges and Installation Access

All personnel visiting AUTEC shall comply with Clearance Requirements. Foreign nationals must be escorted by security personnel at all times and may not reside on base. In addition, special clearance procedures apply. For more information, please refer to the following webpage:

<http://www.navsea.navy.mil/nuw/newport/autec/Pages/Unofficial%20class%20visit.aspx>

1.3.1.3 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installations under the cognizance of NAVFAC SE 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.

1.3.2 Working Hours

Regular working hours shall consist of an 8 1/2 hour period established by the Contractor Officer, between 7:30 and 4:00., Monday through Friday, excluding Government holidays.

1.3.3 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. 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.

1.3.4 Exclusionary Period

No work shall be performed during certain periods as directed by ongoing operational requirements without prior written approval of the Contracting Officer. These outages have not been considered in computing the time allowed for the performance of this contract.

1.3.5 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, and data shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours."
- d. Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

1.4 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," applies.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 20 00.00 25

PRICE AND PAYMENT PROCEDURES
12/11
NAVFAC SE VERSION

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.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP-1110-1-8

(2009) Construction Equipment Ownership
and Operating Expense Schedule

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. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Earned Value Report; G

1.3 EARNED VALUE REPORT

1.3.1 Data Required

This contract requires the use of a cost-loaded Network Analysis Schedule (NAS). The information required for the Schedule of Prices will be entered as an integral part of the Network Analysis Schedule. Within 15 calendar days of notice of award, prepare and deliver to the Contracting Officer an Earned Value Report (construction contract) as directed by the Contracting Officer. Provide a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, and extended prices. Costs shall be summarized and totals provided for each construction category.

1.3.2 Schedule Instructions

Payments will not be made until the Earned Value Report from the cost-loaded NAS has been submitted to and accepted by the Contracting Officer. Identify the cost for site work, and include incidental work to the 5 ft line. Identify costs for the building(s), and include work out to the 5 ft line. Work out to the 5 ft line shall include construction encompassed within a theoretical line 5 ft from the face of exterior walls and shall include attendant construction, such as pad mounted HVAC cooling equipment, cooling towers, and transformers placed beyond the 5 ft line.

1.3.3 Real Property Assets

The Government will provide the Draft DD Form 1354, Transfer and Acceptance of Military Real Property filled in with the appropriate Real Property Unique Identifiers (RPUID) and related construction Category Codes to summarize the designed real property assets that apply to this contract. The Contractor shall meet with the Contracting Officer and the Real Property Accounting Officer during the Pre Construction Meeting and the Project Closeout Meetings to modify and include any necessary changes to the DD Form 1354. The Contractor shall provide the Interim DD Form 1354 that uses the appropriate division of the RPUIDs/ Category Codes to represent the final constructed facility and include all associated cost. Coordinate the Contractor's Price and Payment structure with the structure of the RPUIDs/ Category Codes.

Divide detailed asset breakdown into the RPUIDs and related construction Category Codes and populate associated costs which represent all aspects of the work. Where assets diverge into multiple RPUID/ Category Codes, divide the asset and provide the proportion of the assets in each RPUID/ Category Code. Assets and related RPUID/ Category Codes may be modified by the Contracting Officer as necessary during course of the work. Coordinate identification and proportion of these assets with the Government Real Property Accounting Officer.

Cost data accumulated under this section are required in the preparation of DD Form 1354.

1.4 CONTRACT MODIFICATIONS

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, equipment use rates shall be based upon the applicable provisions of the [EP-1110-1-8](#).

1.5 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

1.5.1 Content of Invoice

Requests for payment will be processed in accordance with the Contract Clause FAR 52.232-27, Prompt Payment Construction Contracts and FAR 52.232-5, Payments Under Fixed-Price Construction Contracts. The requests for payment shall include the documents listed below.

- a. Updated Project Schedule and reports required by the contract.
- b. Contractor Safety Self Evaluation Checklist.
- c. Other supporting documents as requested.
- d. Updated copy of submittal register.
- e. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies.
- f. Contractor's Monthly Estimate for Voucher (NAVFAC LANT Form 4-330/110 (New 7/84)) with Subcontractor and supplier payment certification.
- g. Affidavit to accompany invoice (NAVFAC LANT NORVA Form 4-4235/4

(Rev.5/81)).

h. Materials on Site.

1.5.2 Submission of Invoices

If Clause 252.232-7006 "Wide Area Work Flow Payment Instructions" is included in the contract; the documents listed in paragraph "CONTENT OF INVOICE" shall be provided in their entirety as attachments in Wide Area Work Flow (WAWF) for each invoice submitted. The maximum size of each WAWF attachment is two megabytes, but there are no limits on the number of attachments. If a document cannot be attached in WAWF due to system or size restriction it shall be provided as instructed by the Contracting Officer.

Monthly invoices and supporting forms for work performed through the anniversary award date of the contract shall be submitted to the Contracting Officer within 5 calendar days of the date of invoice. For example, contract award date is the 7th of the month, the date of each monthly invoice shall be the 7th and the invoice shall be submitted by the 12th of the month.

1.5.3 Final Invoice

- a. A final invoice shall be accompanied by the certification required by DFARS 252.247.7023 TRANSPORTATION OF SUPPLIES BY SEA, and the Contractor's Final Release. If the Contractor is incorporated, the Final Release shall contain the corporate seal. An officer of the corporation shall sign and the corporate secretary shall certify the Final Release.
- b. For final invoices being submitted via WAWF, the original Contractor's Final Release Form and required certification of Transportation of Supplies by Sea must be provided directly to the respective Contracting Officer prior to submission of the final invoice. Once receipt of the original Final Release Form and required certification of Transportation of Supplies by Sea has been confirmed by the Contracting Officer, the Contractor shall then submit final invoice and attach a copy of the Final Release Form and required certification of Transportation of Supplies by Sea in WAWF.
- c. Final invoices not accompanied by the Contractor's Final Release and required certification of Transportation of Supplies by Sea will be considered incomplete and will be returned to the Contractor.

1.6 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

1.6.1 Obligation of Government Payments

The obligation of the Government to make payments required under the provisions of this contract will, at the discretion of the Contracting Officer, be subject to reductions and/or suspensions permitted under the FAR and agency regulations including the following in accordance with "FAR 32.503-6:

- a. Reasonable deductions due to defects in material or workmanship;
- b. Claims which the Government may have against the Contractor under or in connection with this contract;
- c. Unless otherwise adjusted, repayment to the Government upon demand for overpayments made to the Contractor; and
- d. Failure to provide up to date record drawings not current as stated in Contract Clause "FAC 5252.236-9310, Record Drawings."

1.6.2 Payment for Onsite and Offsite Materials

Progress payments may be made to the contractor for materials delivered on the site, for materials stored off construction sites, or materials that are in transit to the construction sites under the following conditions:

- a. FAR 52.232-5(b) Payments Under Fixed Price Construction Contracts.
- b. Materials delivered on the site but not installed, including completed preparatory work, and off-site materials to be considered for progress payment shall be major high cost, long lead, special order, or specialty items, not susceptible to deterioration or physical damage in storage or in transit to the construction site. Examples of materials acceptable for payment consideration include, but are not limited to, structural steel, non-magnetic steel, non-magnetic aggregate, equipment, machinery, large pipe and fittings, precast/prestressed concrete products, plastic lumber (e.g., fender piles/curbs), and high-voltage electrical cable. Materials not acceptable for payment include consumable materials such as nails, fasteners, conduits, gypsum board, glass, insulation, and wall coverings.
- c. Materials to be considered for progress payment prior to installation shall be specifically and separately identified in the Contractor's estimates of work submitted for the Contracting Officer's approval in accordance with Earned Value Report requirement of this contract. Requests for progress payment consideration for such items shall be supported by documents establishing their value and that the title requirements of the clause at FAR 52.232-5 have been met.
- d. Materials are adequately insured and protected from theft and exposure.
- e. Provide a written consent from the surety company with each payment request for offsite materials.
- f. Materials to be considered for progress payments prior to installation shall be stored either in Hawaii, Guam, Puerto Rico, or the Continental United States. Other locations are subject to written approval by the Contracting Officer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

PIER 1902 REPAIRS
AUTECH Site 1

Work Order No. 1302903
Andros Island, Bahamas

-- End of Section --

SECTION 01 30 00.00 25

ADMINISTRATIVE REQUIREMENTS

09/12

NAVFAC SE VERSION

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 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View location map; G

Progress and completion pictures; G

1.2 PROGRESS AND COMPLETION PICTURES

Photography in a controlled access area is restricted and may be classified, therefore photographs taken before, during, and after construction shall be provided to the designated security official for review and approval prior to removal from AUTECH. Review Section 1-10 of NAVSEAINST 5510.2C "NAVSEA Access and Movement Control."

Photographically document site conditions prior to start of construction operations. Provide monthly, and within one month of the completion of work, digital photographs, 1600x1200x24 bit true color minimum resolution in JPEG file format showing the sequence and progress of work. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten views from points located by the Contracting Officer. Submit a view location sketch indicating points of view. Submit with the monthly invoice two sets of digital photographs each set on a separate CD-R, cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Photographs for each month shall be in a separate monthly directory and each file shall be named to indicate its location on the view location sketch. The view location sketch shall also be provided on the CD as digital file. All file names shall include a date designator. Cross reference submittals in the appropriate daily report. Photographs shall be provided for unrestricted use by the Government.

1.3 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.

1.4 CONTRACTOR SPECIAL REQUIREMENTS

Contractors cannot bring foreign nationals to AUTECH, Andros Island.

1.5 SUPERVISION

Have at least one qualified supervisor capable of reading, writing, and conversing fluently in the English language on the job site during working hours. In addition, if a Quality Control (QC) representative is required on the contract, then that individual shall also have fluent English communication skills.

1.6 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 or earned value report, shop drawings, and other submittals, scheduling programming, prosecution of the work, and clear expectations of the "Interim DD Form 1354" Submittal. Major subcontractors who will engage in the work shall also attend.

1.7 FACILITY TURNOVER PLANNING MEETINGS (NAVFAC Red Zone - NRZ)

Key personnel will meet to identify strategies to ensure the project is carried to expeditious closure and turnover to the Client. Start the turnover process at the Pre Construction Conference meeting and convene at the Facility Turnover Meetings once the project has reached approximately 75 percent completion or three to six months prior to Beneficial Occupancy Date (BOD), whichever comes first. The Contracting Officer's Representative will lead the meetings and guide discussions based on an agenda provided by the Government. The facility Turnover effort shall include the following:

- a. Pre Construction Meeting - Contracting Officer's Technical Representative (COTR) will provide the NRZ Checklist and the Contractor, Client, and NAVFAC Representatives will compare Contractor's schedule to NRZ Checklist items.
- b. Facility Turnover Meetings
 1. Fill in the NRZ Checklist including Contractor, Client, and NAVFAC Checklist Items and assign a person responsible for each item and a due date. The Contractor's Representative will facilitate the assignment of responsibilities, fill out the NRZ Checklist, and discuss "Interim DD Form 1354" requirements.
 2. Review the Contractor's updated schedule. The Contractor shall develop a POAM for the completion of all Contractor, Client, and NAVFAC Checklist items.
 3. Confirm that all NRZ Checklist items will be completed on time for the scheduled Facility Turnover.

1.8 EXPORT LICENSES FOR OVERSEAS PROJECTS

Obtain individual export licenses and project export licenses required by the Department of Commerce regulations (15 CFR 772 and 15 CFR 773) so that no delays are experienced in shipping from the United States of America to a foreign country. For additional information, the Contractor may contact one of the U.S. and Foreign Commercial Service District Offices of the Department of Commerce which are located in almost every State.

1.9 PARTNERING

To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership within the Project Team whose members are from the Government, the Contractor and their Subcontractors. Key personnel from the Supported Command, the End User (who will occupy the facility), NAVFAC (Echelon III and IV), the Navy Region/Installation, the Contractor and Subcontractors, and the Designer of Record will be invited to participate in the Partnering process. The Partnership will draw on the strength of each organization in an effort to achieve a project that is without any safety mishaps, conforms to the Contract, and stays within budget and on schedule.

The Contracting Officer will provide Information on the Partnering Process and a list of key and optional personnel who should attend the Partnering meeting.

1.9.1 Informal Partnering

The Contracting Officer will organize the Partnering Sessions with key personnel of the project team, including Contractor personnel and Government personnel.

The Initial Partnering session should be a part of the Pre-Construction Meeting. Partnering sessions will be held at a location agreed to by the Contracting Officer and the Contractor (typically a conference room provided by the PWD FEAD/ROICC office or the Contractor).

The Initial Informal Partnering Session will be conducted and facilitated using electronic media (a video and accompanying forms) provided by the Contracting Officer.

The Partners will determine the frequency of the follow-on sessions.

1.10 AVAILABILITY OF CADD DRAWING FILES

After award and upon request, the electronic "Computer-Aided Drafting and Design (CADD)" drawing files will only be made available to the Contractor for use in preparation of construction data related to the referenced contract subject to the following terms and conditions. Request specific drawing numbers of files required; the entire set of drawing files will not be provided.

Data contained on these electronic files shall not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor shall make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the

Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor shall, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CADD drawing files are not construction documents. Differences may exist between the CADD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CADD files, nor does it make representation to the compatibility of these files with the Contractors hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished CADD files, the signed and sealed construction documents shall govern. The Contractor is responsible for determining if any conflict exists. Use of these CADD files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project.

If the Contractor uses, duplicates and/or modifies these electronic CADD files for use in producing construction data related to this contract, all previous indicia of ownership (seals, logos, signatures, initials and dates) shall be removed.

1.11 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 17.00 25

NETWORK ANALYSIS SCHEDULES (NAS)
08/12
NAVFAC SE VERSION

PART 1 GENERAL

1.1 DESCRIPTION

The Contractor is responsible for scheduling procurement, Contractor quality control and construction, acceptance testing and training. Refer to Specification Section 01 33 00 SUBMITTAL PROCEDURES to determine if any items require Government approval prior to construction; If any are required, that submittal review time shall be included in the schedule.

The schedule is a tool to manage the project, both for Contractor and Government activities. It will also be used to report progress and evaluate time extensions. If cost-loaded, it will provide the basis for progress payments.

The Contractor shall use the Critical Path Method (CPM) and the Precedence Diagram Method (PDM) to satisfy time and cost applications. For consistency, when scheduling software terminology is used in this specification, the terms in Primavera's scheduling programs are used.

1.2 SUBMITTALS

The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, except as modified in this contract.

SD-01 Preconstruction Submittals

Qualifications; G

Baseline Network Analysis Schedule (NAS); G

SD-07 Certificates

Monthly Network Analysis Schedule Update; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.3 SCHEDULE ACCEPTANCE PRIOR TO START OF WORK

The Contracting Officer and Contractor shall participate in a preliminary meeting(s) to discuss the proposed schedule and requirements of this section prior to the Contractor preparing the Project Baseline Schedule.

Government review comments on the Contractor's schedule(s) shall not relieve the Contractor from compliance with requirements of the Contract Documents.

Only bonds shall be paid prior to acceptance of the Baseline Network Analysis Schedule (NAS).

The acceptance of a Baseline NAS is a condition precedent to:

1. The Contractor starting work on the demolition or construction stage(s) of the contract.
2. Processing Contractor's pay request(s) for construction activities/items of work.
3. Review of any schedule updates.

Submittal of the [Baseline Network Analysis Schedule](#), and subsequent schedule updates, shall 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 shall be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

1.4 SOFTWARE

Project schedules must be prepared and maintained using Primavera P6. Importing data into P6 using data conversion techniques or third party software will be cause for rejection of the submitted schedule.

A listing of Primavera P6 settings and parameters which shall be used in preparing the Baseline Schedule is contained later in this specification section. Deviation from these settings and parameters, without prior consent of the Contracting Officer, will be cause for rejection of schedule submission.

1.5 QUALIFICATIONS

The designated Scheduler for the project shall have prepared and maintained at least 3 previous schedules of similar size and complexity of this contract using Primavera P3, Primavera Suretrak or Primavera P6. A resume outlining the qualifications of the Scheduler shall be submitted for acceptance to the Contracting Officer. Payment will not be processed until an acceptable Scheduler is provided.

1.6 NETWORK SYSTEM FORMAT

The system shall include time scaled logic diagrams and specified reports.

1.6.1 Diagrams

Provide Time-scaled Logic Diagram printed in color on ANSI D size sheets. The diagram shall clearly show activities on the critical path. Include the following information for each activity:

- a. Activity ID
- b. Activity Description
- c. Original Duration in Work Days
- d. Remaining duration
- e. Percent Complete

- f. Early Start Date
- g. Early Finish Date
- h. Total Float

1.6.2 Schedule Activity Properties and Level of Detail

The NAS shall identify all Government, Construction Quality Management (CQM), Construction activities planned for the project and all other activities that could impact project completion if delayed. Separate activities shall be created for each Phase, Area, Floor Level and Location the activity is occurring. Activity categories included in the schedule are specified below.

With the exception of the Contract Award and Contract Completion Date (CCD) milestone activities, no activity shall be open-ended; each activity shall have predecessor and successor ties. Once an activity exists on the schedule it may not be deleted or renamed to change the scope of the activity and shall not be removed from the schedule logic without approval from the Contracting Officer. The ID number for a deleted activity shall not be re-used for another activity. No more than 20 percent of the activities shall be critical or near critical. Critical is defined as having zero days of Total Float. "Near Critical" is defined as having Total Float of 1 to 14 days. Contractor activities shall be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

1.6.2.1 Activity Categories

- a. Procurement Activities: Examples of procurement activities include, but are not limited to; Material/equipment submittal preparation, submittal and approval of material/equipment; material/equipment fabrication and delivery, and material/equipment on-site. As a minimum, separate procurement activities will be provided for critical items, long lead items, items requiring government approval and material/equipment procurement for which payment will be requested in advance of installation. The Contractor shall show each delivery with relationship tie to the Construction Activity specifically for the delivery.
- 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, Design Start, Construction Start, (including Design/Construction Start for each Fast-Track Phase), Notice(s) to Proceed and delivery of Government Furnished Material/Equipment.
- c. Quality Management (QM) Activities: CQM Activities shall identify the Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan. These activities shall be added to each Three-Week Look Ahead Schedule referenced in the paragraph entitled "THREE-WEEK LOOK AHEAD SCHEDULE" and will also be included in each monthly update. The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.
- d. Construction Activities: No on-site construction activity shall have a

duration in excess of 20 working days. Separate construction activities shall be created for each Phase, Area, Floor Level and Location the activity is occurring. Contractor activities will be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days, unless otherwise defined in this contract.

- e. Turnover and Closeout Activities: Include a separate section with all items on the NAVFAC Red Zone Checklist/POAM that are applicable to this project. The checklist will be provided at the Preconstruction Meeting. As a minimum, this will include all testing, specialized inspection activities, Pre-Final inspection, Punch List Completion, Final Inspection and Acceptance. Add a milestone for the Facility Turnover Planning Meeting at approximately 75 percent construction contract completion or three to six months prior to BOD, whichever is sooner.

1.6.2.2 Contract Milestones and Constraints

- a. Project Start Date Milestones: The Contractor shall include as the first activity on the schedule a start milestone titled "Contract Award", which shall have a Mandatory Start constraint equal to the Contract Award Date.
- b. Facility Turnover Planning Meeting Milestones: See paragraph "Activity Categories" above.
- c. Substantial Completion Milestone: The Contractor shall include an unconstrained finish milestone on the schedule titled "Substantial Completion". Substantial Completion is defined as the point in time the Government would consider the project ready for beneficial occupancy wherein by mutual agreement of the Government and Contractor, Government use of the facility is allowed while construction access continues in order to complete remaining items (e.g. punch list and other close out submittals).
- d. Projected Completion Milestone: The Contractor shall include an unconstrained finish milestone on the schedule titled "Projected Completion". Projected Completion is defined as the point in time the Government would consider the project complete. This milestone shall have the Contract Completion (CCD) milestone as its only successor.
- e. Contract Completion Date (CCD) Milestone: The Contractor shall include as the last activity on the schedule a finish milestone titled "Contract Completion (CCD)". Calculation of schedule updates shall be such that if the finish of the "Projected Completion" milestone falls after the contract completion date, then negative float will be calculated on the longest path and if the finish of the "Projected Completion" milestone falls before the contract completion date, the float calculation shall reflect positive float on the longest path.

1.6.2.3 Activity Code

At a minimum, the Contractor shall establish activity codes identified in this specification and 3 additional activity codes identified by the Contracting Officer. Once established, activity codes and values cannot be changed without approval by the Contracting Officer.

- a. Phase: All activities shall be assigned a 4-digit code value based on the contract phase it occurs in.

- b. Area Code: All activities shall be assigned an area code value identifying the Area in which the activity occurs. Activities shall not belong to more than one area. Area is defined as a distinct space, function or activity category; such as, separate structure(s), sitework, project summary, construction quality management, material/equipment procurement, etc.
- c. Work Item: All activities in the project schedule shall be assigned a 4-digit Work Item code value. Examples of Work Item code values include but are not limited to water lines, drain lines, building pad and foundation, slab on grade, walls and columns, suspended slab, roof structure, roofing, exterior finish systems, interior rough-in, and finishes, etc.
- d. Location 1: Assign a 4-digit Location 1 code value to activities associated with multistory structures. Code values are used to identify the floor level where an activity is occurring.
- e. Location 2: Assign a 4-digit Location 2 code value to all activities to identify the location within an Area, Work Item or Building Level that an activity is occurring.
- f. Responsibility Code: All activities in the project schedule shall be identified with the party responsible for completing the task. Activities shall not belong to more than one responsible party.

1.6.2.4 Anticipated Weather Delays

The Contractor shall use the National Oceanic and Atmospheric Administration's (NOAA) historical monthly averages for the NOAA location closest to the project site as the basis for establishing a "Weather Calendar" showing the number of anticipated non-workdays for each month due to adverse weather, Saturdays, Sundays and all Federal Holidays as non-work days.

1.6.2.5 Anticipated Restricted Delays

Unless otherwise noted or defined in Section 01 14 00.00 25 WORK RESTRICTIONS, the Contractor shall allow in the schedule a total of 5 lost workdays per calendar year for instances where base access is not permitted due to a restriction or closure which causes a delay in the work. A lost workday is defined as a day which the Contractor cannot work at least 50 percent of the day on the closed installation. If the installation is closed for a period longer than 5 lost workdays per calendar year, the Contracting Officer will issue a no cost contract modification as applicable in accordance with the contract clauses extending the contract completion date where the critical path has been impacted.

1.6.2.6 Cost Loading

- a. Cost Loading Activities: Material and Equipment Costs for which payment will be requested in advance of installation shall be assigned to their respective procurement activity (i.e., the material/equipment on-site activity). Cost for material/equipment paid for after installation, labor and construction equipment shall be assigned to their respective Construction Activities. The value of inspection/testing activities will not be less than 10 percent of the total costs for Procurement and Construction Activities. Evenly

disperse overhead and profit to each activity over the duration of the project.

- b. Quantities and Units of Measure: Each cost loaded activity shall have a detailed quantity breakdown and unit of measure.

1.6.3 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. Identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.
- b. Default Progress Data Disallowed: Actual Start and Actual Finish dates on the CPM schedule shall match the dates on the Contractor Quality Control and Production Reports.
- c. Software Settings: 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. Activity progress will be shown using Remaining Duration. Default activity type will be set to "Task Dependent".
- d. At a minimum, include the following settings and parameters in Baseline Schedule preparation:
 - 1. General: Calendars and Activity Codes are defined or established at the "Project" level, not the "Global" level.
 - 2. Admin Drop-Down Menu, Admin Preferences, Time Periods Tab:
 - a) Time periods for P6 should be set to 8.0 Hours/Day, 40.0 Hours/Week, 172.0 Hours/Month and 2000.0 Hours/Year.
 - b) Allow users to specify the number of work hours for each time period: Should be unchecked.
 - 3. Project Level, Date Tab:
 - a) Set "Must Finish By" date to "Contract Completion Date".
 - 4. Project Level, Default Tab:
 - a) Duration Type: Set to "Fixed Duration & Units".
 - b) Percent Complete Type: Set to "Physical".
 - c) Activity Type: Set to "Task Dependent".
 - d) Calendar: Set to "Standard 5 Day Workweek". Calendar shall reflect Saturday, Sunday and all Federal holidays as non-work days. Alternative calendars may be used with Contracting Officer approval.
 - 5. Project Level, Calculations Tab:
 - a) Price/Unit: Set to "\$1/h".
 - b) Activity percent complete based on activity steps: Should be

Checked.

c) Reset Remaining Duration and Units to Original: Should be Checked.

d) Subtract Actual from At Completion: Should be Checked.

e) Recalculate Actual units and Cost when duration % complete changes: Should be Checked.

f) Update units when costs change on resource assignments: Should be Unchecked.

g) Link Actual and Actual This Period Units and Cost: Should be Checked.

6. Project Level, Settings Tab:

a) Define Critical Activities: Check "Total Float is less than or equal to" and add "0d".

7. Work Breakdown Structure Level, Earned Value Tab:

a) Technique for Computing Performance Percent Complete: "Activity percent complete" is selected.

b) Technique for Computing Estimate to Complete (ETC): "PF = 1" is selected.

1.6.4 Required Tabular Reports

The following reports shall be included with the schedule submittal:

a. Log Report: Listing of all changes made between the previous schedule and current updated schedule.

b. Narrative Report: Identify and justify; 1) Progress made in each area of the project; 2) Critical Path; 3) Date/time constraint(s), other than those required by the contract 4) Changes in the following; added or deleted activities, original and remaining durations for activities that have not started, logic, milestones, planned sequence of operations, critical path, and cost loading; 5) Any decrease in previously reported activity Earned Amount; 6) Pending items and status thereof, including permits, changes orders, and time extensions; 7) Status of Contract Completion Date and interim milestones; 8) Current and anticipated delays (describe cause of delay and corrective actions(s)); and 9) Description of current and future schedule problem areas. Each entry in the narrative report will cite the respective Activity ID and Activity Description, the date and reason for the change, and description of the change.

c. Earned Value Report: Listing all activities having a budget amount cost loaded. Compilation of total earnings on the project from notice to proceed to current progress payment request. Group and sort activities as directed by the Contracting Officer. Show current budget, previous physical percent complete, to-date physical percent complete, previous earned value, to-date earned value and cost to complete on the report for each activity.

- d. Schedule Variance Control (SVC) Diagram: With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates and 2) Earned Value to-date. Revise Cash Flow S-Curves when the contract is modified, or as directed by the Contracting Officer.

1.7 SUBMISSION AND ACCEPTANCE

1.7.1 Monthly Network Analysis Updates

Contractor and Government representatives shall meet at monthly intervals to review and agree on the information presented in the updated project schedule. The submission of an acceptable, updated schedule to the Government is a condition precedent to the processing of the Contractor's pay request. An acceptable, updated schedule shall be submitted to the Government regardless of whether a Contractor's pay request will be submitted for the given period. If a Schedule of Prices is the basis for progress payments, it shall be consistent with the logic and activity breakdowns on the progress schedule. If progress payments are based on a cost-loaded schedule, the Contractor and Government shall agree on percentage of payment for each activity progressed during the update period.

Provide the following with each Schedule submittal:

- a. Time Scaled Logic Diagram.
- b. Reports listed in paragraph entitled "Required Tabular Reports."
- c. Data disks containing the project schedule. Include the back-up native .xer file.

1.7.2 As-Built Schedule

As a condition precedent to the release of retention and making final payment, submit an "As-Built Schedule," as the last schedule update showing all activities at 100 percent completion. This schedule shall reflect the exact manner in which the project was actually constructed.

1.8 CONTRACT MODIFICATION

Submit a Time Impact Analysis with each cost and time proposal for a proposed change. Time Impact Analysis (TIA) shall illustrate the influence of each change or delay on the Contract Completion Date or milestones. No time extensions will be granted nor delay damages paid unless a delay occurs which consumes all available Project Float, and extends the Projected Finish beyond the Contract Completion Date.

- a. Each TIA shall be in both narrative and schedule form demonstrating the delay impact.
- b. Each TIA shall include a Fragmentary Network (fragment) demonstrating how the Contractor proposes to incorporate the impact into the most currently accepted schedule update. 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 run the schedule calculations and submit the impacted

schedule with the proposal or claim.

- c. Unless the Contracting Officer requests otherwise, only conformed contract modifications shall be added into the Project NAS.

1.9 PROJECT FLOAT

Project Float is the length of time between the Contractor's Projected Finish Milestone and the Contract Completion Date Milestone. Project Float available in the schedule, at any time shall not be for the exclusive use of either the Government or the Contractor.

1.10 THREE-WEEK LOOK AHEAD SCHEDULE

The Contractor shall prepare and issue a 3-Week Look Ahead schedule to provide a more detailed day-to-day plan of upcoming work identified on the Project Network Analysis Schedule. The work plans shall be keyed to NAS activity numbers and updated each week to show the planned work for the current and following two-week period. Additionally, include upcoming outages, closures, preparatory meetings, and initial meetings. Identify critical path activities on the Three-Week Look Ahead Schedule. The detail work plans are to be bar chart type schedules, maintained separately from the Project NAS on an electronic spreadsheet program and printed on 8 ½ by 11 sheets as directed by the Contracting Officer. Activities shall not exceed 5 working days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work. Three hard copies and one electronic file of the 3-Week Look Ahead Schedule shall be delivered to the Contracting Officer no later than 8 a.m. each Monday and reviewed during the weekly CQC Coordination Meeting.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES

05/11

PART 1 GENERAL

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 start of construction (work) or commencing work on site.

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 (MSDS) concerning impedances, hazards and safety precautions.

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.

Interim "DD Form 1354" with cost breakout for all assets 30 days prior to facility turnover.

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 QC approval. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

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 Contracting Office submittals required in the technical sections of this specification, including shop drawings, product data and samples.

The Architect-Engineer (NAVFAC SE) for this project will review and approve for the Contracting Officer those submittals reserved for Contracting Officer approval to verify submittals comply with the contract requirements.

1.4.1.1 O&M Data

The Architect-Engineer (NAVFAC SE) for this project 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.

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.

1.4.1.2 Overseas Shop Drawing Submittals

All submittals shall be sent via overnight express mail service. All costs associated with the overnight express mail service shall be borne by the construction Contractor. Costs associated with the overnight express mail of submittals related to proposed submittal variances of resubmittals necessary as a result of noncompliant or incomplete Contractor submittals shall be the responsibility of the Contractor.

1.5 PREPARATION

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to the Contracting Officer. 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," of this section.

1.5.2 Identifying Submittals

When submittals are provided by a Subcontractor, 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 subcontractor associated with the 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

Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 30 by 42 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.

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.

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

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.

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

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.

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

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.

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

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.

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.

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.

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 be accepted for expedition of construction effort.

Submit manufacturer's instructions prior to installation.

1.5.5 Format of SD-04 Samples

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

- a. Sample of Equipment or Device: Full size.
- b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.
- c. 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.
- d. 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.

- e. Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.
- f. 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.
- g. Sample Panel: 4 by 4 feet.
- h. Sample Installation: 100 square feet.

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.

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.

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

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

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

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

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.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

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 one sample, or one set of samples showing range of variation, of each required item.
- 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 two sets of administrative submittals.

1.7 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and 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, after consulting with the DOR, 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, including the DOR's written analysis and approval. 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, including its Designer(s) of Record, 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 AND DATABASE

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.

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.

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 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 QC.

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.

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

Entries for columns (j) and (o), are to be used as follows (others may be prescribed by Transmittal Form):

1.8.4.1 Government Review Action Codes

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, resubmission required"; "Resubmit"

"D" - "Returned by correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply"; "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 documents but which have been omitted from the register or marked "N/A." 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.
- 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 QC Manager approval and 20 working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer approval 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 QC Manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates Contracting Officer is approving authority for that submittal

item.

1.9.2 Constraints

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

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

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

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

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. Act on submittals, determining appropriate action based on QC organization's review of submittal.
 - (1) When QC Manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Approved Submittals," of the section."
 - (2) When Contracting Officer 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 or approving 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 Contracting Officer, 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 QC Manager, QC Manager 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 QC Manager _____, 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

When approving authority is Contracting Officer, 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," of this section and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date approved submittals.

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 following notations:

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

- b. Submittals marked "approved as noted" "or approved except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.
- c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.
- d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

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 Contracting Officer's approval or acceptance of submittals is not to 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.

1.13 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not to 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 disapprove 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 25

SPECIAL PROJECT PROCEDURES
12/11
NAVFAC SE VERSION

PART 1 GENERAL

1.1 DEFINITIONS

Not used.

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Watercraft list

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 HAZARDS TO AIRFIELD OPERATION

Not used.

3.2 HARBOR WATERWAYS

In addition to "DFARS 252.236-7002, Obstruction of Navigable Waterways," obtain from the Contracting Officer, permission to use waterways and the regulations and directives governing such usage. Submit a watercraft list with a description of crafts, including sizes, types, numbers and boat crew for approval.

3.2.1 Hazards to Navigation

Maintain complete control of the movement of floating equipment and material. Loose floating equipment and material are not permitted. Keep in readiness at all times a powered craft capable of moving, securing and disposing of floating equipment which may get loose and become a hazard to navigation.

3.2.2 Submarine Cables or Underwater Utilities

Physically locate submarine cables or underwater utilities as indicated prior to performance of work.

-- End of Section --

SECTION 01 35 26.00 25

GOVERNMENTAL SAFETY REQUIREMENTS
09/12
NAVFAC SE VERSION

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

- ASSE/SAFE A10.32 (2004) Fall Protection
- ASSE/SAFE Z359.1 (2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

- ASME B30.22 (2010) Articulating Boom Cranes
- ASME B30.3 (2009) Tower Cranes
- ASME B30.5 (2011) Mobile and Locomotive Cranes
- ASME B30.8 (2010) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 10 (2010; Errata 2012) Standard for Portable Fire Extinguishers
- NFPA 241 (2013) Standard for Safeguarding Construction, Alteration, and Demolition Operations
- NFPA 51B (2009; TIA 09-1) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
- NFPA 70 (2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013) National Electrical Code
- NFPA 70E (2012) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

- EM 385-1-1 (2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011; Change 7 2012) Safety and Health Requirements Manual

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 1926	Safety and Health Regulations for Construction
29 CFR 1926.1400	Cranes & Derricks in Construction
29 CFR 1926.500	Fall Protection
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

NAVFAC P-307	(2009; Change 1 Mar 2011; Change 2 Aug 2011) Management of Weight Handling Equipment
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1.2 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, high visibility, or is deemed high visibility by NAVFAC SE.
- 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. 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.
- f. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.
- g. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the eight 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; or collision, including unplanned contact between the load, crane, 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.) Any mishap meeting the criteria described above shall be documented in both the Contractor Significant Incident Report (CSIR) and using the NAVFAC prescribed Navy Crane Center (NCC) form submitted within five days both as provided by the Contracting Officer. Comply with additional requirements and procedures for accidents in accordance with NAVFAC P-307, Section 12.

1.3 SUBMITTALS

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

Government acceptance, as defined in EM 385-1-1, is required for submittals with a "G, A" designation.

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G, A

Activity Hazard Analysis (AHA); G, A

Crane Critical Lift Plan; G, A

Proof of qualification for Crane Operators; G, A

SD-06 Test Reports

Notifications and Reports

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

Accident Reports

Crane Reports

SD-07 Certificates

Confined Space Entry Permit

Hot work permit

License Certificates

Contractor Safety Self-Evaluation Checklist; G, A

Third Party Certification of Floating Cranes/Derricks, Crane Barges, and Auxiliary Shipboard Mounted Cranes

Certificate of Compliance (Crane or Alternate machine used to lift a suspended load, and rigging gear requirements).

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

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. Complete the checklist monthly and submit 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 may result in retention of up to 10 percent of the voucher. Additionally, provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher. The Contracting Officer will submit a copy of the Contractor Safety Self-Evaluation and Monthly Exposure Report to the local safety and occupational health office.

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent addition of USACE EM 385-1-1, and any applicable Federal, State, local, and host nation laws, ordinances, criteria, rules and regulations. 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)

The SSHO must meet the requirements of EM 385-1-1 section 1 and ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one (1) person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Designated Representative/alternate shall be at the work site at all times to implement and administer the Contractor's

safety program and government-accepted Accident Prevention Plan. The SSHO's training, experience, and qualifications shall be as required by EM 385-1-1 paragraph 01.A.17, entitled SITE SAFETY AND HEALTH OFFICER (SSHO), and all associated sub-paragraphs.

A Competent Person shall be provided for all of the hazards identified in the Contractor's Safety and Health Program in accordance with the accepted Accident Prevention Plan, and shall be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the Contracting Officer for acceptance in consultation with the Safety Office.

1.6.1.1.1 Contractor Quality Control (QC) Person:

The Contractor Quality Control Person cannot be the SSHO on this project, even though the QC has safety inspection responsibilities as part of the QC duties.

1.6.1.2 Competent Person for Confined Space Entry

Provide a "Competent Person" to supervise the entry into each confined space. That individual must meet the requirements and definition of Competent Person as contained in 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 I. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities 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 an organization that tests and qualifies crane operators). Provide proof of current qualification. In addition, the Contractor shall comply with Contractor Operated Crane Requirements included in the latest revision of document NAVFAC P-307 Section 1.7.2 "Contractor Operated Cranes," and Appendix P, Figure P-1 and with 29 CFR 1926, Subpart CC.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)

The SSHO shall:

- 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 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.
- h. Maintain a list of hazardous chemicals on site and their material safety data sheets.

Failure to perform the above duties will result in dismissal of the superintendent, QC Manager, 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.

1.6.3.2 Safety Meetings

Conduct and document 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 report.

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". 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, the Contractor Quality control Manager, and any designated CSP 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, SSO and quality control manager. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control 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 review and amend 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 outlined 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 and/or enclosed space entry plan in accordance with USACE EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive CPL 2.100, 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.H. and the following:
- (1) For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400.
 - (2) (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) Program Documentation. The program documentation 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 1.8 m(6 feet). A qualified person for fall protection shall prepare and sign the program documentation. 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 Program documentation 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 Program documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Program documentation in the Accident Prevention Plan (APP).

The FP&P Plan shall include a Rescue and Evacuation Plan in accordance with USACE EM 385-1-1, Section 21.M. The plan shall 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 in the Fall Protection and Prevention (FP&P) Plan, and as part of the Accident Prevention Plan (APP).

1.8 **ACTIVITY HAZARD ANALYSIS (AHA)**

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE

EM 385-1-1, Section 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 one calendar day after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, shall be deemed as meeting the requirement for a bulletin board. 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 NOTIFICATIONS and REPORTS

1.12.1 Accident Notification

Notify the Contracting Officer as soon as practical, but no more 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. 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.

1.12.2 Accident Reports

- a. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, property damage accidents resulting in at least \$20,000 in damages, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). The Contracting Officer will provide copies of any required or special forms.
- b. Near Misses: Complete the applicable documentation in NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS).
- c. 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.

1.12.3 Crane Reports

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

1.12.4 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 I. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. For cranes at DOD activities in foreign countries, certify that the crane and rigging gear conform to the appropriate host country safety standards. 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.

1.12.5 Third Party Certification of Barge-Mounted Mobile Cranes

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

1.13 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. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS

ISSUED. 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 60 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 phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

Obtain services from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems, welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, vaults, etc.) that have the potential for flammable or explosive atmospheres.

1.14 RADIATION SAFETY REQUIREMENTS

License Certificates for radiation materials and equipment shall be submitted to the Contracting Officer and Radiation Safety Office (RSO) for all specialized and licensed material and equipment that could cause fatal harm to construction personnel or to the construction project.

Workers shall be protected from radiation exposure in accordance with 10 CFR 20 Standards for Protection Against Radiation.

Loss of radioactive material shall be reported immediately to the Contracting Officer.

Actual exposure of the radiographic film or un-shielding the source shall not be initiated until after 5 p.m. on weekdays.

In instances where radiography is scheduled near or adjacent to buildings or areas having limited access or one-way doors, no assumptions shall be made as to building occupancy. Where necessary, the Contracting Officer will direct the Contractor to conduct an actual building entry, search, and alert. Where removal of personnel from such a building cannot be accomplished and it is otherwise safe to proceed with the radiography, a fully instructed employee shall be positioned inside such building or area to prevent exiting while external radiographic operations are in process. Transportation of Regulated Amounts of Radioactive Material will comply with 49 CFR, Subchapter C, Hazardous Material Regulations. Local Fire authorities and the site Radiation Safety officer (RSO) shall be notified of any Radioactive Material use.

Transmitter Requirements: The base policy concerning the use of transmitters such as radios, cell phones, etc., must be adhered to by all contractor personnel. They must also obey Emissions control (EMCON) restrictions.

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.

1.17 CONFINED SPACE ENTRY REQUIREMENTS.

Contractors entering and working in confined spaces while performing general industry work are required to follow the requirements of OSHA 29 CFR 1926 and comply with the requirements in Section 34 of EM 385-1-1, OSHA 29 CFR 1910, and OSHA 29 CFR 1910.146.

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.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with USACE EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be carried/available on each person.

Mandatory PPE includes:

- a. Hard Hat
- b. Appropriate Safety Shoes
- c. Reflective Vests

3.1.1 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Office or their designated representative 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.

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-isocyanates, 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. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.3 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). 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

Apply for utility outages at least 10 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 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 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Ensure that each employee is familiar with and complies with these procedures and USACE EM 385-1-1, Section 12, Control of Hazardous Energy.

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 protection in accordance with USACE EM 385-1-1, Section 21.B.

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 21.N through 21.N.04. 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 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).

3.4.4 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.

3.4.5 Rescue and Evacuation Procedures

When personal fall arrest systems are used, 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 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 EQUIPMENT

3.6.1 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. Additionally, when material handling equipment is used as a crane it must meet NAVFAC P-307 requirements in Sections 1.7.2, "Contractor Operated Cranes," and 12, "Investigation and Reporting of Crane and Rigging Gear Accidents."
- c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

3.6.2 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. 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 percent 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, [NAVFAC P-307](#) Figure 10-3 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.

3.6.3 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. Incorporate such additional safety precautions or requirements into the AHAs.

3.6.4 USE OF EXPLOSIVES

Explosives shall not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval shall not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, shall be only where directed and in approved storage facilities. These facilities shall be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.7 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.7.1 Utility Locations

All underground utilities in the work area must be positively identified by a third party, independent, private utility locating company in addition to any station locating service and coordinated with the station utility department.

3.7.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, 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.

3.7.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company shall locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. 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.

3.8 ELECTRICAL

3.8.1 Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately removed from service all damaged extension cords. Portable extension cords shall meet the requirements of EM 385-1-1, NFPA 70E, and OSHA electrical standards.

3.9 WORK IN CONFINED SPACES

Comply with the requirements in Section 34 of USACE EM 385-1-1, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, OSHA Directive CPL 2.100 and OSHA 29 CFR 1926. 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 34 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 42 00

SOURCES FOR REFERENCE PUBLICATIONS
11/14

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g. ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ACOUSTICAL SOCIETY OF AMERICA (ASA)
1305 Walt Whitman Road, Suite 300
Melville, NY 11747-4300
Ph: 516-576-2360
Fax: 631-923-2875
E-mail: asa@aip.org
Internet: <http://asa.aip.org>

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC. (AIA/NAS)
1000 Wilson Blvd, Suite 1700
Arlington, VA 22209
Ph: 703-358-1052
Fax: 703-358-1052
E-mail: chris.carnahan@aia-aerospace.org
Internet: <http://www.aia-aerospace.org>

AIR CONDITIONING CONTRACTORS OF AMERICA (ACCA)
2800 Shirlington Road, Suite 300
Arlington, VA 22206
Ph: 703-575-4477
E-mail: info@acca.org
Internet: <http://www.acca.org>

AIR DIFFUSION COUNCIL (ADC)
1901 N. Roselle Road, suite 800
Schaumburg, IL 60195
Ph: 847-706-6750
Fax: 847-706-6751
E-mail: info@flexibleduct.org

Internet: <http://www.flexibleduct.org>

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)
30 West University Drive
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088
E-mail: amca@amca.org
Internet: <http://www.amca.org>

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
2111 Wilson Blvd, Suite 500
Arlington, VA 22201
Ph: 703-524-8800
Fax: 703-562-1942
E-mail: AHRI@AHRI_connect
Internet: <http://www.ahrinet.org>

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)
1200 G Street, NW, Suite 500
Washington, D.C. 20005
Ph: 202-628-6380
Fax: 202-393-5453
E-mail: kconn@atis.org
Internet: <http://www.atis.org>

ALUMINUM ASSOCIATION (AA)
National Headquarters
1525 Wilson Boulevard, Suite 600
Arlington, VA 22209
Ph: 703-358-2960
E-Mail: info@aluminum.org
Internet: <http://www.aluminum.org>

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173-4268
Ph: 847-303-5664
Fax: 847-303-5774
E-mail: customerservice@aamanet.org
Internet: <http://www.aamanet.org>

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)
444 North Capital Street, NW, Suite 249
Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@ashto.org
Internet: <http://www.aashto.org>

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)
1 Davis Drive
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Research Triangle Park, NC 27709-2215
Ph: 919-549-8141
Fax: 919-549-8933
Internet: <http://www.aatcc.org>

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Ph: 202-367-1155
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Internet: <http://www.americanbearings.org>

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Vienna, VA 22182
Ph: 703-356-7172
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Fax: 281-877-5803
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Internet: <http://www.eagle.org>

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38800 Country Club Drive
Farmington Hills, MI 48331-3439
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: <http://www.concrete.org>

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)
8445 Freeport Parkway, Suite 350
Irving, TX 75063-2595
Ph: 972-506-7216
Fax: 972-506-7682
E-mail: info@concrete-pipe.org
Internet: <http://www.concrete-pipe.org>

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Ph: 513-742-2020 or 513-742-6163
Fax: 513-742-3355
E-mail: mail@acgih.org
Internet: <http://www.acgih.org>

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American Wood Council
ATTN: Publications Department
1111 Nineteenth Street NW, Suite 800
Washington, DC 20036
Ph: 800-890-7732 or 202-463-2766
Fax: 202-463-2791
E-mail: awcpubs@afandpa.org
Internet: <http://www.awc.org/>

AMERICAN GAS ASSOCIATION (AGA)
400 North Capitol Street N.W.
Suite 450
Washington, D.C. 20001

Ph: 202-824-7000
Internet: <http://www.aga.org>

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)
1001 N. Fairfax Street, Suite 500
Alexandria, VA 22314-1587
Ph: 703-684-0211
Fax: 703-684-0242
E-mail: tech@agma.org
Internet: <http://www.agma.org>

AMERICAN HARDBOARD ASSOCIATION (AHA)
1210 West Northwest Highway
Palatine, IL 60067
Ph: 847-934-8800
Fax: 847-934-8803
E-mail: aha@hardboard.org
Internet: <http://domensino.com/AHA/>

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)
3141 Fairview Park Dr, Suite 777
Falls Church, VA 22042
Tel: 703-849-8888
Fax: 703-207-3561
E-mail: infonet@aiha.org
Internet: <http://www.aiha.org>

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
One East Wacker Drive, Suite 700
Chicago, IL 60601-1802
Ph: 312-670-2400
Fax: 312-670-5403
Bookstore: 800-644-2400
E-mail: aisc@ware-pak.com
Internet: <http://www.aisc.org>

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)
7012 South Revere Parkway, Suite 140
Centennial, CO 80112
Ph: 503-639-0651
Fax: 503-684-8928
E-mail: info@aitc-glulam.org
Internet: <http://www.aitc-glulam.org>

AMERICAN IRON AND STEEL INSTITUTE (AISI)
25 Massachusetts Avenue, NW Suite 800
Washington, DC 20001
Ph: 202-452-7100
Internet: <http://www.steel.org>

AMERICAN LADDER INSTITUTE (ALI)
2025 M St. NW
Washington, DC 20036
Ph: 202-367-1217
Fax: 202-973-8712
E-mail: info@americanladderinstitute.org
Internet: <http://www.americanladderinstitute.org>

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)
P.O. Box 210
Germantown, MD 20875-0210
Ph: 301-972-1700
Fax: 301-540-8004
E-mail: alsc@alsc.org
Internet: <http://www.alsc.org>

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1899 L Street, NW, 11th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: storemanager@ansi.org
Internet: <http://www.ansi.org/>

AMERICAN PETROLEUM INSTITUTE (API)
Internet: <http://www.api.org>

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION
(AREMA)
4501 Forbes Blvd., Suite 130
Lanham, MD 20706
Ph: 301-459-3200
Fax: 301-459-8077
E-mail: bcaruso@arema.org
Internet: <http://www.arema.org>

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
P.O. Box 28518
1711 Arlingate Lane
Columbus, OH 43228-0518
Ph: 800-222-2768; 614-274-6003
Fax: 614-274-6899
E-mail: tjones@asnt.org
Internet: <http://www.asnt.org>

AMERICAN SOCIETY FOR QUALITY (ASQ)
600 North Plankinton Avenue
Milwaukee, WI 53203
-or-
P.O. Box 3005
Milwaukee, WI 53201-3005
Ph: 800-248-1946; 414-272-8575
Fax: 414-272-1734
E-mail: help@asq.org
Internet: <http://www.asq.org>

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191
Ph: 703-295-6300; 800-548-2723
E-mail: member@asce.org
Internet: <http://www.asce.org>

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING
ENGINEERS (ASHRAE)
1791 Tullie Circle, NE
Atlanta, GA 30329

Ph: 800-527-4723 or 404-636-8400
Fax: 404-321-5478
E-mail: ashrae@ashrae.org
Internet: <http://www.ashrae.org>

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018
Ph: 847-699-2929
Internet: <http://www.asse.org>

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
18927 Hickory Creek Drive, Suite 220
Mokena, IL 60448
Ph: 708-995-3019
Fax: 708-479-6139
E-mail: staffengineer@asse-plumbing.org
Internet: <http://www.asse-plumbing.org>

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy Avenue
Denver, CO 80235-3098
Ph: 303-794-7711
E-mail: distribution@awwa.org
Internet: <http://www.awwa.org>

AMERICAN WELDING SOCIETY (AWS)
13301 NW 47 Ave
Miami, FL 33054

Ph: 888-WELDING, 305-824-1177, 305-826-6192
Fax: 305-826-6195
E-mail: customer.service@awspubs.com
Internet: <http://www.aws.org>

AMERICAN WOOD COUNCIL (AWC)
222 Catoctin Circle SE, Suite 201
Leesburg, VA 20175
Ph: 800-890-7732
Fax: 412-741-0609
E-mail: publications@awc.org
Internet: <http://www.awc.org>

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)
P.O. Box 361784
Birmingham, AL 35236-1784
Ph: 205-733-4077
Fax: 205-733-4075
Internet: <http://www.awpa.com>

AmericanHort (AH)
2130 Stella Court
Columbus, OH 43215 USA
Ph: 614-487-1117
Fax: 614-487-1216
E-mail: hello@AmericanHort.org
Internet: <http://americanhort.org/AmericanHort/AmericanHort>

APA - THE ENGINEERED WOOD ASSOCIATION (APA)
7011 South 19th St.
Tacoma, WA 98466-5333
Ph: 253-565-6600
Fax: 253-565-7265
Internet: <http://www.apawood.org>

ARCHITECTURAL WOODWORK INSTITUTE (AWI)
46179 Westlake Drive, Suite 120
Potomac Falls, VA 20165
Ph: 571-323-3636
Fax: 571-323-3630
E-mail: info@awinet.org
Internet: <http://www.awinet.org>

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9639 Kinsman Road
Materials Park, OH 44073-0002
Ph: 440-338-5151, 800-336-5152
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Internet:
<http://asmcommunity.asminternational.org/portal/site/www/Home/>

ASME INTERNATIONAL (ASME)
Two Park Avenue, M/S 10E
New York, NY 10016-5990
Ph: 800-843-2763
Fax: 973-882-1717
E-mail: customercare@asme.org
Internet: <http://www.asme.org>

ASPHALT INSTITUTE (AI)
2696 Research Park Drive
Lexington, KY 40511-8480
Ph: 859-288-4960
Fax: 859-288-4999
E-mail: info@asphaltinstitute.org
Internet: <http://www.asphaltinstitute.org>

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Washington D.C. 20045
Ph: 202-591-2450
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Internet: <http://www.asphaltroofing.org>

ASSOCIATED AIR BALANCE COUNCIL (AABC)
1518 K Street, NW
Washington, DC 20005
Ph: 202-737-0202
Fax: 202-638-4833
E-mail: info@aabc.com
Internet: <http://www.aabc.com/>

ASSOCIATION FOR IRON AND STEEL TECHNOLOGY (AIST)
186 Thorn Hill Road
Warrendale, PA 15086-7528
Ph: 724-814-3000
Fax: 724-814-3001
E-Mail: memberservices@aist.org
Internet: <http://www.aist.org/publications>

ASSOCIATION FOR THE ADVANCEMENT OF MEDICAL INSTRUMENTATION (AAMI)
4301 N. Fairfax Drive, Suite 301
Arlington, VA 22203-1633
Ph: 703-525-4890
Fax: 703-276-0793
E-mail: customerservice@aami.org
Internet: <http://www.aami.org>

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)
600 North 18th Street
P.O. Box 2641
Birmingham, AL 35291-0992
Ph: 205-257-3839
E-Mail: aeicdir@bellsouth.net
Internet: <http://www.aeic.org>

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1111 19th Street NW, Suite 402
Washington, DC 20036
Ph: 202-872-5955
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513 West Broad Street, Suite 210
Falls Church, VA 22046
Ph: 703-538-1600
Fax: 703-534-8307
E-mail: info@awci.org
Internet: <http://www.awci.org>

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West Conshohocken, PA 19428-2959
Ph: 877-909-2786
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939 Ellis Street
San Francisco, CA 94109
Ph: 415-771-6000
Fax: 415-928-8560
E-Mail: publicrecords@baaqmd.gov
Internet: <http://www.baaqmd.gov/>

BIFMA INTERNATIONAL (BIFMA)
678 Front Ave. NW, Suite 150
Grand Rapids, MI 49504-5368
Ph: 616-285-3963
Fax: 616-285-3765
E-mail: email@bifma.org

Internet: <http://www.bifma.org>

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Internet: <http://www.biocycle.net>

BRITISH STANDARDS INSTITUTE (BSI)
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E-mail: cservices@bsigroup.com
Internet: <http://www.bsigroup.com>

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)
355 Lexington Avenue, 15th Floor
New York, NY 10017
Ph: 212-297-2122
Fax: 212-370-9047
Internet: <http://www.buildershardware.com>

CALIFORNIA ENERGY COMMISSION (CEC)
Media and Public Communications Office
1516 Ninth Street, MS-29
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E-mail: appliances@energy.ca.gov
Internet: <http://www.energy.ca.gov/>

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P.O. Box 2048
Dalton, GA 30722-2048
Ph: 706-278-3176
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Ph: 423-842-2122
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1010 Jorie Blvd, Suite 30
Oak Brook, IL 60523
Ph: 630-584-1919
Fax: 866-560-8537
E-mail: cisca@cisca.org
Internet: <http://www.cisca.org>

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)
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Cleveland OH 44115-2851
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Fax: 216-241-0105
E-mail: cffa@chemicalfabricsandfilm.com

Internet: <http://www.chemicalfabricsandfilm.com/>

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Arlington, VA 22209
Ph: 703-894-4140
Fax: 703-894-4130
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Ph: 703-724-1128
Fax: 703-724-1588
Internet: <http://www.compositepanel.org/>

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1300 Sumner Avenue
Cleveland OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: cagi@cagi.org
Internet: <http://www.cagi.org/>

COMPRESSED GAS ASSOCIATION (CGA)
14501 George Carter Way, Suite 103
Chantilly, VA 20151-1788
Ph: 703-788-2700
Fax: 703-961-1831
E-mail: cga@cganet.com
Internet: <http://www.cganet.com>

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933 North Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200
Fax: 847-517-1206
Internet: <http://www.crsi.org/>

CONCRETE SAWING AND DRILLING ASSOCIATION (CSDA)
100 2nd Ave South, Ste 402N
St. Petersburg, FL 33701
PH: 727-577-5004
E-mail: info@csda.org
Internet: <http://www.csda.org>

CONSUMER ELECTRONICS ASSOCIATION (CEA)
1919 South Eads St.
Arlington, VA 22202
Ph: 866-858-1555 or 703-907-7634
Fax: 866-858-2555 or 703-907-7693
E-mail: standards@CE.org
Internet: <http://www.CE.org>

CONSUMER PRODUCT SAFETY COMMISSION (CPSC)
4330 East-West Highway
Bethesda, MD 20814
Ph: 301-504-7923

Fax: 301-504-0124 or 301-504-0025
Internet: <http://www.cpsc.gov>

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5672 Strand Ct., Suite 2
Naples, Florida 34110
Ph: 239-514-3441
Fax: 239-514-3470
E-mail: karen@cemanet.org
Internet: <http://www.cemanet.org>

COOLING TECHNOLOGY INSTITUTE (CTI)
P.O. Box 73383
Houston, TX 77273-3383
Ph: 281-583-4087
Fax: 281-537-1721
E-mail: vmanser@cti.org
Internet: <http://www.cti.org>

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Charlotte, NC 28217-3992
Ph: 704-676-1190
Fax: 704-676-1199
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CSA GROUP (CSA)
178 Rexdale Blvd.
Toronto, ON, Canada M9W 1R3
Ph: 416-747-4044
Fax: 416-747-2510
E-mail: sales@csagroup.org
Internet: <http://www.csagroup.org/us/en/home>

DISTRICT OF COLUMBIA MUNICIPAL REGULATIONS (DCMR)
1350 Pennsylvania Avenue, NW, Suite 419
Washington DC 20004
Ph: 202-727-6306
Fax: 202-727-3582
TTY: 711
E-mail: secretary@dc.gov
Internet:
<http://os.dc.gov/service/publication-and-regulatory-services>

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1300 Sumner Avenue
Cleveland, OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105
Internet: <http://www.dasma.com>

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)
1322 Riverhaven Place
Birmingham, AL 35244
Ph: 205-402-8700
Internet: <http://www.dipra.org>

ELECTRICAL GENERATING SYSTEMS ASSOCIATION (EGSA)
1650 South Dixie Highway, Suite 400
Boca Raton, FL 33432-7462
Ph: 561-750-5575
Fax: 561-395-8557
Internet: <http://www.egsa.org>

ELECTRONIC COMPONENTS INDUSTRY ASSOCIATION (ECIA)
2214 Rock Hill Rd., Suite 170
Herndon, VA 20170
Ph: 571-323-0294
Fax: 571-323-0245
E-mail: emikoski@ecaus.org
Internet: <http://www.ecianow.org/>

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EIA has become part of the ELECTRONIC COMPONENTS INDUSTRY
ASSOCIATION (ECIA)

ELECTROSTATIC DISCHARGE ASSOCIATION (ESD)
7900 Turin Road, Building 3
Rome, NY 13440-2069
Ph: 315-339-6937
Fax: 315-339-6793
E-mail: info@esda.org
<http://www.esda.org/>

ENERGY INSTITUTE (EI)
Publications Team
Energy Institute
61 New Cavendish Street
London
W1G 7AR, UK
Ph: +44 (0)20 7467 7100
Fax: +44 (0)20 7255 1472
E-mail: pubs@energyinst.org.uk
Internet:
<http://www.energyinstpubs.org.uk/cgi-bin/open.cgi?page=index>

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Intertek
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Internet: <http://www.intertek.com/>

EUROPEAN COMMITTEE FOR STANDARDIZATION (CEN/CENELEC)
CEN-CENELEC Management Centre
Avenue Marnix 17
B-1000 Brussels
Ph: 32-2-550-08-11
Fax: 32-2-550-08-19
Internet: <http://www.cen.eu/Pages/default.aspx>

EXPANSION JOINT MANUFACTURERS ASSOCIATION (EJMA)
25 North Broadway
Tarrytown, NY 10591
Fax: 914-332-1541
E-mail: inquiries@ejma.org
Internet: <http://www.ejma.org>

FLUID CONTROLS INSTITUTE (FCI)
1300 Sumner Avenue
Cleveland, OH 44115
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: fcifluidcontrolsinstitute.org
Internet: www.fluidcontrolsinstitute.org

FLUID SEALING ASSOCIATION (FSA)
994 Old Eagle School Rd. #1019
Wayne, PA 19087-1866
Ph: 610-971-4850
Internet: www.fluidsealing.com

FM GLOBAL (FM)
270 Central Avenue
P.O. Box 7500
Johnston, RI 02919-4923
Ph: 877-364-6726
Fax: 401-275-3029
E-mail: servicedesk.myrisk@fmglobal.com
Internet: <http://www.fmglobal.com>

FOREST STEWARDSHIP COUNCIL (FSC)
212 Third Avenue North
Suite 445
Minneapolis, MN 55401
Ph: 612-353-4511
E-mail: info@us.fcs.org
Internet: <https://us.fsc.org/>

FORESTRY SUPPLIERS INC. (FSUP)
205 West Rankin Street
P.O. Box 8397
Jackson, MS 39284-8397
Ph: 800-752-8460
Internet: <http://www.forestry-suppliers.com>

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH
(FCCCHR)
University of South California
Research Annex 219
3716 South Hope Street
Los Angeles, CA 90089-7700
Ph: 213-740-2032 or 866-545-6340
Fax: 213-740-8399
E-mail: fccchr@usc.edu
Internet: <http://www.usc.edu/dept/fccchr>

GEOLOGICAL SOCIETY OF AMERICA (GeoSA)
P.O. Box 9140
Boulder, CO 80301-9140
Ph: 303-357-1000
Fax: 303-357-1070
E-mail: gsaservice@geosociety.org
Internet: <http://www.geosociety.org>

GEOSYNTHETIC INSTITUTE (GSI)
475 Kedron Avenue
Folsom, PA 19033-1208
Ph: 610-522-8440
Fax: 610-522-8441
Internet: <http://www.geosynthetic-institute.org>

GERMAN INSTITUTE FOR STANDARDIZATION (DIN)
Americas
Englewood, CO, US
Ph: +1 800-447-2273 (Toll Free), +1 303-736-3001 (US/Canada)
Internet:

GLASS ASSOCIATION OF NORTH AMERICA (GANA)
800 SW Jackson St., Suite 1500
Topeka, KS 66612-1200
Ph: 785-271-0208
E-mail: gana@glasswebsite.com
Internet: <http://www.glasswebsite.com>

GREEN BUILDING INITIATIVE (GBI)
5410 SW Macadam, Suite 150
Portland, Oregon 97239
Ph: 877-424-4241
Fax: 503.961.8991
Email: info@thegbi.org
Internet: <http://www.thegbi.org/>

GREEN SEAL (GS)
1001 Connecticut Avenue, NW
Suite 827
Washington, DC 20036-5525
Ph: 202-872-6400
Fax: 202-872-4324
Internet: <http://www.greenseal.org>

GYPSUM ASSOCIATION (GA)
6525 Belcrest Road, Suite 480
Hyattsville, MD 20782
Ph: 301-277-8686
Fax: 301-277-8747
E-mail: info@gypsum.org
Internet: <http://www.gypsum.org>

H.P. WHITE LABORATORY (HPW)
3114 Scarboro Road
Street, MD 21154
Ph: 410-838-6550
Fax: 410-838-2802
E-mail: info@hpwhite.com
Internet: <http://www.hpwhite.com>

HARDWOOD PLYWOOD AND VENEER ASSOCIATION (HPVA)
1825 Michael Faraday Dr.
Reston, VA 20190
Ph: 703-435-2900
Fax: 703-435-2537
E-mail: hpva@hpva.org

Internet: <http://www.hpva.org>

HEAT EXCHANGE INSTITUTE (HEI)
1300 Sumner Avenue
Cleveland, OH 44115
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: hei@heatexchange.org
Internet: <http://www.heatexchange.org>

HYDRAULIC INSTITUTE (HI)
6 Campus Drive, First Floor North
Parsippany, NJ 07054-4406
Ph: 973-267-9700
Fax: 973-267-9055
Internet: <http://www.pumps.org>

HYDRONICS INSTITUTE DIVISION OF AHRI (HYI)
35 Russo Place
P.O. Box 218
Berkeley Heights, NJ 07922-0218
Ph: 908-464-8200
Fax: 908-464-7818
Internet: <http://www.ahrinet.org>

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3060 Saturn Street, Suite 100
Brea, CA 92821
Ph: 800-423-6587 ext. 66546
Fax: 562-695-4694
E-mail: es@icc-es.org
Internet: <http://www.icc-es.org>

ILLUMINATING ENGINEERING SOCIETY (IES)
120 Wall Street, 17th Floor
New York, NY 10005-4001
Ph: 212-248-5000
Fax: 212-248-5018
E-mail: IES@IES.org
Internet: <http://www.IES.org>

INDUSTRIAL FASTENERS INSTITUTE (IFI)
6363 Oak Tree Boulevard
Independance, OH 44131
Ph: 216-241-1482
E-mail: IFI-orders@indfast.org
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INSTITUTE OF CLEAN AIR COMPANIES (ICAC)
3033 Wilson Blvd., Suite 700
Arlington, VA 22201
Ph: 571-858-3707
Fax: 703-243-8696
E-mail: icacinfo@icac.com
Internet: <http://www.icac.com>

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
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Piscataway, NJ 08854-4141

Ph: 732-981-0060 or 800-701-4333
Fax: 732-562-9667
E-mail: onlinesupport@ieee.org
Internet: <http://www.ieee.org>

INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY (IEST)
2340 South Arlington Heights Rd. Suite 620
Arlington Heights, IL 60005-4510
Ph: 847-981-0100
Fax: 847-981-4130
E-mail: information@iest.org
Internet: <http://www.iest.org>

INSTITUTE OF INSPECTION, CLEANING, AND RESTORATION CERTIFICATION
(IICRC)
IICRC Headquarters
4317 NE Thurston Way, Suite 200
Vancouver, WA 98662
Ph: 360-693-5675
Fax: 360-693-4858
E-mail: info@iicrc.org
Internet: <http://www.iicrc.org/home>

INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)
1627 Eye Street, NW, Suite 600
Washington, DC 20006
Ph: 202-785-0060
Fax: 202-785-0609
E-mail: ite_staff@ite.org
Internet: <http://www.ite.org>

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27 N. Wacker Dr. Suite 365
Chicago, IL 60606-2800
Ph: 613-233-1510
Fax: 613-482-9436
E-mail: enquiries@igmaonline.org
Internet: <http://www.igmaonline.org>

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)
800 Place Victoria
PO Box 113
Montréal, Quebec, H4Z 1M1
Ph: 514-390-6726 or 800-716-6326
Fax: 514-874-9659
E-mail: custserv@iata.org
Internet: <http://www.iata.org>

INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS
(IAPMO)
4755 E. Philadelphia St.
Ontario, CA 91761
Ph: 909-472-4100
Fax: 909-472-4150
E-mail: iapmo@iapmo.org
Internet: <http://www.iapmo.org>

INTERNATIONAL CODE COUNCIL (ICC)
500 New Jersey Avenue, NW
6th Floor, Washington, DC 20001
Ph: 800-786-4452 or 888-422-7233
E-mail: order@iccsafe.org
Internet: www.iccsafe.org

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)
10600 West Higgins Road, Suite 607
Rosemont, IL 60018
Ph: 847-827-0830
Fax: 847-827-0832
Internet: <http://www.icri.org>

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)
3050 Old Centre Ave. Suite 102
Portage, MI 49024
Ph: 269-488-6382
Internet: <http://www.netaworld.org>

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)
3, rue de Varembe
P.O. Box 131
CH-1211 Geneva 20, Switzerland
Ph: 41-22-919-02-11
Fax: 41-22-919-03-00
Internet: <http://www.iec.ch>

INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION (IGSHPA)
1201 S Innovation Way, Suite 400
Stillwater, OK 74074
Ph: 800-626-4747 or 405-744-5175
Fax: 405-744-5283
E-mail: igshpa@okstate.edu
Internet: <http://www.igshpa.okstate.edu/>

INTERNATIONAL INSTITUTE OF AMMONIA REFRIGERATION (IIAR)
1001 N. Fairfax Street, Suite 503
Alexandria, VA 22314
Ph: 703-312-4200
Fax: 703-312-0065
E-mail: iiar_request@iiar.org
Internet: <http://www.iiar.org>

INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION (IMSA)
597 Haverty Court, Suite 100
Rockledge, FL 32955
Ph: 321-392-0500 and 800-723-4672
Fax: 315-806-1400
E-mail: manuals@imsasafety.org

Internet: <http://www.imsasafety.org/>

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
1, ch. de la Voie-Creuse
Case Postale 56
CP 56 - CH-1211 Geneva 20
Switzerland
Ph: 41-22-749-01-11
Fax: 41-22-733-34-30
E-mail: central@iso.ch
Internet: <http://www.iso.org>

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)
1901 North Moore Street
Arlington, VA 22209-1762
Ph: 703-525-1695
Fax: 703-528-2148
Internet: <http://www.safetysafetyequipment.org/>

INTERNATIONAL TELECOMMUNICATION UNION (ITU)
Place des Nations
CH-1211 Geneve 20 Switzerland
Ph: 41-22-730-6141
Fax: 41-22-730-5194
E-mail: sales@itu.int
Internet: <http://www.itu.int/en/Pages/default.aspx>

INTERNATIONAL WINDOW CLEANING ASSOCIATION (IWCA)
1100-H Brndywine Blvd.
Zanesville, OH 43701-7303
Ph: 800-875-4922
E-mail: info@iwca.org
Internet: <http://www.iwca.org>

IPC - ASSOCIATION CONNECTING ELECTRONICS INDUSTRIES (IPC)
3000 Lakeside Drive, 309 S
Bannockburn, IL 60015
Ph: 847-615-7100
Fax: 847-615-7105
E-mail: answers@ipc.org
Internet: <http://www.ipc.org>

INTERNATIONAL SOCIETY OF AUTOMATION (ISA)
67 T.W. Alexander Drive
PO Box 12277
Research Triangle Park, NC 27709
Ph: 919-549-8411
Fax: 919-549-8288
E-mail: info@isa.org
Internet: <http://www.isa.org>

INTERNET ENGINEERING TASK FORCE (IETF)
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48377 Fremont Blvd., Suite 117
Fremont, California 94538
Ph: 510-492-4080
Fax: 510-492-4001
E-mail: ietf-info@ietf.org
Internet: <http://www.ietf.org/>

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JAPANESE STANDARDS ASSOCIATION (JSA)
c/o MITA MT Bldg.
3-13-12 Mita Minato-ku Tokyo 108-0073 JAPAN
Ph: 81-3-4231-8520
Fax: 81-3-4231-8655
Internet: http://www.jsa.or.jp/default_english.asp

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Reston, VA 20191-5435
Ph: 703-264-1690
Fax: 703-620-6530
Internet: <http://www.kcma.org>

L.H. BAILEY HORTORIUM (LHBH)
Dept of Plant Biology
c/o Cornell University
440 Mann Library Building
Ithaca, NY 14853
Ph: 607-255-1052
Fax: 607-254-5407
Internet: <http://plantbio.cals.cornell.edu/hortorium>

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San Jose, CA 95126
Ph: 408-938-5266
Fax: 408-790-3838
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E-mail: info@mss-hq.com
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111 Deer Lake Road, Suite 100
Deerfield, IL 60015
Ph: 847-480-9138
Fax: 847-480-9282
E-mail: mfma@maplefloor.org
Internet: <http://www.maplefloor.org>

MARBLE INSTITUTE OF AMERICA (MIA)
380 E. Lorain Street
Oberlin, OH 44074
Ph: 440-250-9222
Fax: 440-774-9222
E-mail: miainfo@marble-institute.com
Internet: <http://www.marble-institute.com>

MASTER PAINTERS INSTITUTE (MPI)
2800 Ingleton Avenue
Burnaby, BC CANADA V5C 6G7
Ph: 1-888-674-8937
Fax: 1-888-211-8708
E-mail: info@paintinfo.com or techservices@mpi.net
Internet: <http://www.mpi.net/>

MATERIAL HANDLING INSTITUTE (MHI)
8720 Red Oak Blvd., Suite 201
Charlotte, NC 28717-3992
Ph: 704-676-1190
Fax: 704-676-1199
Internet: <http://www.mhi.org>

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)
1300 Sumner Avenue
Cleveland, OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: mbma@mbma.com
Internet: <http://www.mbma.com>

MIDWEST INSULATION CONTRACTORS ASSOCIATION (MICA)
16712 Elm Circle
Omaha, NE 68130
Ph: 800-747-6422
Fax: 402-330-9702
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MIDWEST ROOFING CONTRACTORS ASSOCIATION (MRCA)
8735 W Higgins Road
Suite 300
Chicago, IL 60631
Ph: 800-497-6722
Fax: 847-375-6473
E-mail: info@mrca.org
Internet: General Information: <http://www.mrca.org>

MODBUS ORGANIZATION, INC (MODBUS)
PO Box 628
Hopkinton, MA 01748
Ph: 508-435-7170
Fax: 508-435-7172
Internet: <http://www.modbus.org>

NACE INTERNATIONAL (NACE)
Houston, TX 77084-4906
Ph: 281-228-6223
Fax: 281-228-6300
E-mail: firstservice@nace.org
Internet: <http://www.nace.org>

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

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NATIONAL AIR DUCT CLEANERS ASSOCIATION (NADCA)
15000 Commerce Parkway, Suite C
Mt. Laurel, NJ 08054
Toll Free: 855-GO-NADCA
Ph: (856) 380-6810
Fax: (856) 439-0525
E-mail: info@nadca.com
Internet: <http://www.nadca.com>

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)
800 Roosevelt Road, Bldg C, Suite 312
Glen Ellyn, IL 60137
Ph: 630-942-6591
Fax: 630-790-3095
E-mail: wlewis7@cox.net (Wes Lewis, technical consultant)
Internet: <http://www.naamm.org>

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Columbus, OH 43229-1183
Ph: 614-888-8320
Fax: 614-888-0750
E-mail: information@nationalboard.org
Internet: <http://www.nationalboard.org>

NATIONAL CABLE AND TELECOMMUNICATIONS ASSOCIATION (NCTA)
25 Massachusetts Avenue, NW, Suite 100
Washington, DC 20001-1413
Ph: 202-222-2300
Fax: 202-222-2514
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Internet: <http://www.ncta.com>

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Ph: 703-713-1900
Fax: 703-713-1910
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Internet: <http://www.ncma.org/Pages/default.aspx>

NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS (NCRP)
7910 Woodmont Avenue, Suite 400
Bethesda, MD 20814-3095
Ph: 301-657-2652
Fax: 301-907-8768
E-mail: ncrppubs@ncrpponline.org
Internet: <http://www.ncrp.com>

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NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)
3 Bethesda Metro Center, Suite 1100
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Ph: 301-657-3110
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1300 North 17th Street, Suite 900
Arlington, VA 22209
Ph: 703-841-3200
Internet: <http://www.nema.org/>

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1677 County Route 64
P.O. Box 838
Salem, New York 12865-0838
Ph: 518-854-3100
Fax: 518-854-3257
E-Mail: into@neii.org
Internet: <http://www.neii.org/index.cfm>

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)
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Gaithersburg, MD 20877
Ph: 301-977-3698
Fax: 301-977-9589
Internet: <http://www.nebb.org>

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6305 Ivy Lane, Suite 140
Greenbelt, MD 20770
Ph: 301-589-1776
Fax: 301-589-3884
E-Mail: info@nfrc.org
Internet: <http://www.nfrc.org>

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Quincy, MA 02169-7471
Ph: 617-770-3000
Fax: 617-770-0700
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6737 W. Washington Street, Suite 2350 14
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Fax: 414-778-3361
E-mail: nfpa@nfpa.com
Internet: <http://www.nfpa.com>

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1420 King Street
Alexandria, VA 22314-2794
Ph: 888-476-4238 (1-888 IS-NICET)
E-mail: tech@nicet.org
Internet: <http://www.nicet.org>

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Suite 9200
Patriots Plaza Building
Washington, DC 20201
Ph: 800-232-4636
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E-mail: nioshdocket@cdc.gov
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Gaithersburg, MD 20899-1070
Ph: 301-975-NIST (6478)
E-mail: inquiries@nist.gov
Internet: <http://www.nist.gov>

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Fax: 703-243-5489
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<http://www.nps.gov>

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Fax: 317-571-0041
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Internet: <http://www.nwfa.org>

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Manager, Customer Service
900 Spring Street
Silver Spring, MD 20910
Ph: 240-485-1165
E-mail: jjenkins@nrmca.org (Jacques Jenkins)
Internet: <http://www.nrmca.org>

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
10255 West Higgins Road, Suite 600
Rosemont, IL 60018-5607
Ph: 866-275-6722 (866-ASK-NRCA)
Fax: 847-299-1183
E-mail: info@nrca.net
Internet: <http://www.nrca.net>

NATIONAL SECURITY TELECOMMUNICATIONS AND INFORMATION SYSTEMS
SECURITY (NSTISS)
CNSS Secretariat
National Security Agency
9800 Savage Road, Ste 6716
Fort George G. Meade, MD 20755-6716
Ph: 410-854-6805
Fax: 410-854-6814
E-mail: cnss@radium.ncsc.mil
Internet: <http://www.cnss.gov/index.html>

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Fredericksburg, TX 78624
Ph: 800-323-9736
Fax: 888-362-2770
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Fax: 703-684-0427
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272 Tuttle Road
Cumberland, ME 04021
Ph: 207-829-6901
Fax: 207-829-4293
E-mail: info@nelma.org
Internet: <http://www.nelma.org>

NSF INTERNATIONAL (NSF)
789 North Dixboro Road
P.O. Box 130140
Ann Arbor, MI 48105
Ph: 734-769-8010 or 800-NSF-MARK
Fax: 734-769-0109
E-mail: info@nsf.org
Internet: <http://www.nsf.org>

OPC FOUNDATION (OPC)
16101 N. 82nd Street
Suite 3B
Scottsdale, AZ 85260-1868
Ph: 480-483-6644
Fax: 480-483-7202
Internet: <http://www.opcfoundation.org>

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD)
2, rue Andre Pascal
75775 Paris Cedex 16, France
Ph: + 33 1 45 24 82 00
Fax: 33 1 45 24 85 00
Internet: <http://www.oecd.org>
U.S. Contact Center
OECD Washington Center
2001 L Street, NW, Suite 650
Washington, DC 20036-4922
Ph: 202-785-6323
Fax: 202-785-0350
E-mail: washington.contact@oecd.org

PIPE FABRICATION INSTITUTE (PFI)
511 Avenue of America's, #601
New York, NY 10011
Ph: 514-634-3434
Fax: 514-634-9736
E-mail: pfi@pfi-institute.org
Internet: <http://www.pfi-institute.org>

PLASTIC PIPE AND FITTINGS ASSOCIATION (PPFA)
800 Roosevelt Road
Building C, Suite 312
Glen Ellyn, IL 60137
Ph: 630-858-6540
Fax: 630-790-3095
Internet: <http://www.ppfahome.org>

PLASTICS PIPE INSTITUTE (PPI)
105 Decker Court, Suite 825
Irving, TX 75062
Ph: 469-499-1044

Fax: 469-499-1063
Internet: <http://www.plasticpipe.org>

PLUMBING AND DRAINAGE INSTITUTE (PDI)
800 Turnpike Street, Suite 300
North Andover, MA 01845
Ph: 978-557-0720 or 800-589-8956
E-Mail: pdi@PDIONline.org
Internet: <http://www.pdionline.org>

PLUMBING AND MECHANICAL CONTRACTORS ASSOCIATION (PMCA)
14695 SW Millikan Way
Beaverton, OR 97006
Ph: 503-626-6666
Fax: 503-626-6630
Internet: <http://www.pmcaoregon.com/>

PLUMBING-HEATING-COOLING CONTRACTORS ASSOCIATION (PHCC)
180 South Washington Street, Suite 100
Falls Church, VA 22046
Ph: 800-533-7694 or 703-237-8100
Fax: 703-237-7442
E-mail: naphcc@naphcc.org
Internet: <http://www.phccweb.org>

PORCELAIN ENAMEL INSTITUTE (PEI)
PO Box 920220
Norcross, GA 30010
Ph: 770-409-7280
Fax: 770-409-7280
E-mail: penamel@aol.com
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POST-TENSIONING INSTITUTE (PTI)
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Fax: 206-343-7522
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818 Grayson Road, Suite 201
Pleasant Hill, CA 94523
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Fax: 925-935-1496
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Internet: <http://www.redwoodinspection.com/>

RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC)
E-Mail: boltcouncil@gmail.com
Internet: <http://www.boltcouncil.org>

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Washington, DC 20005
Ph: 202-682-4800
E-mail: info@rma.org
Internet: <http://www.rma.org>

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)
2000 Powell Street, Suite 600
Emeryville, CA 94608
Ph: 800-326-3228
E-mail: info@SCSglobal services.com
Internet: <http://www.scsglobalservices.com/>

SCIENTIFIC EQUIPMENT AND FURNITURE ASSOCIATION (SEFA)
65 Hilton Avenue
Garden City, N.Y. 11530
Ph: 516-294-5424
Fax: 516-294-4765
E-mail: info@sefalabs.com
Internet: <http://www.sefalabs.com>

SCREEN MANUFACTURERS ASSOCIATION (SMA)
Ph: 773-636-0672
E-mail: Kathryn@SMainfo.org
Internet: <http://smainfo.org>

SEMICONDUCTOR EQUIPMENT AND MATERIALS INTERNATIONAL (SEMI)
3081 Zanker Road
San Jose, CA 95134
Ph: 408-943-6900
Fax: 408-428-9600
E-mail: semihq@semi.org
Internet: <http://www.semi.org>

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION
(SMACNA)
4201 Lafayette Center Drive
Chantilly, VA 20151-1219
Ph: 703-803-2980
Fax: 703-803-3732
Internet: <http://www.smacna.org>

SINGLE PLY ROOFING INDUSTRY (SPRI)
411 Waverley Oaks Road, Suite 331B

Waltham, MA 02452
Ph: 781-647-7026
Fax: 781-647-7222
E-mail: info@spri.org
Internet: <http://www.spri.org>

SOCIETY FOR PROTECTIVE COATINGS (SSPC)
40 24th Street, 6th Floor
Pittsburgh, PA 15222
Ph: 412-281-2331
Fax: 412-281-9992
E-mail: info@sspc.org
Internet: <http://www.sspc.org>

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)
400 Commonwealth Drive
Warrendale, PA 15096
Ph: 724-776-4970
Fax: 877-606-7323
E-mail: customerservice@sae.org
Internet: <http://www.sae.org>

SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS (SCTE)
140 Philips Road
Exton, PA 19341-1318
Ph: 800-542-5040 or 610-363-6888
Fax: 610-363-5898
E-Mail: information@scte.org
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SOCIETY OF MOTION PICTURE AND TELEVISION ENGINEERS (SMPTE)
3 Baker Avenue, 5th Floor
White Plains, New York 10601
Ph: 914-761-1100
Fax: 914-761-3115
Internet: <http://www.smpte.org>

SOLAR RATING AND CERTIFICATION CORPORATION (SRCC)
400High Point Drive, Suite 400
Cocoa, FL 32926
Ph: 321-213-6037
Fax: 321-821-0910
E-mail: srcc@solar-rating.org
Internet: <http://www.solar-rating.org>

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)
21865 Copley Drive
Diamond Bar, CA 91765
Ph: 909-396-2000
E-mail: webinquiry@aqmd.gov
Internet: <http://www.aqmd.gov>

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)
665 Rodi Road, Suite 305
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E-Mail: member-services@cypressinfo.org
Internet: <http://www.cypressinfo.org>

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Pensacola, FL 32504-0915
Ph: 850-434-2611
Fax: 850-433-5594
Internet: <http://www.spib.org>

SPRAY POLYURETHANE FOAM ALLIANCE (SPFA)
3927 Old Lee Hwy. #101B
Fairfax, VA 22030
Ph: 800-523-6154
Fax: 703-222-5816
Internet: <http://www.sprayfoam.org>

STANDARDS COUNCIL OF CANADA - CANADIAN GENERAL STANDARDS BOARD
(CAN/CGSB)
270 Albert Street, Suite 200
Ottawa, ON K1P 6N7
Canada
Ph: 1-613-238-3222
Fax: 1-613-569-7808
E-mail: info@scc.ca
Internet: <http://www.scc.ca>

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)
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E-mail: michael_campos@dot.ca.gov
Internet: <http://www.dot.ca.gov/hq/esc/techpubs/>

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)
Division of State Documents
16 Francis Street
Annapolis, MD 21401
Ph: 410-974-2486
Fax: 410-280-5647
E-mail: support@sos.state.md.us
Internet: <http://www.dsd.state.md.us/comar/>

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)
201 North 9th Street
General Assembly Building
Richmond, Virginia 23219
E-mail: codes@dls.virginia.gov
Internet: <http://register.dls.virginia.gov>

STEEL DECK INSTITUTE (SDI)
P.O. Box 426
Glenshaw, PA 15116
Ph: 412.487.3325
Fax: 412.487.3326
E-mail: bob@sdi.org
Internet: <http://www.sdi.org>

STEEL DOOR INSTITUTE (SDI/DOOR)
30200 Detroit Road

Westlake, OH 44145
Ph: 440-899-0010
Fax: 440-892-1404
E-mail: info@steeldoor.org
Internet: <http://www.steeldoor.org>

STEEL JOIST INSTITUTE (SJI)
234 W. Cheves Street
Florence, SC 29501
Ph: 843-407-4091
Internet: <http://www.steeljoist.org>

STEEL TANK INSTITUTE (STI)
944 Donata Ct.
Lake Zurich, IL 60047
Ph: 847-438-8265
Fax: 847-438-8766
Internet: <http://www.steeltank.com>

STEEL WINDOW INSTITUTE (SWI)
1300 Sumner Avenue
Cleveland, OH 44115-2851
Ph: 216-241-7333
Fax: 216-241-0105
E-mail: info@steelwindows.com
Internet: <http://www.steelwindows.com>

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY (TAPPI)
15 Technology Parkway South, Suite 115
Peachtree Corners, GA 30092
Ph: 800-322-8686 or 770-446-1400
Fax: 770-446-6947
E-mail: memberconnection@tappi.org
Internet: <http://www.tappi.org>

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)
1320 N. Courthouse Rd., Suite 200
Arlington, VA 22201
Ph: 703-907-7700
Fax: 703-907-7727
Internet: <http://www.tiaonline.org>

TILE COUNCIL OF NORTH AMERICA (TCNA)
100 Clemson Research Boulevard
Anderson, SC 29625
Ph: 864-646-8453
Fax: 864-646-2821
E-mail: info@tileusa.com
Internet: <http://www.tcnatile.com/>

TREE CARE INDUSTRY ASSOCIATION (TCIA)
136 Harvey Road, Suite 101
Londonderry, NH 03053
Ph: 603-314-5380
Fax: 603-314-5386
Internet: <http://tcia.org/>

TRIDIUM, INC (TRIDIUM)
3951 Westerre Parkway, Suite 350

Richmond, VA 23233
Ph: 804-747-4771
Fax: 804-747-5204
Internet: <http://www.tridium.com>

TRUSS PLATE INSTITUTE (TPI)
218 N. Lee Street, Suite 312
Alexandria, VA 22314
Ph: 703-683-1010
Fax: 866-501-4012
E-mail: info@tpinst.org
Internet: <http://www.tpinst.org>

TUBULAR EXCHANGER MANUFACTURERS ASSOCIATION (TEMA)
25 North Broadway
Tarrytown, NY 10591
Ph: 914-332-0040
Fax: 914-332-1541
E-mail: tema@tema.org
Internet: <http://www.tema.org>

TURFGRASS PRODUCERS INTERNATIONAL (TPI)
2 East Main Street
East Dundee, IL 60118
Ph: 847-649-5555
Fax: 847-649-5678
E-mail: info@turfgrasssod.org
Internet: <http://www.turfgrasssod.org>

U.S. AIR FORCE (USAF)
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Ph: 202-404-2438 Internet: <http://www.e-publishing.af.mil/>

U.S. ARMY (DA)
U.S. Army Publishing Directorate
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Internet: <http://www.apd.army.mil>

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
(USACHPPM)
5158 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5403
Ph: 800-222-9698
Fax: 1 (410) 436-7142
E-mail: chppmhhc@AMEDD.ARMY.MIL
Internet: <http://chppm-www.apgea.army.mil>

U.S. ARMY CORPS OF ENGINEERS (USACE)
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Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: <http://www.publications.usace.army.mil/>

or

<http://www.hnc.usace.army.mil/Missions/Engineering/TECHINFO.aspx>

U.S. ARMY ENVIRONMENTAL CENTER (USAEC)

Internet: <http://aec.army.mil/>

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Defense Technical Information Center (DTIC)

Internet: <http://www.dtic.mil/dtic/>

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Office of the Law Revision Counsel

Internet: <http://uscode.house.gov/>

U.S. DEFENSE INTELLIGENCE AGENCY (DIA)

Office of Corporate Communications

Joint Base Anacostia Bolling

Building 6000

Washington DC 20340-5100

PH: 202-231-5554

E-mail: dia-pao@dia.mil

Internet: <http://www.dia.mil>

U.S. DEFENSE LOGISTICS AGENCY (DLA)

Fort Belvoir, VA

Internet: <http://www.dla.mil>

U.S. DEPARTMENT OF AGRICULTURE (USDA)

Order AMS Publications from:

AGRICULTURAL MARKETING SERVICE (AMS)

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Gastonia, NC 28054-2193

Ph: 704-810-8871

Fax: 704-852-4189

E-mail: seed.ams@usda.gov

Internet: <http://www.ams.usda.gov/lsg/seed.htm>

Order Other Publications from:

U.S. Department of Agriculture, Rural Utilities Program

USDA Rural Development, Room 4051-S

Mail Stop 1510

1400 Independence Avenue SW

Washington, DC 20250-1510

Phone: (202) 720-9540

TTY: (800) 877-8339 (Federal Relay Service)

Fax: (202) 720-1725

Internet: http://www.rurdev.usda.gov/utilities_lp.html

U.S. DEPARTMENT OF COMMERCE (DOC)

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Internet: <http://www.ntis.gov>

U.S. DEPARTMENT OF DEFENSE (DOD)
Order DOD Documents from:
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Washington, DC 20301-1400
Ph: 703-571-3343
FAX: 215-697-1462

E-mail: customerservice@ntis.gov
Internet: <http://www.ntis.gov>
Obtain Military Specifications, Standards and Related Publications
from:

Acquisition Streamlining and Standardization Information System
(ASSIST)

Department of Defense Single Stock Point (DODSSP)
Document Automation and Production Service (DAPS)
Building 4/D

700 Robbins Avenue
Philadelphia, PA 19111-5094

Ph: 215-697-6396 - for account/password issues

Internet: <http://assist.daps.dla.mil/online/start/>; account
registration required

Obtain Unified Facilities Criteria (UFC) from:

Whole Building Design Guide (WBDG)

National Institute of Building Sciences (NIBS)

1090 Vermont Avenue NW, Suite 700

Washington, DC 20005

Ph: 202-289-7800

Fax: 202-289-1092

Internet: http://www.wbdg.org/references/docs_refs.php

U.S. DEPARTMENT OF ENERGY (DOE)
1000 Independence Avenue Southwest
Washington, D.C. 20585
Internet: www.eere.energy.gov

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
HUD User

P.O. Box 23268

Washington, DC 20026-3268

Ph: 800-245-2691 or 202-708-3178

TDD: 800-927-7589

Fax: 202-708-9981

Internet: <http://www.huduser.org>

U.S. DEPARTMENT OF STATE (SD)

2201 C Street, NW

Washington, DC 20520

Internet: <http://www.state.gov>

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

1200 New Jersey Ave. SE

Washington, DC 20590

Ph: 202-366-4000

Internet: <http://www.dot.gov>

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-272-0167
Internet: <http://www2.epa.gov/libraries>
--- Some EPA documents are available only from:
National Technical Information Service (NTIS)
5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6050 or 1-688-584-8332
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: <http://www.ntis.gov>

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)
Order for sale documents from:
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U.S. Government Printing Office (GPO)
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Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: <http://www.gpoaccess.gov>
Order free documents from:
Federal Aviation Administration
Department of Transportation
800 Independence Avenue, SW
Washington, DC 20591
Ph: 1-866-835-5322
Internet: <http://www.faa.gov>

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)
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Internet: <http://www.gpoaccess.gov/>

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FHWA, Office of Safety
1200 New Jersey Ave., SE
Washington, DC 20590
Ph: 202-366-4000
Internet: <http://www.fhwa.dot.gov>
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U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
1275 First St. NE
Washington, DC 20417
Ph: 202-501-1231
Internet: <http://www.gsaelibrary.gsa.gov/ElibMain/home.do>
Obtain documents from:
Acquisition Streamlining and Standardization Information System
(ASSIST)
Internet: <https://assist.dla.mil/online/start/>; account
registration required

U. S. GREEN BUILDING COUNCIL (USGBC)
2101 L St NW, Suite 500
Washington, D.C. 20037
Ph: 800-795-1747
Internet: <http://www.usgbc.org>

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
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College Park, MD 20740-6001
Ph: 866-272-6272
Fax: 301-837-0483
Internet: <http://www.archives.gov>
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Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: <http://www.gpoaccess.gov>

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)
1322 Patterson Ave. SE, Suite 1000
Washington Navy Yard, DC 20374-5065
Ph: 202-685-9387
Internet: <http://www.navfac.navy.mil>

U.S. NAVAL FACILITIES ENGINEERING SERVICE CENTER (NFESC)
401 Industry Road, Suite 500
Louisville, KY 40208
Ph: 502-638-4400
Fax: 502-638-4300
E-mail: contact@nstcenter.com
Internet: <http://www.nfesc.navy.mil>

U.S. NAVAL SEA SYSTEMS COMMAND (NAVSEA)
Commander Naval Sea Systems Command
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376-1080

Ph: 202-781-0000
E-mail: navsea_publicqueries@navy.mil
Internet: <http://www.navsea.navy.mil/PublicInquiries.aspx>

UL ENVIRONMENT (ULE)
2211 Newmarket Parkway, Suite 106
Marietta, GA 30067
Ph: 770-933-0638
Fax: 770-980-0072
E-mail: environment@ul.com
Internet: <http://www.ul.com/environment>

UNDERWRITERS LABORATORIES (UL)
2600 N.W. Lake Road
Camas, WA 98607-8542
Ph: 877-854-3577
E-mail: CEC.us@us.ul.com
Internet: <http://www.ul.com/>
UL Directories available through IHS at <http://www.ihs.com>

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)
2711 LBJ Freeway, Suite 1000
Dallas, TX 75234
Ph: 972-243-3902
Fax: 972-243-3907
E-mail: info@uni-bell.org
Internet: <http://www.uni-bell.org>

WASHINGTON STATE ADMINISTRATIVE CODE (WAC)
Legislative Information Center
Gerry Sheehan, Coordinator
106 Legislative Building
Olympia, WA 98504-0600
Ph: 360-786-7573
Fax: 360-786-1529
E-mail: support@leg.wa.gov
Internet: <http://app.leg.wa.gov/wac/Default.aspx>

WASHINGTON STATE DEPARTMENT OF ECOLOGY (WSDE)
Washington State Department of Ecology
P.O. Box 447600
Olympia, WA 98504-7600
Ph: 360-407-7472
E-mail: ecypub@ecy.wa.gov
Internet: <https://fortress.wa.gov/ecy/publications/UIPages/Home.aspx>

WATER ENVIRONMENT FEDERATION (WEF)
601 Wythe Street
Alexandria, VA 22314-1994
Ph: 800-666-0206
Fax: 703-684-2492
E-mail: inquiry@wef.org
Internet: <http://www.wef.org>

WATER QUALITY ASSOCIATION (WQA)
4151 Naperville Road
Lisle, IL 60532-3696
Ph: 630-505-0160

Fax: 630-505-9637
Internet: <http://www.wqa.org>

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)
P.O. Box 23145
Portland, OR 97281
Ph: 503-639-0651
Fax: 503-684-8928
E-mail: info@wclib.org
Internet: <http://www.wclib.org>

WESTERN WOOD PRESERVERS INSTITUTE (WWPI)
12503 SE Mill Plain Blvd, Ste 205
Vancouver, WA 98684
Ph: 360-693-9958
E-mail: info@wwpinstitute.org
Internet: <http://www.wwpinstitute.org>

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)
1500 SW First Ave., Suite 870
Portland, OR 97201
Ph: 503-224-3930
Fax: 503-224-3934
E-mail: info@wwpa.org
Internet: <http://www.wwpa.org>

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)
330 N Wabash Avenue, Suite 2000
Chicago, IL 60611
Ph: 312-321-6802
E-mail: wdma@wdma.com
Internet: <http://www.wdma.com>

WIRE ROPE TECHNICAL BOARD (WRTB)
7011A Manchester Blvd., #178
Alexandria, VA 22310-3203
Ph: 703-299-8550
Fax: 703-299-9253
E-mail: wrtb@usa.net
Internet: <http://www.wireropetechnicalboard.org>

WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION (WMMPA)
507 First Street
Woodland, CA 95695
Ph: 530-661-9591 or 800-550-7889
Fax: 530-661-9586
E-mail: info@wmmpa.com
Internet: <http://www.wmmpa.com>

WOOLMARK COMPANY (WBI)
Level 30, HSBC Centre
580 George St
Sydney NSW 2000
GPO Box 4177
Sydney, NSW, Australia 2001
Ph: 61 2 8295 3100
Fax: 61 2 8295 4100
E-mail: feedback@wool.com
internet: <http://www.woolmark.com>

PIER 1902 REPAIRS
AUTEC Site 1

Work Order No. 1302903
Andros Island, Bahamas

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01 45 00.00 25

QUALITY CONTROL
08/13
NAVFAC SE VERSION

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 (2012; Errata 2013) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

ASTM INTERNATIONAL (ASTM)

ASTM D6245 (2012) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation

ASTM D6345 (2010) Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air

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

ANSI/SMACNA 008 (2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011; Change 7 2012) Safety and Health Requirements Manual

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED GBDC (2009) LEED Reference Guide for Green Building Design and 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES

SD-01 Preconstruction Submittals

Construction Quality Control (QC) Plan; G

Submit na approved Construction QC Plan prior to start of construction.

Indoor Air Quality (IAQ) Management Plan; G

Basis of Design and Design Intent

SD-07 Certificates

CA Resume

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: 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.
- 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.
- c. Preparatory Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Preparatory Phase held.
- d. Initial Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Initial Phase held.
- f. Field Test Reports: Within two working days after the test is performed, submit the report as an electronic attachment to the CQC Report.
- g. Monthly Summary Report of Tests: Submit the report as an electronic attachment to the CQC Report at the end of each 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.
- i. Rework Items List: Submit lists containing new entries daily, in the same manner as the CQC Report.
- j. CQC Meeting Minutes: Within two working days after the meeting is held, submit the report as an electronic attachment to the CQC Report.
- 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 and approval, 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 the Training Plan and training materials are accurate and provide correct instruction and documentation on the critical elements of the products, materials, and systems in the constructed facility. Verify that all identified Government operating personnel are 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. The only duties and responsibilities of the QC Manager are to manage and implement the QC program on this Contract. 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.

1.5.1.2 Qualifications

A graduate of a four year accredited college or university program in one of the following disciplines: Engineering, Architecture, Construction Management, Engineering Technology, Building Construction, or Building Science, with a minimum of 10 years experience as a 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.

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Construction Quality Control (QC) Plan

1.6.1.1 Requirements

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 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: Not Applicable
- 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.

1.7 QC PLAN MEETINGS

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, CA, Environmental 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 weekly QC meetings by the QC Manager at the work site with the Project Superintendent, the CA, 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

Not used.

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, the CA, 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 daily Contractor Quality Control Report and 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 daily CQC Report and 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 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 DOCUMENTATION

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

1.16.1 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.

1.16.2 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.

1.16.3 Reports from the QC Specialist(s)

Not used.

1.16.4 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.

1.16.5 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.

1.16.6 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by Section 01 78 00.00 25 CLOSEOUT SUBMITTALS 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.

1.17 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.

1.18 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.

1.18.1 Requirements During Construction

Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of volatile organic compounds (VOCs) in indoor air in accordance with ASTM D6345. Use filters with a Minimum Efficiency Reporting Value (MERV) of 8 in permanently installed air handlers during construction.

1.18.1.1 Control Measures

Meet or exceed the requirements of ANSI/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.

1.18.1.2 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.

1.18.2 Requirements after Construction

After construction ends and prior to occupancy, conduct a building 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 52.2](#) at 100 percent outside air, or in accordance with [LEED GBDC](#). Air contamination testing must be consistent with EPA's current Compendium of Methods for the Determination of Air Pollutants in Indoor Air, and with the [LEED GBDC](#). After building 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 25

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
10/11
NAVFAC SE VERSION

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511 (2007) 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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241 (2013) Standard for Safeguarding
Construction, Alteration, and Demolition
Operations

NFPA 70 (2014; AMD 1 2013; Errata 1 2013; AMD 2
2013; Errata 2 2013) National Electrical
Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1 (2007; Rev K) Obstruction Marking and
Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD (2009) Manual on Uniform Traffic Control
Devices

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Traffic control plan; G
SD-03 Product Data

Backflow preventers; G

SD-06 Test Reports

Backflow Preventer Tests; G

SD-07 Certificates

Backflow Tester Certification; G

Backflow Preventers Certificate of Full Approval

1.3 CONSTRUCTION SITE PLAN

Not used.

1.4 BACKFLOW PREVENTERS 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.

1.4.1 Backflow Tester Certificate

Prior to testing, submit to the Contracting Officer certification issued by the State 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

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.

1.5 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.

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

The requirements for the signs, their content, and location are as shown on the drawings. 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 Haul Roads

Construct access and haul roads necessary for proper prosecution of the work under this contract. Construct with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are to be avoided. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

2.2.2 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.

2.2.3 Fencing

Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people.

- a. 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. Install fencing to be able to restrain a force of at least 250 pounds against it.
- b. Enclose the project work area and Contractor lay-down area with a **safety fence**. Remove the fence upon completion and acceptance of the work. Intent is to block (screen) public view of the construction.
- c. In addition, prior to the start of work, enclose those areas at the construction site which are not within the construction fence with a temporary safety fence, including gates and warning signs, to protect the public from construction activities. The safety fence shall match the base standard color (or bright orange where it protects excavated areas), shall be made of high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on minimum 10 foot centers. Remove the fence from the work site upon completion of the contract.

2.2.4 Temporary Wiring

Provide temporary wiring in accordance with **NFPA 241** and **NFPA 70**. Include frequent inspection of all equipment and apparatus.

2.2.5 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements **AWWA C511**. Provide backflow preventers complete with 150 pound flanged, bronze mounted gate valve, stainless steel or bronze, 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**.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. 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 at prevailing rates.
- c. The point at which the Government will deliver such utilities or services and the quantity available is as indicated. 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.

3.2.3 Meters and Temporary Connections

At the Contractor's expense and in a manner satisfactory to the Contracting Officer, provide and maintain necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. Notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor will not make the final electrical connection.

3.2.4 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of \$50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

3.2.5 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated paraphernalia. Pay all outstanding utility bills before final acceptance of the work by the Government.

3.2.6 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.

- b. Provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the Contracting Officer. The doors shall be self-closing. The exterior of the unit shall match the base standard color. Locate the facility behind the construction fence or out of the public view.

3.2.7 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.8 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.

3.2.9 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 [MUTCD](#), 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

Not used.

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 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 in accordance with facility standards 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.
- b. Cut grass (or annual weeds) within the construction and storage sites to a maximum 4 inch height at least once a week during the growing season unless the grass area is not visible to the public. Trim the grass around fences at time of grass cutting. Maintain grass or weeds on stockpiled earth as described above.

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.

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 in Existing Buildings

The Contractor will be working around existing buildings; the storage of material will not be allowed in the buildings. Provide 8 foot high security fence with a lockable gate around the storage area. Remove at the completion of work.

3.4.10 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.4.10.1 Building and 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.

3.5 GOVERNMENT FIELD OFFICE

Not used.

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. 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 any salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

3.9 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haul roads, 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 areas used by the Contractor for the storage of equipment or material, or other use to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

-- End of Section --

SECTION 01 57 19.00 25

TEMPORARY ENVIRONMENTAL CONTROLS
12/11
NAVFAC SE VERSION

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.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 530/F-93/004 (1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)

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

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific

Hazardous Wastes and Specific Types of
Hazardous Waste Management Facilities

40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
40 CFR 272	Approved State Hazardous Waste Management Programs
40 CFR 273	Standards For Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	Specific Toxic Chemical Listings
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material, including solid, liquid, semisolid, or contained gaseous materials resulting from

domestic, industrial, commercial, mining, or agricultural operations.
Types of solid waste typically generated at construction sites may include:

- a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.
- b. Surplus soil: Existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.
- c. Debris: Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.
- d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.
- e. Scrap metal: Scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.
- f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.
- g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may be included as recyclable if sold to a scrap metal company. Paint cans may be included as recyclable if sold to a scrap metal company.
- h. Hazardous Waste: By definition, to be a hazardous waste a material must first meet the definition of a solid waste. Hazardous waste and hazardous debris are special cases of solid waste. They have additional regulatory controls and must be handled separately. They are thus defined separately in this document.

Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

1.2.3 Hazardous Debris

As defined in Solid Waste paragraph, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261.

1.2.4 Chemical Wastes

This includes salts, acids, alkalizes, herbicides, pesticides, and organic chemicals.

1.2.5 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.6 Hazardous Waste

Any discarded material, liquid, solid, or gas, which meets the definition of hazardous material or is designated hazardous waste by the Environmental Protection Agency or State Hazardous Control Authority as defined in 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 271, 40 CFR 272, 40 CFR 273, 40 CFR 279, and 40 CFR 280.

1.2.7 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172. Hazardous material is any material that:

- a. Is regulated as a hazardous material per 49 CFR 173, or
- b. Requires a Material Safety Data Sheet (MSDS) per 29 CFR 1910.120, or
- c. During end use, treatment, handling, packaging, storage, transpiration, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D.

Designation of a material by this definition, when separately regulated or controlled by other instructions or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this instruction for "control" purposes. Such material include ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs). Nonetheless, the exposure may occur incident to manufacture, storage, use and demilitarization of these items.

1.2.8 Waste Hazardous Material (WHM)

Any waste material which because of its quantity, concentration, or physical, chemical, or infectious characteristics may pose a substantial hazard to human health or the environment and which has been so designated. Used oil not containing any hazardous waste, as defined above, falls under this definition.

1.2.9 Oily Waste

Those materials which are, or were, mixed with used oil and have become separated from that used oil. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, used oil and may be appropriately tested and discarded in a manner which is in compliance with other State and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that:

- a. It is not prohibited in other State regulations or local ordinances
- b. The amount generated is "de minimus" (a small amount)
- c. It is the result of minor leaks or spills resulting from normal process operations
- d. All free-flowing oil has been removed to the practical extent possible

Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, a hazardous waste determination must be performed prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.10 Regulated Waste

Those solid waste that have specific additional Federal, state, or local controls for handling, storage, or disposal.

1.2.11 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)
chlorofluorocarbon-12 (CFC-12)
chlorofluorocarbon-13 (CFC-13)
chlorofluorocarbon-111 (CFC-111)
chlorofluorocarbon-112 (CFC-112)
chlorofluorocarbon-113 (CFC-113)
chlorofluorocarbon-114 (CFC-114)
chlorofluorocarbon-115 (CFC-115)

chlorofluorocarbon-211 (CFC-211)
chlorofluorocarbon-212 (CFC-212)
chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-500 (CFC-500)
chlorofluorocarbon-502 (CFC-502)
chlorofluorocarbon-503 (CFC-503)
halon-1211
halon-1301
halon-2402
carbon tetrachloride
methyl bromide
methyl chloroform

Class II ODS is defined in Section 602(s) of The Clean Air Act and includes the following chemicals:

hydrochlorofluorocarbon-21 (HCFC-21)
hydrochlorofluorocarbon-22 (HCFC-22)
hydrochlorofluorocarbon-31 (HCFC-31)
hydrochlorofluorocarbon-121 (HCFC-121)
hydrochlorofluorocarbon-122 (HCFC-122)
hydrochlorofluorocarbon-123 (HCFC-123)
hydrochlorofluorocarbon-124 (HCFC-124)
hydrochlorofluorocarbon-131 (HCFC-131)
hydrochlorofluorocarbon-132 (HCFC-132)

hydrochlorofluorocarbon-133 (HCFC-133)
hydrochlorofluorocarbon-141 (HCFC-141)
hydrochlorofluorocarbon-142 (HCFC-142)
hydrochlorofluorocarbon-221 (HCFC-221)
hydrochlorofluorocarbon-222 (HCFC-222)
hydrochlorofluorocarbon-223 (HCFC-223)
hydrochlorofluorocarbon-224 (HCFC-224)
hydrochlorofluorocarbon-225 (HCFC-225)
hydrochlorofluorocarbon-226 (HCFC-226)
hydrochlorofluorocarbon-231 (HCFC-231)
hydrochlorofluorocarbon-232 (HCFC-232)
hydrochlorofluorocarbon-233 (HCFC-233)
hydrochlorofluorocarbon-234 (HCFC-234)
hydrochlorofluorocarbon-235 (HCFC-235)
hydrochlorofluorocarbon-251 (HCFC-251)
hydrochlorofluorocarbon-252 (HCFC-252)
hydrochlorofluorocarbon-253 (HCFC-253)
hydrochlorofluorocarbon-261 (HCFC-261)
hydrochlorofluorocarbon-262 (HCFC-262)
hydrochlorofluorocarbon-271 (HCFC-271)

1.2.11.1 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats) and lamps (e.g., fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at [40 CFR 273](#). Also include any other hazardous wastes that have been designated as universal wastes in individual states (e.g. Texas - paint related waste; Florida - pharmaceutical waste).

1.3 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 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey; G

Solid Waste Management Plan and Permit; G

Regulatory Notifications; G

Environmental Management Plan; G

Storm Water Pollution Prevention Plan; G

Storm Water Notice of Intent (for NPDES coverage under the general permit for construction activities); G

Dirt and Dust Control Plan

Contractor Hazardous Material Inventory Log; G

SD-06 Test Reports

Laboratory Analysis

Disposal Requirements

Erosion and Sediment Control Inspection Reports

Storm Water Inspection Reports for General Permit

Contractor 40 CFR employee training records

Solid Waste Management Report; G

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable sub items listed below.

Storm Water Pollution Prevention Plan compliance notebook; G

Waste Determination Documentation

Disposal Documentation for Hazardous and Regulated Waste

Contractor 40 CFR Employee Training Records

Solid Waste Management Permit

Solid Waste Management Report

Contractor Hazardous Material Inventory Log; G

Hazardous Waste/Debris Management

Regulatory Notifications

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

The Contractor may be required to promptly conduct tests and procedures for the purpose of assessing whether construction operations are in compliance with Applicable Environmental Laws. Analytical work shall be done by qualified laboratories; and where required by law, the laboratories shall be certified.

1.4.1 Environmental Compliance Assessment Training and Tracking System (ECATTS)

The QC Manager is responsible for environmental compliance on projects unless an Environmental Manager is named. The QC Manager (and alternative QC Manager) or Environmental Manager shall complete ECATTS training prior to starting respective portions of on-site work under this contract. If personnel changes occur for any of these positions after starting work, replacement personnel shall complete ECATTS training within 14 days of assignment to the project

Submit an ECATTS certificate of completion for personnel who have completed the required "Environmental Compliance Assessment Training and Tracking System (ECATTS)" training. This training is web-based and can be accessed from any computer with Internet access using the following instructions.

Register for NAVFAC Environmental Compliance Training and Tracking System, by logging on to <http://navfac.ecatts.com/>. Obtain the password for registration from the Contracting Officer.

This training has been structured to allow contractor personnel to receive credit under this contract and also to carry forward credit to future contracts. Contractors shall ensure that the QC Manager (and alternate QC Manager) or Environmental Manager review their training plans for new modules or updated training requirements prior to beginning work. Some training modules are tailored for specific State regulatory requirements; therefore, Contractors working in multiple states will be required to re-take modules tailored to the state where the contract work is being performed.

ECATTS is available for use by all contractor and subcontractor personnel associated with this project. These other personnel are encouraged (but not required) to take the training and may do so at their discretion.

1.4.2 Conformance with the Environmental Management System

The Contractor shall perform work under this contract consistent with the

policy and objectives identified in the installation's Environmental Management System (EMS). The Contractor shall perform work in a manner that conforms to objectives and targets, environmental programs and operational controls identified by the EMS. The Contractor will provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, the Contractor shall take corrective and/or preventative actions. In addition, the Contractor shall ensure that its employees are aware of their roles and responsibilities under the EMS and how these EMS roles and responsibilities affect work performed under the contract.

The Contractor is responsible for ensuring that their employees receive applicable environmental and occupational health and safety training, and keep up to date on regulatory required specific training for the type of work to be conducted onsite. All on-site Contractor personnel, and their subcontractor personnel, performing tasks that have the potential to cause a significant environmental impact shall be competent on the basis of appropriate education, training or experience. Upon contract award, the Contracting Officer's Representative will notify the installation's EMS coordinator to arrange EMS training. Refer to Section 01 57 19.01 25, SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS for additional site specific EMS requirements related to construction. The installation's EMS coordinator shall identify training needs associated with environmental aspects and the EMS, and arrange training or take other action to meet these needs. The Contractor shall provide training documentation to the Contracting Officer. The EMS coordinator shall retain associated records.

1.5 QUALITY ASSURANCE

1.5.1 Preconstruction Survey

Perform a [Preconstruction Survey](#) of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record.

1.5.2 [Regulatory Notifications](#)

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. In cases where the Navy must also provide public notification (such as stormwater permitting), the Contractor must coordinate with the Contracting Officer. The Contractor shall submit copies of all regulatory notifications to the Contracting Officer prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.5.3 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the activity; types and quantities of wastes/wastewater that may be generated during the contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the Contracting Officer and

activity environmental staff to discuss the proposed Environmental Management Plan. Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, required permits, permit requirements, and other measures to be taken.

1.5.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager will be directly responsible for coordinating contractor compliance with Federal, State, local, and station requirements. The Environmental Manager will ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the Environmental Management Plan; ensure that all environmental permits are obtained, maintained, and closed out; ensure compliance with Storm Water Program Management requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure all Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out.

1.5.5 Contractor 40 CFR Employee Training Records

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. Submit these training records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 ENVIRONMENTAL MANAGEMENT PLAN

Prior to initiating any work on site, the Contractor will meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Contractor's Environmental Plan shall incorporate construction related objectives and targets from the installation's Environmental Management System. The Environmental Management Plan will be submitted in the following format and shall include the elements specified below. The environmental review process shall be in accordance with NUWC DET AUTEC INST 5090.2.

a. Description of the Environmental Management Plan

- (1) General overview and purpose

- (a) A brief description of each specific plan required by environmental permit or elsewhere in this contract.
 - (b) The duties and level of authority assigned to the person(s) on the job site that oversee environmental compliance.
 - (c) A copy of any standard or project specific operating procedures that will be used to effectively manage and protect the environment on the project site.
 - (d) Communication and training procedures that will be used to convey environmental management requirements to contractor employees and subcontractors.
 - (e) Emergency contact information contact information (office phone number, cell phone number, and e-mail address).
 - (f) Copy of site plan showing where any fuels, hazardous substances, solvents, or lubricants will be stored.
 - (g) Copy of spill plan to address leaks or spills of fuels, hazardous substances, solvents, or lubricants.
- (2) General site information
- (3) A letter signed by an officer of the firm appointing the Environmental Manager and stating that he/she is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.
- b. Management of Natural Resources
- (1) Land resources
 - (2) Tree protection
 - (3) Replacement of damaged landscape features
 - (4) Temporary construction
 - (5) Stream crossings
 - (6) Fish and wildlife resources
 - (7) Wetland areas
- c. Protection of Historical and Archaeological Resources
- (1) Objectives
 - (2) Methods
- d. Storm Water Management and Control
- (1) Ground cover
 - (2) Erodible soils

- (3) Temporary measures
 - (a) Mechanical retardation and control of runoff
 - (b) Vegetation and mulch
 - (4) Effective selection, implementation and maintenance of Best Management Practices (BMPs).
- e. Protection of the Environment from Waste Derived from Contractor Operations
- (1) Control and disposal of solid and sanitary waste. If Section 01 74 19.00 25 is included in the contract, submit the plan required by that section as part of the Environmental Management Plan.
 - (2) Control and disposal of hazardous waste (Hazardous Waste Management Section)
- This item will consist of the management procedures for all hazardous waste to be generated. The elements of those procedures will coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the Contracting Officer. As a minimum, include the following:
- (a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;
 - (b) Sampling/analysis plan;
 - (c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);
 - (d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);
 - (e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);
 - (f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;
 - (g) Used oil management procedures in accordance with 40 CFR 279;
 - (h) Pollution prevention\hazardous waste minimization procedures;
 - (i) Plans for the disposal of hazardous waste by permitted facilities;
 - (j) Procedures to be employed to ensure all required employee training records are maintained.
- f. Prevention of Releases to the Environment

- (1) Procedures to prevent releases to the environment
- (2) Notifications in the event of a release to the environment

g. Regulatory Notification and Permits

List what notifications and permit applications must be made. Demonstrate that those permits have been obtained by including copies of all applicable, environmental permits.

3.1.1 Environmental Protection Plan Review

Within thirty days after the Contract award date, submit the proposed Environmental Management Plan for further discussion, review, and approval. Commencement of work will not begin until the environmental management plan has been approved.

3.1.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause 52.236-7.

The following permits will be obtained by the Contracting Officer:

For permits obtained by the Contracting Officer, whether or not required by the permit, the Contractor is responsible for conforming to all permit requirements and performing all quality control inspections of the work in progress, and to submit notifications and certifications to the applicable regulatory agency via the Contracting Officer.

No permits will be obtained by the Contracting Officer.

Where required by the State regulatory authority, the inspections and certifications will be provided through the services of a Professional Engineer (PE), registered in the State where the work is being performed. Where a PE is not required, the individual must be otherwise qualified by other current State licensure, specific training and prior experience (minimum 5 years). As a part of the quality control plan, which is required to be submitted for approval by the quality control section, provide a sub item containing the name, appropriate professional registration or license number, address, and telephone number of the professionals or other qualified persons who will be performing the inspections and certifications for each permit.

3.2 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. If the work is near streams, lakes, or other waterways, conform to the national permitting requirements of the Clean Water Act.

Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

Except in areas to be cleared, do not remove, cut, deface, injure, or

destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor will be responsible for any resultant damage.

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed. Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

The Contracting Officer's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition unless otherwise required by the Contracting Officer.

3.2.1 Erosion and Sediment Control Measures

3.2.1.1 Burnoff

Burnoff of the ground cover is not permitted.

3.2.2 Erosion and Sediment Control Inspection Reports

Not used.

3.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Upon discovery, notify the Contracting Officer. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.4 SOLID WASTE MANAGEMENT PLAN and PERMIT

Provide to the contracting officer written notification of the quantity of solid waste/debris that is anticipated to be generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance or as applicable, submit one copy of a State and local [Solid Waste Management Permit](#) or license showing such agency's approval of the disposal plan before transporting wastes off Government property. [Contractor shall follow AUTECH's Solid Waste Management Plan.](#)

3.4.1 [Solid Waste Management Report](#)

Monthly, submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

The Contractor will include copies of the waste handling facilities' weight

tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating the disposal location for the solid waste which is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification will include the receiver's tax identification number and business, EPA or State registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor will submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received will not be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

3.4.2 Control and Management of Solid Wastes

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

Manage spent hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, as per environmental law.

3.4.2.1 Dumpsters

Equip dumpsters with a secure cover and paint the standard base color. Keep cover closed at all times, except when being loaded with trash and debris. Locate dumpsters behind the construction fence or out of the public view. Empty site dumpsters at least once a week, or as needed to keep the site free of debris and trash. If necessary, provide 55 gallon trash containers painted the darker base color to collect debris in the construction site area. Keep 55 gallon trash containers closed at all times, except when being loaded with trash or debris. Locate the trash containers behind the construction fence or out of the public view. Empty trash containers at least once a day. For large demolitions, large dumpsters without lids are acceptable but should not have debris higher than the sides before emptying. Keep large dumpsters closed at all times, except when being loaded with trash or debris.

3.5 WASTE DETERMINATION DOCUMENTATION

Complete a Waste Determination form (provided at the pre-construction conference) for all contractor derived wastes to be generated. Base the waste determination upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (Material Safety Data Sheets (MSDS) by themselves are not adequate). Attach all support documentation to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and all containers of the original materials.

3.6 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

Submit the "Contractor Hazardous Material Inventory Log" (found at: <http://www.wbdg.org/ccb/NAVGRAPH/graphdoc.pdf>), which provides information required by (EPCRA Sections 312 and 313) along with corresponding Material Safety Data Sheets (MSDS) to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the Contracting Officer.

3.6.1 Disposal Documentation for Hazardous and Regulated Waste

Manifest, pack, ship and dispose of hazardous or toxic waste and universal waste that is generated as a result of construction in accordance with the generating facilities generator status under the Resource Conservation and Recovery Act. Contact the Contracting Officer for the facility RCRA identification number that is to be used on each manifest.

Submit a copy of the applicable EPA and or State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Hazardous or toxic waste manifest must be reviewed, signed, and approved by the Navy before the Contractor may ship waste. To obtain specific disposal instructions the Contractor must coordinate with the Activity environmental office. Refer to Section 01 57 19.01 25 SUPPLEMENTAL TEMPORARY ENVIRONMENTAL CONTROLS for the Activity Point of Contact information.

3.7 POLLUTION PREVENTION/HAZARDOUS WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of hazardous waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the Environmental Management Plan. Consult with the activity Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material when preparing this part of the plan. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.8 WHM/HW MATERIALS PROHIBITION

No waste hazardous material or hazardous waste shall be disposed of on government property. No hazardous material shall be brought onto government property that does not directly relate to requirements for the performance of this contract. The government is not responsible for disposal of Contractor's waste material brought on the job site and not required in the performance of this contract. The intent of this provision is to dispose of that waste identified as waste hazardous material/hazardous waste as defined herein that was generated as part of this contract and existed within the boundary of the Contract limits and not brought in from offsite by the Contractor. Incidental materials used to support the contract including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive. The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or to the river or conduct waste treatment or

disposal on government property without written approval of the Contracting Officer. [Comply with U.S. Navy Atlantic Undersea Test and Evaluation Center's HAZARDOUS WASTE MANAGEMENT PLAN for NUWC DET AUTECH sites Andros Island, Bahamas Issue 4 dated 07 June 2000.](#)

3.9 HAZARDOUS MATERIAL MANAGEMENT

No hazardous material shall be brought onto government property that does not directly relate to requirements for the performance of this contract.

Include hazardous material control procedures in the Safety Plan. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Submit a MSDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on base. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. Ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. Ensure that all containers of hazardous materials have NFPA labels or their equivalent. Keep copies of the MSDS for hazardous materials on site at all times and provide them to the Contracting Officer at the end of the project. Certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per [40 CFR 261](#).

3.10 PETROLEUM PRODUCTS AND REFUELING

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. Provide a spill kit on site and train staff in use of kit. Limit the storage of all fuels, lubricants, solvents, paints and hazardous substances to a total of less than 55 gallons on site. Manage all used oil generated on site in accordance with [40 CFR 279](#). Determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. Used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste.

3.10.1 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with [40 CFR 112](#), surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.10.2 Inadvertent Discovery of Petroleum Contaminated Soil or Hazardous Wastes

If petroleum contaminated soil or suspected hazardous waste is found during construction that was not identified in the contract documents, the

contractor shall immediately notify the contracting officer. The contractor shall not disturb this material until authorized by the contracting officer.

3.11 FUEL TANKS

Total storage of all fuels and all solvents is 55 gallons without approval by the Government. Storage and refilling practices shall comply with 40 CFR Part 112. Secondary containment shall be provided and be no less than 110 percent of the tank volume plus five inches of free-board. If a secondary berm is used for containment then the berm shall be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Drips pans are required and the tanks must be covered during inclement weather.

3.12 RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. The site plan shall include where any fuels, hazardous substances, solvents or lubricants will be stored. The spill plan is to address any leaks or spills of fuels, hazardous substances, solvents or lubricants. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Base or Activity Fire Department, the activity's Command Duty Officer, and the Contracting Officer. If the contractor's response is inadequate, the Navy may respond. If this should occur, the contractor will be required to reimburse the government for spill response assistance and analysis.

The Contractor is responsible for verbal and written notifications as required by the federal 40 CFR 355, State, local regulations and Navy Instructions. Spill response will be in accordance with 40 CFR 300 and applicable State and local regulations. Contain and clean up these spills without cost to the Government. If Government assistance is requested or required, the Contractor will reimburse the Government for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 20 days.

Maintain spill cleanup equipment and materials at the work site. Clean up all hazardous and non-hazardous (WHM) waste spills. The Contractor shall reimburse the government for all material, equipment, and clothing generated during any spill cleanup. The Contractor shall reimburse the government for all costs incurred including sample analysis materials, equipment, and labor if the government must initiate its own spill cleanup procedures, for Contractor responsible spills, when:

- a. The Contractor has not begun spill cleanup procedure within one hour of spill discovery/occurrence, or
- b. If, in the government's judgment, the Contractor's spill cleanup is not adequately abating life threatening situation and/or is a threat to any body of water or environmentally sensitive areas.

3.13 CONTROL AND MANAGEMENT OF HAZARDOUS WASTES

3.13.1 Facility Hazardous Waste Generator Status

Not used.

3.13.2 Hazardous Waste/Debris Management

Identify all construction activities which will generate hazardous waste/debris. Provide a documented waste determination for all resultant waste streams. Hazardous waste/debris will be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

Hazardous waste will also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities will be identified as being generated by the Government.

Prior to removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by activity personnel from the Station Environmental Office. No hazardous waste will be brought onto Government property. Provide to the Contracting Officer a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.13.2.1 Regulated Waste Storage/Satellite Accumulation/90 Day Storage Areas

If the work requires the temporary storage/collection of regulated or hazardous wastes, the Contractor will request the establishment of a Regulated Waste Storage Area, a Satellite Accumulation Area, or a 90 Day Storage Area at the point of generation. The Contractor must submit a request in writing to the Contracting Officer providing the following information:

<u>Contract Number</u>	[_____]
<u>Contractor</u>	[_____]
<u>Haz/Waste or Regulated Waste POC</u>	[_____]
<u>Phone Number</u>	[_____]
<u>Type of Waste</u>	[_____]
<u>Source of Waste</u>	[_____]
<u>Emergency POC</u>	[_____]
<u>Phone Number</u>	[_____]

<u>Location of the Site</u>	[_____]
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(Attach Site Plan to the Request)

Attach a waste determination form. Allow ten working days for processing this request. The designated area where waste is being stored shall be barricaded and a sign identifying as follows:

"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.13.2.2 Sampling and Analysis of HW

a. Waste Sampling

Sample waste in accordance with EPA 530/F-93/004. Each sampled drum or container will be clearly marked with the Contractor's identification number and cross referenced to the chemical analysis performed.

b. Laboratory Analysis

Follow the analytical procedure and methods in accordance with the 40 CFR 261. The Contractor will provide all analytical results and reports performed to the Contracting Officer

c. Analysis Type

Identify waste hazardous material/hazardous waste by analyzing for the following properties as a minimum: ignitability, corrosiveness, total chlorides, BTU value, PCBs, TCLP for heavy metals, and cyanide.

3.13.2.3 Asbestos Certification

Not used.

3.13.2.4 Hazardous Waste Disposal

No hazardous, toxic, or universal waste shall be disposed or hazardous material abandoned on government property. And unless otherwise otherwise noted in this contract, the government is not responsible for disposal of Contractor generated waste material. The disposal of incidental materials used to accomplish the work including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive.

The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or water way or conduct waste treatment or disposal on government property without written approval of the Contracting Officer.

Control of stored waste, packaging, sampling, analysis, and disposal will be determined by the details in the contract. The requirements for jobs in the following paragraphs will be used as the guidelines for disposal of any hazardous waste generated.

a. Responsibilities for Contractor's Disposal

Contractor responsibilities include any generation of WHM/HW requiring Contractor disposal of solid waste or liquid.

- (1) The Contractor agrees to provide all service necessary for the final treatment/disposal of the hazardous material/waste in accordance with all local, State and Federal laws and regulations, and the terms and conditions of the contract within sixty (60) days after the materials have been generated. These services will include all necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal, and/or transportation, including manifesting or completing waste profile sheets, equipment, and the compilation of all documentation is required).
- (2) Contain all waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 272, 40 CFR 273, 40 CFR 279, 40 CFR 280, and 40 CFR 761.
- (3) Obtaining a representative sample of the material generated for each job done to provide waste stream determination.
- (4) Analyzing for each sample taken and providing analytical results to the Contracting Officer. Provide two copies of the results.
- (5) Determine the DOT proper shipping names for all waste (each container requiring disposal) and will demonstrate how this determination is developed and supported by the sampling and analysis requirements contained herein to the Contracting Officer.

Contractor Disposal Turn-In Requirements

For any waste hazardous materials or hazardous waste generated which requires the Contractor to dispose of, the following conditions must be complied with in order to be acceptable for disposal:

- a. Drums compatible with waste contents and drums meet DOT requirements for 49 CFR 173 for transportation of materials.
- b. Drums banded to wooden pallets. No more than three (3) 55 gallon drums to a pallet, or two (2) 85 gallon over packs.
- c. Band using 1-1/4 inch minimum band on upper third of drum.
- d. Recovery materials label (provided by Code 106.321) located in middle of drum, filled out to indicate actual volume of material, name of material manufacturer, other vendor information as available.
- e. Always have three (3) to five (5) inches of empty space above volume of material. This space is called 'outage'.

3.13.3 Class I and II ODS Prohibition

Class I and II ODS as defined and identified herein will not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition will be considered to prevail over any other provision, specification, drawing, or referenced documents. Regulations related to the protection of stratosphere ozone may be found in 40 CFR 82.

Heating and air conditioning technicians must be certified through an EPA-approved program. Copies of certifications shall be maintained at the

employees' place of business and be carried as a wallet card by the technician, as provided by environmental law. Accidental venting of a refrigerant is a release and shall be reported to the Contracting Officer.

3.13.3.1 Universal Waste/e-Waste Management

Universal waste including but not limited to some mercury containing building products such florescent lamps, mercury vapor lamps, high pressure sodium lamps, CRTs, batteries, aerosol paint containers, electrical equipment containing PCBs, and consumed electronic devices, shall be managed in accordance with applicable environmental law and installation instructions.

3.14 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.14.1 [Dirt and Dust Control Plan](#)

Submit truck and material haul routes along with a plan for controlling dirt, debris, and dust on base roadways. As a minimum, identify in the plan the subcontractor and equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.

3.15 ABRASIVE BLASTING

3.15.1 Blasting Operations

The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive, agent, paint chips, and other debris . Perform work involving removal of hazardous material in accordance with [29 CFR 1910](#).

3.15.2 [Disposal Requirements](#)

Submit analytical results of the debris generated from abrasive blasting operations per paragraph entitled Laboratory Analysis of this section. Hazardous waste generated from blasting operations will be managed in accordance with paragraph entitled "Hazardous Waste\Debris Management" of this section and with the approved HWMP. Disposal of non-hazardous abrasive blasting debris will be in accordance with paragraph entitled, "Control and Disposal of Solid Wastes".

3.16 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless

PIER 1902 REPAIRS
AUTECH Site 1

Work Order No. 1302903
Andros Island, Bahamas

otherwise specified.

-- End of Section --

SECTION 01 62 35.00 25

RECYCLED / RECOVERED MATERIALS
12/11
NAVFAC SE VERSION

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.

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

40 CFR 247

Comprehensive Procurement Guideline for
Products Containing Recovered Materials

1.2 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. Make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications contain requirements for materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN
THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 74 19.00 25

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
08/13
NAVFAC SE VERSION

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy: (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. A minimum of 50 percent by weight of total project solid waste shall be diverted from the landfill.

1.2 MANAGEMENT

Develop and implement a waste management program. 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.

1.3 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 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan; G

SD-11 Closeout Submittals

Records

1.4 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. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting outlined in Section 01 45 00.00 20 QUALITY CONTROL. 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.

1.5 WASTE MANAGEMENT PLAN

A waste management plan shall be submitted within 15 days after notice to proceed and not less than 10 days before the preconstruction meeting. 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 regular meetings to be held to address waste management.
- d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.
- e. Characterization, including estimated types and quantities, of the waste to be generated.
- f. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.
- g. 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.
- h. 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 that will

be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.

- i. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the Contracting Officer.
- j. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.
- k. 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).
- l. Anticipated net cost savings determined by subtracting Contractor program management costs 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.

1.6 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.

1.7 REPORTS

Provide quarterly reports and a final report to the Contracting Officer. Quarterly and final reports shall include project name, information for waste generated this quarter, and cumulative totals for the project. Each report shall include supporting documentation to include manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. Include timber harvest and demolition information, if any.

1.8 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. Handle hazardous waste and hazardous materials in accordance with applicable regulations. Separate materials by one of the following methods:

1.8.1 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. Land clearing debris.
- b. Asphalt.
- c. Concrete and masonry.
- d. 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.
- e. Wood (nails and staples allowed).
- f. Debris.
- g. Glass (colored glass allowed).
- h. Paper.
 - (1) Bond.
 - (2) Newsprint.
 - (3) Cardboard and paper packaging materials.
- i. Plastic.

Type	
1	Polyethylene Terephthalate (PET, PETE)

Type	
2	High Density Polyethylene (HDPE)
3	Vinyl (Polyvinyl Chloride or PVC)
4	Low Density Polyethylene (LDPE)
5	Polypropylene (PP)
6	Polystyrene (PS)
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.

- j. Gypsum.
- k. Non-hazardous paint and paint cans.
- l. Carpet.
- m. Ceiling tiles.
- n. Insulation.
- o. Beverage containers.

1.8.2 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.

1.8.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.9 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:

1.9.1 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. Coordinate reuse with the Contracting Officer. Sale or donation of waste suitable for reuse shall be considered.

1.9.2 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.

1.9.3 Compost

Not used.

1.9.4 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

1.9.5 Return

Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 78 00.00 25

CLOSEOUT SUBMITTALS
04/14
NAVFAC SE VERSION

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.

GREEN SEAL (GS)

GS-37 (2012) Cleaning Products for Industrial and Institutional Use

U.S. ARMY CORPS OF ENGINEERS (USACE)

TR-06-X (2006; Supplement 2009) A/E/C (Architectural, Engineering, and Construction) CADD Standard - Release 3.0

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-300-08 (2009, with Change 2) Criteria for Transfer and Acceptance of DoD Real Property

1.2 SUBMITTALS

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

SD-03 Product Data

As-Built Record of Equipment and Materials
Warranty Management Plan
Warranty Tags
Spare Parts Data

SD-08 Manufacturer's Instructions

Preventative Maintenance
Condition Monitoring (Predictive Testing)
Inspection
Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

SD-11 Closeout Submittals

Record Drawings
Interim Form DD1354; G
Checklist for Form DD1354; G
NAVFAC Sustainable & Energy Data Record Card; G

1.3 PROJECT RECORD DOCUMENTS

1.3.1 Record Drawings

Drawings showing final as-built conditions of the project. This paragraph covers record drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working record drawings" and "final record drawings" refer to contract drawings which are revised to be used for final record drawings showing as-built conditions.

1.3.1.1 Working Record and Final Record Drawings

Revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Prepare final record (as-built) drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final record (as-built) drawings will be jointly reviewed for accuracy and completeness by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final record drawings as specified herein, the Contracting Officer will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the record drawings. This monthly deduction will continue until an agreement can be reached between the Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. Show on the working and final record drawings , but not limited to, the following information:

- a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.
- b. The location and dimensions of any changes within the pier structure.
- c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.
- d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection,

installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

- e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
- f. Changes or modifications which result from the final inspection.
- g. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.
- h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.
- i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.
- j. Modifications (include within change order price the cost to change working and final record drawings to reflect modifications) and compliance with the following procedures.
 - (1) Follow directions in the modification for posting descriptive changes.
 - (2) Place a Modification Delta at the location of each deletion.
 - (3) For new details or sections which are added to a drawing, place a Modification Delta by the detail or section title.
 - (4) For minor changes, place a Modification Delta by the area changed on the drawing (each location).
 - (5) For major changes to a drawing, place a Modification Delta by the title of the affected plan, section, or detail at each location.
 - (6) For changes to schedules or drawings, place a Modification Delta either by the schedule heading or by the change in the schedule.

1.3.1.2 Drawing Preparation

Modify the record drawings as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints must be neat, legible and accurate. These drawings are part of the permanent records of this project and must be returned to the Contracting Officer after approval by the Government. Any drawings damaged or lost by the Contractor must be satisfactorily replaced by the Contractor at no expense to the Government.

1.3.1.3 Computer Aided Design and Drafting (CADD) Drawings

Only employ personnel proficient in the preparation of CADD drawings to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must be the same as the original line colors, line weights, lettering, layering conventions, and symbols. If

additional drawings are required, prepare them using the specified electronic file format applying TR-06-X. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CADD files. The Contractor will be furnished "as-designed" drawings in AutoCad format. The electronic files will be supplied on optical disk. Provide all program files and hardware necessary to prepare final record drawings. The Contracting Officer will review final record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

- a. When final revisions have been completed, show the wording "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high on the cover sheet drawing. Mark all other contract drawings either "Record" drawing denoting no revisions on the sheet or "Revised Record" denoting one or more revisions. Date original contract drawings in the revision block.
- b. Within 20 days after Government approval of all of the working record drawings for a phase of work, prepare the final CADD record drawings for that phase of work and submit two sets of hard-copy prints of these drawings for Government review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 20 days of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit three sets of electronic files on optical disc, two sets of hard-copy prints and one set of the approved working record drawings. Of the three optical discs, submit two to the Contracting Officer for distribution to the Designer-of-Record and Public Works, and forward one to NAVFAC SE Asset Management GI&S, Southeast GeoReadiness Center Manager, NAS Jacksonville, Jacksonville, FL 32212. They must be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this are the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record drawing files and marked prints as specified will be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made to the Contractor.

1.3.1.4 Payment

No separate payment will be made for record drawings required under this contract, and all costs accrued in connection with such drawings are considered a subsidiary obligation of the Contractor.

1.3.2 As-Built Record of Equipment and Materials

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with Government comments. Submit Two sets of final record of equipment and materials 10 days after final inspection. Key the designations to the related area

depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

1.3.3 Final Approved Shop Drawings

Furnish final approved project shop drawings 30 days after transfer of the completed facility.

1.3.4 Construction Contract Specifications

Furnish final record (as-built) construction contract specifications, including modifications thereto, 30 days after transfer of the completed facility.

1.3.5 Real Property Equipment

Furnish a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Furnish a draft list at time of transfer. Furnish the final list 30 days after transfer of the completed facility.

1.4 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

- a. Indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.
- b. Supply two items of each part for spare parts inventory. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.5 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance, Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

- a. Define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a signoff blank for the Contractor and Contracting Officer for each test feature; e.g., gpm, rpm, psi. Include a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume,

voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventative maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize corrective maintenance and repair.

- b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.6 WARRANTY MANAGEMENT

1.6.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the clause Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of project acceptance and continue for the full product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Include within the warranty management plan , but not limited to, the following:

- a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subContractors, manufacturers or suppliers involved.
- b. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- c. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- d. A list for each warranted equipment, item, feature of construction or system indicating:
 - (1) Name of item.
 - (2) Model and serial numbers.
 - (3) Location where installed.
 - (4) Name and phone numbers of manufacturers or suppliers.
 - (5) Names, addresses and telephone numbers of sources of spare parts.
 - (6) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty

of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.

- (7) Cross-reference to warranty certificates as applicable.
 - (8) Starting point and duration of warranty period.
 - (9) Summary of maintenance procedures required to continue the warranty in force.
 - (10) Cross-reference to specific pertinent Operation and Maintenance manuals.
 - (11) Organization, names and phone numbers of persons to call for warranty service.
 - (12) Typical response time and repair time expected for various warranted equipment.
- e. The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- f. Procedure and status of tagging of all equipment covered by extended warranties.
- g. Copies of [instructions](#) to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.6.2 Performance Bond

The Contractor's Performance Bond must remain effective throughout the construction period.

- a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.
- b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.
- c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.6.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact

will be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.6.4 **Warranty Tags**

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	
WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.	

1.7 **OPERATION AND MAINTENANCE MANUALS**

Submit 6 copies of the project operation and maintenance manuals 30 calendar days prior to testing the system involved. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

1.7.1 **Configuration**

Operation and Maintenance Manuals must be consistent with the

manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Bind information in manual format and grouped by technical sections. Test data must be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals must have 0.3937-inch holes and be bound in 3-ring, loose-leaf binders. Organize data by separate index and tabbed sheets, in a loose-leaf binder. Binder must lie flat with printed sheets that are easy to read. Caution and warning indications must be clearly labeled.

1.7.2 Training and Instruction

Submit classroom and field instructions in the operation and maintenance of systems equipment where required by the technical provisions. These services must be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. Contracting Officer will be given 7 calendar days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, such as lists, static exhibits, and visual aids, must be made available to the Contracting Officer.

1.8 CLEANUP

Leave premises "broom clean." Comply with [GS-37](#) for general purpose cleaning and bathroom cleaning. Use only nonhazardous cleaning materials, including natural cleaning materials, in the final cleanup. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Recycle, salvage, and return construction and demolition waste from project in accordance with the Waste Management Plan. Promptly and legally transport and dispose of any trash. Do not burn, bury, or otherwise dispose of trash on the project site.

1.9 REAL PROPERTY RECORD

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft DD Form 1354, and submit an accounting of all installed property with [Interim Form DD1354](#) "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations from the Draft DD Form 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD Form 1354. Refer to [UFC 1-300-08](#) for instruction on completing the DD Form 1354. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site:
<http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf>

Submit the completed [Checklist for Form DD1354](#) of Installed Building Equipment items. Attach this list to the updated DD Form 1354.

1.10 NAVFAC SUSTAINABLE & ENERGY DATA RECORD CARD

Within 60 days of the completion of Project, complete an electronic copy of the NAVFAC Sustainable & Energy Data Record Card, and submit to the Contracting Officer. Draft Record card for this project should be available from Designer of Record (DOR) or Contracting Officer.

Instructions and a blank DD Form (fill-able) in ADOBE (PDF) may be obtained at the Whole Building Design Guide web site by navigating:
Home > Participating Agencies > Department of Defense (DoD) > NAVFAC Sustainable Development Program > Contract Documents > NAVFAC Sustainable & Energy Data Record Card; or directly at
http://www.wbdg.org/pdfs/navfac_sustainable_energy_data_record_card.pdf.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 02 41 00

DEMOLITION AND DECONSTRUCTION
05/10

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 145 (1991; R 2008) Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

AASHTO T 180 (2010) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6 (2006) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011; Change 7 2012) Safety and Health Requirements Manual

U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25 (June 2000) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M (2006) MILSTRIP - Military Standard Requisitioning and Issue Procedures

MIL-STD-129 (2007; Rev P; Change 4 2007) Military Marking for Shipment and Storage

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

40 CFR 61 National Emission Standards for Hazardous Air Pollutants

49 CFR 173.301 Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.2 PROJECT DESCRIPTION

1.2.1 Demolition/Deconstruction Plan

Prepare a [Demolition Plan](#) and/or [Deconstruction Plan](#) and submit proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started.. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. [Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be Removed.](#) Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan. Provide procedures for safe conduct of the work in accordance with [EM 385-1-1](#). Plan shall be approved by Contracting Officer prior to work beginning.

1.2.2 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. [The work of this section is to be performed in a manner that maximizes salvage and recycling of materials.](#) Remove rubbish and debris from the project site; do not allow accumulations at the work site. The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with [EM 385-1-1](#), Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.3.2 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of

existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.3.3 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor.

1.3.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical utilities. Structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted. Where burning is permitted, adhere to federal, state, and local regulations.

1.5 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished shall be as designated on drawings, unless directed otherwise by the Contracting Officer.

1.6 SUBMITTALS

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

SD-01 Preconstruction Submittals

Existing Conditions; G

SD-07 Certificates

Demolition Plan; G

Deconstruction Plan; G

Notification of Demolition and Renovation form

SD-11 Closeout Submittals

Receipts

1.7 QUALITY ASSURANCE

Submit timely notification of demolition deconstruction and renovation projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the local air pollution control district/agency and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

Complete and submit Notification of Demolition and Renovation form to Federal authorities and Contracting Officer, postmarked or delivered at least ten working days prior to commencement of work, in accordance with 40 CFR 61, Subpart M. Complete paragraphs, I, II, IIIB, IIIC (if applicable), IX and XVI of form.

1.7.1 Dust and Debris Control

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to watercraft.

1.8 PROTECTION

1.8.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the Contracting Officer prior to beginning such work.

1.8.2 Protection of Personnel

Before, during and after the demolition and deconstruction work continuously evaluate the condition of the structure being demolished and deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.9 FOREIGN OBJECT DAMAGE (FOD)

If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade shall include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds. Remove barricade when no longer required.

1.10 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be

relocated which are damaged by the Contractor with new undamaged items as approved by the Contracting Officer.

1.11 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of pile caps, finish deck elevations, possible conflicting electrical conduits, plumbing lines, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

PART 2 PRODUCTS

2.1 FILL MATERIAL

- a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition or deconstruction of structures. Fill material shall be waste products from demolition or deconstruction until all waste appropriate for this purpose is consumed.
- b. Fill material shall conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material shall be free from roots and other organic matter, trash, debris, and stones larger than 2 inches in any dimension.
- c. Proposed fill material must be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	AASHTO M 145
Moisture-density relations	AASHTO T 180, Method B or D

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible.

3.1.1 Structures

- a. Remove existing structures indicated to be removed as indicated on drawings.

- b. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to structure.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities 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 but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area.

3.1.3 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Salvage removed concrete.

3.1.4 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

- a. Concrete: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing masonry walls to remain, with an approved patching material, applied in accordance with the manufacturer's printed instructions.

3.1.5 Mechanical Equipment and Fixtures

3.1.5.1 Piping

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve shall be attached to the open end of the pipe to ensure positive leak

control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Classify piping not designated for salvage, or not reusable, as scrap metal.

3.1.5.2 Fixtures, Motors and Machines

Remove and salvage fixtures associated with plumbing, and other mechanical system installations. Tag salvaged items for identification, storage, and protection from damage. Classify broken, damaged, or otherwise unserviceable units and not caused to be broken, damaged, or otherwise unserviceable as debris to be disposed of by the Contractor.

3.1.6 Electrical Equipment and Fixtures

Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.

3.1.6.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.

3.1.6.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.

3.1.6.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

3.1.6.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

3.1.7 Items With Unique/Regulated Disposal Requirements

Remove and dispose of items with unique or regulated disposal requirements in the manner dictated by law or in the most environmentally responsible manner.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.2.2 Reuse of Materials and Equipment

Remove and store materials and equipment indicated on the contract drawings to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.2.3 Salvaged Materials and Equipment

Remove materials and equipment that are listed in the Demolition and Deconstruction Plan and specified to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site, as directed by the Contracting Officer.

- a. Salvage items and material to the maximum extent possible.
- b. Store all materials salvaged for the Contractor as approved by the Contracting Officer and remove from Government property before completion of the contract. On site sales of salvaged material is prohibited.
- c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers. Deliver the following items reserved as property of the Government to the areas designated by the Contracting Officer.

3.2.4 Transportation Guidance

Ship all ODS containers in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

3.2.5 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable combustible material off the site.

3.3 CLEANUP

Remove debris and rubbish excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.4 DISPOSAL OF REMOVED MATERIALS

3.4.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable local regulations as contractually specified in the Waste Management Plan.

3.4.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

3.4.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition and deconstruction structures to designated spoil areas on Government property.

3.4.4 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

3.5 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

-- End of Section --

SECTION 03 01 32

CONCRETE REHABILITATION
12/11

PART 1 GENERAL

Work under this section covers concrete repairs to the substructure, superstructure, deck components, mooring and berthing systems, and appurtenances as shown on the drawings and specified herein.

Section 01 22 00.00 10 for measurement and payment for repair work.

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

	(2010)ACI Concrete Terminology http://terminology.concrete.org
ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 301	(2010; Errata 2011) Specifications for Structural Concrete
ACI 304.2R	(1996; R 2008) Placing Concrete by Pumping Methods
ACI 305R	(2010) Specification for Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 308R	(2001; R 2008) Guide to Curing Concrete
ACI 311.4R	(2005) Guide for Concrete Inspection
ACI 318	(2011; Errata 1 2011; Errata 2 2012; Errata 3-4 2013) Building Code Requirements for Structural Concrete and Commentary
ACI 347	(2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete
ACI 364.3R	(2009) Guide for Cementitious Repair

Material Data Sheet

ACI 546R	(2004) Concrete Repair Guide
ACI 546.3R	(2006) Guide for the Selection of Materials for the Repair of Concrete
ACI E 706	(2004) Surface Repair Using form-and-pump Techniques
ASTM INTERNATIONAL (ASTM)	
ASTM A 706/A 706M	(2009b) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 1077	(2010d) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 109/C 109M	(2008) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM C 117	(2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(2010) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 157/C 157M	(2008) Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
ASTM C 172	(2010) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 231/C 231M	(2010) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 31/C 31M	(2010) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 39/C 39M	(2010) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C 496/C 496M	(2004e1) Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C 1202	(2010) Standard Test Method for Electrical

Indication of Concrete's Ability to Resist
Chloride Ion Penetration

- ASTM C 1581/C 1581M (2009a) Standard Test Method for Determining Age at Cracking and Induced Tensile Stress Characteristics of Mortar and Concrete under Restrained Shrinkage
- ASTM D 75/D 75M (2009) Standard Practice for Sampling Aggregates
- ASTM C 1583/C 1583M (2004e1) Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)

- (2010) Concrete Repair Terminology
- ICRI 310.1R-2008 (2008) Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (formerly No. 03730)
- ICRI 320.2R-2009 (2009) Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces (formerly No. 03733)
- ICRI 210.3-2004 (2004) Guide to Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials (formerly No. 03739)

U.S. ARMY CORPS OF ENGINEERS (USACE)

- COE CRD-C 400 (1963) Requirements for Water for Use in Mixing or Curing Concrete
- EM 385-1-1 (2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011; Change 7 2012) Safety and Health Requirements Manual

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

- AASHTO T 277 (2007) Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration

AMERICAN WELDING SOCIETY (AWS)

- AWS D1.1/D1.1M (2012; Errata 2011) Structural Welding Code - Steel
- AWS D1.4/D1.4M (2011) Structural Welding Code - Reinforcing Steel

1.2 DEFINITIONS

The concrete and concrete repair terminology and definitions used are provided by "ACI Concrete Terminology" and ICRI "Concrete Repair Terminology" unless otherwise defined in the specifications.

1.2.1 Concrete

A composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate, usually a combination of fine aggregate and coarse aggregate; in Portland cement concrete, the binder is a mixture of Portland cement and water, with or without admixtures.

1.2.2 Pre-Packed Material

A composite material that consists of a mixture of cement paste, and fine aggregate, with or without admixtures.

1.2.3 Cement-Based Material

A material consisting of portland cement and/or other cementitious materials as a binder and aggregate. As used in this specification, cement-based materials include materials with polymer modifiers.

1.2.4 Embedded Galvanic Anode

A zinc material used to cathodically protect adjacent reinforcing steel from corrosion, typically embedded in low resistivity cementitious matrix.

1.3 GENERAL REPAIR REQUIREMENTS

The following requirements shall be met:

- a. The achievement of the specified requirements, characteristics, and properties of repair materials and systems and the composite repair system regarding the fulfillment of their purpose to prolong the useful service life of the structure.
- b. The achievement of the compatibility of the existing concrete and reinforcement with the repair and protection materials and systems and compatibility between different repair and protection products, including avoiding the risk of creating conditions which may cause acceleration of corrosion.
- c. The achievement of the required condition of the substrate regarding cleanliness, roughness, cracking, tensile and compressive strength, chlorides and other aggressive agents, depth of carbonation, moisture content, and temperature.
- d. The achievement of the required repair application conditions regarding ambient temperature, humidity, wind force, and precipitation and any temporary protection when needed.

1.4 REPAIR STRUCTURAL FUNCTION

Repairs to reinforced concrete structures are required to perform different functions. In some cases replacement of deteriorated or damaged concrete

to provide an acceptable appearance may be all that is required. This type of repair is considered a cosmetic repair. Another more common type of repair is a protective repair, with the main objective being to protect reinforcement from corrosion in order to slow down the deterioration processes. In both of the above repair types stress-carrying function is not a primary consideration, and the repairs can be described as non-structural.

By contrast, repairs to some structural elements, such as beam and columns, may require removal of stress carrying concrete and replacement with material capable of carrying the same load, in this case the type of repair is considered a structural repair and the remaining load must be defined. If all load is left on the structure during the repair operation, then the repair material will not become stressed. This "no-load-relief" case, occurs when compressive stress in the repair of a column, for instance, only results when creep or other deformation of the existing concrete takes place. In the event that the original member was overdesigned, and in tension zones of beams, some relief of the requirements for structural repairs may be available. Special considerations shall be given in project specific specifications regarding the structural function requirements of the repair.

1.5 REPAIR MATERIAL PROPERTY REQUIREMENTS

All repair materials shall be in accordance with applicable provisions of [ACI 546.3R](#), ICRI Guideline No. [ICRI 320.2R-2009](#) and conform to the following requirements.

The most important characteristics governing the selection of repair materials for this project is the repair materials permeability, compatibility with the existing substrate, and sensitivity to cracking caused by restrained volume changes. The critical material properties that affect its resistance to cracking include splitting tensile strength, and drying shrinkage.

The project is intended to be for repairs of concrete spalls and cracks, with an intended service life of 15 years.

1.5.1 Concrete

Concrete shall satisfy the performance criteria in accordance with Section [03 30 00 CONCRETE](#) and the following property criteria.

1.5.1.1 Form and Pour Material

Form and Pour Material shall be in accordance with Section [03 30 00 CONCRETE](#) and the following property criteria.

Property	Test Method	Criteria
Splitting Tensile Strength	ASTM C 496/C 496M	367 psi (minimum) @ 28 Days
Drying Shrinkage	ASTM C 157/C 157M modified by ACI 364.3R	0.05% (maximum) @ 28 Days
Restrained shrinkage cracking	ASTM C 1581/C 1581M	No cracks within 14 days

Property	Test Method	Criteria
Chloride Ion Penetration	ASTM C 1202 or AASHTO T 277	2,000 coulombs (maximum)@ 28 Days
Compressive Strength	ASTM C 39/C 39M	3,000 psi +/- 15% @ 28 Days

1.5.1.2 Form and Pump Material

Form and Pump Material shall be in accordance with Section 03 30 00 CONCRETE or paragraph 1.5.2 Pre-Packaged Material and meet the following property criteria.

Property	Test Method	Criteria
Splitting Tensile Strength	ASTM C 496/C 496M	367 psi (minimum) @ 28 Days
Drying Shrinkage	ASTM C 157/C 157M modified by ACI 364.3R	0.05%(maximum)@ 28 Days
Restrained shrinkage cracking	ASTM C 1581/C 1581M	No cracks within 14 days
Chloride Ion Penetration	ASTM C 1202 or AASHTO T 277	2,000 coulombs (maximum)@ 28 Days
Compressive Strength	ASTM C 39/C 39M	3,000 psi +/- 15% @ 28 Days

1.5.2 Pre-Packaged Material

Pre-packaged material shall satisfy the following property criteria:

1.5.2.1 Form and Pump Material

Property	Test Method	Criteria
Splitting Tensile Strength	ASTM C 496/C 496M	367 psi (minimum) @ 28 Days
Drying Shrinkage	ASTM C 157/C 157M modified by ACI 364.3R	0.05%(maximum)@ 28 Days
Restrained shrinkage cracking	ASTM C 1581/C 1581M	No cracks within 14 days
Chloride Ion Penetration	ASTM C 1202 or AASHTO T 277	2,000 coulombs (maximum)@ 28 Days
Compressive Strength	ASTM C 39/C 39M	3,000 psi +/- 15% @ 28 Days

1.5.2.2 Hand Troweling Material

Property	Test Method	Criteria
Splitting Tensile Strength	ASTM C 496/C 496M	367 psi (minimum) @ 28 Days
Drying Shrinkage	ASTM C 157/C 157M modified by ACI 364.3R	0.05% (maximum) @ 28 Days
Restrained shrinkage cracking	ASTM C 1581/C 1581M	No cracks within 14 days
Chloride Ion Penetration	ASTM C 1202 or AASHTO T 277	2,000 coulombs (maximum) @ 28 Days
Compressive Strength	ASTM C 109/C 109M	3,000 psi +/- 15% @ 28 Days

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

- Repair Plan; G
- Contractor Qualifications; G
- Worker Qualifications; G
- Testing Technicians; G
- Testing Agencies; G
- Licensed Professional Engineer (PE) Qualifications; G
- CP Specialist Qualifications; G

Submit statements that the concrete testing technicians and agencies meet the specified requirements.

- Field Survey Results; G
- Letter of Acceptance of Government's Defect Quantities; G
- Procedures to Repair Defective Work; G
- Permanent Fiberglass Formwork - erection plan; G
- Permanent Fiberglass Formwork - work plan; G

SD-02 Shop Drawings

- Formwork; G

SD-03 Product Data

- Concrete; G

Reinforcing Steel; G
Pre-Packaged Material; G
Fiberglass Formwork

SD-05 Design Data

Repair Material Mixing Proportioning; G
Trial Batch; G
Mix Design; G
Fiberglass Formwork; G

SD-06 Test Reports

Concrete; G
Pre-Packaged Material; G
Continuity Test Report; G
Aggregates; G
Admixtures; G
Cement; G
Water; G

SD-07 Certificates

Batch Tickets; G
Form Removal Schedule; G
Placement and Compaction; G
QC Inspection Checklist; G

Manufacturer's certifications should be submitted with test results for proposed materials. Certificates should certify compliance with the appropriate specification referenced herein. Do not place materials without prior approval from the Contracting Officer.

SD-08 Manufacturer's Instructions

Pre-Packaged Material; G
Admixtures; G

Submit manufacturer's written surface preparation, mixing, application and curing instructions for each type of material.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for potentially hazardous materials.

Testing Equipment; G

1.7 QUALITY ASSURANCE

1.7.1 Qualifications

Submit Contractor qualifications and worker qualifications for approval in accordance with paragraph SUBMITTALS. The submittals shall, where applicable, identify individuals who will be working on this contract and their relevant experience. Do not make changes in approved personnel without prior approval of the Contracting Officer.

1.7.1.1 Contractor Qualifications

The Contractor performing the repair work shall have been involved in a minimum of 3 concrete repair projects similar in size and scope to this project within the last 5 years.

Contractor should be capable of demonstrating successful experience in all types of repairs specified in this project.

1.7.1.2 Worker Qualifications

Each worker engaged in the use of specialized removal or application equipment, including saw operators, and form-and-pump process, shall have satisfactorily completed an instruction program in the operation of the equipment. Each worker engaged in the operation of specialized equipment for the contract work shall have a minimum of 3 years of experience in the operation of the equipment.

1.7.1.3 Field Testing Technicians and Agency

The individuals who sample and test concrete and other repair materials as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade 1.

Testing agencies that perform testing service on repair materials shall meet the requirements of ASTM C 1077 and/or ACI 311.4R.

The QC inspector, inspecting repair work, shall be a licensed Professional Engineer (PE) qualified in the areas of work being performed.

1.7.2 Regulatory Requirements

Perform all work in accordance with 01 57 19.00 25 TEMPORARY ENVIRONMENTAL CONTROLS and applicable Federal, State and local safety, health, environmental requirements, and EM 385-1-1. The Contractor shall be responsible for obtaining all permits required by Federal, State and local agencies for the performance of the work.

1.7.3 Pre-Construction Conference

Before starting the repair project, the Contracting Officer or authorized representative shall meet the Contractor's project manager and superintendents at the pre-construction conference. At this meeting, the Contractor should present a work schedule to determine its acceptability to the owner and determine if there are going to be any conflicts with daily operations that should be resolved.

All aspects of field demonstrations, application procedures, repair materials, and corrosion protection employed should be discussed to ensure that the Contractors' personnel understand all aspects of the repair project. The conference shall also include competent technical representatives of repair materials and corrosion protection systems manufactures.

1.7.4 Drawings

1.7.4.1 Formwork

ACI 347. Include design calculations indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components stamped by a licensed professional engineer. Indicate placement schedule, construction, and location and method of forming control joints. Include locations of inserts, pipework, conduit, sleeves, and other embedded items. Furnish drawings and descriptions of shoring and reshoring methods as required for horizontal concrete members.

1.7.4.2 Form Removal Schedule

Submit schedule for form removal indicating element and minimum length of time for form removal. Submit technical literature of forming material or liner, form release agent, form ties, and gasketing to prevent leakage at form and construction joints. Provide a full description of materials and methods to be used to patch form-tie holes.

1.7.5 Repair Material Mixing Proportioning

Submit, at least 45 days before work commences, a repair material mixture proportioning for each use. Test reports shall accompany the mixture proportions. Identify the proposed source of the materials and state the proportions of each constituent. When determining the mixture design, use samples of materials to be used on the job.

a. **Trial batch:** Trial batches and testing requirements for various repair materials specified shall be the responsibility of the material manufacturer and Contractor. The pre-packaged material manufacturers representative shall be on-site for all trial batch operations. The laboratory performing the tests shall be on-site and shall conform to **ASTM C 1077**. Samples of aggregates shall be obtained in accordance with the requirements of **ASTM D 75/D 75M**. Samples of materials including the aggregate shall be representative of those proposed for the project and shall be accompanied by the manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in **ACI 211.1**, which will produce a range of strength encompassing those required for the work.

b. **Supporting criteria:** Include in the submittal the following data for each trial batch:

- (1) Proportions by weight
- (2) Unit weights and specific gravities of constituents
- (3) Batch weights
- (4) Compressive strengths in accordance with the following:

Material	Specimen Size	Test
Concrete	6 by 12 inch cylinders	ASTM C 39/C 39M
Mortar	2 inches cubes	ASTM C 109/C 109M

- (5) Curing time

- (6) Working time
- (7) Slump
- (8) Air content

1.7.6 Test Reports

1.7.6.1 Concrete

See Section 03 30 00 CONCRETE.

1.7.6.2 Pre-Packaged Material

Include the following:

- a. Compressive Strength
- b. Splitting Tensile Strength
- c. Drying Shrinkage
- d. Restrained Shrinkage Cracking
- e. Chloride Ion Penetration
- f. Bond Strength
- g. [Aggregates](#)
- h. [Admixtures](#)
- i. [Cement](#)

1.7.6.3 Water

Submit test results.

1.7.7 Placement and Compaction

- a. Submit technical literature for equipment and methods proposed for use in placing repair material. Include pumping or conveying equipment including type, size and material for pipe, valve characteristics, pressure gauge, and the maximum length and height concrete will be pumped. No adjustments shall be made to the mixture design to facilitate pumping.
- b. Submit technical literature for equipment and methods proposed for vibrating and compacting repair material. Submittal shall include technical literature describing the equipment including vibrator diameter, length, frequency, amplitude, centrifugal force, and manufacturer's description of the radius of influence under load. Where flat work is to be cast, provide similar information relative to the proposed compacting screed or other method to ensure dense placement.

1.7.8 Repair Plan

Submit the proposed methods for constructing or repairing each type of concrete repair. The plan shall include, but shall not be limited to, procedures for removal of deteriorated material, surface preparation, testing of repair materials, placing of material, curing, and test patches. The plan shall also include repair materials to be used along with specific information on products and/or constituents, and requirements for handling, storage, etc., equipment to be used, surface preparation, and requirements for placement, finishing, curing and protection specific to the materials used. Repair plan shall contain a proposed schedule for repairs. Submit the repair plan for approval 30 days after notice to proceed, in accordance with Paragraph 1.6, SUBMITTALS.

1.7.9 Field Demonstration

Field demonstrations shall be completed on each repair method to verify the surface preparation, formwork placement, repair material, and placement technique prior to production repair work. Materials utilized in field demonstrations shall be tested in accordance with Paragraph 3.8, FIELD QUALITY CONTROL.

Successful completion of the field demonstration will be determined by the results of the test reports, bond pull off tests, and the inspection of the repair at 28 days to ensure that the requirements of the specifications have been met.

1.7.9.1 Spall Repairs

Trial spall repairs should be undertaken by the Contractor for each type of repair long enough in advance of the repair project being scheduled to start to allow curing of repair materials and completion of the evaluation tests. Evaluation test results should be in compliance with the requirements of this specification.

Trial spall repairs should include a spall repair of 4 square feet or greater in a beam or pile cap utilizing form and pump material, a spall under 4 square feet in a beam or pile cap utilizing hand troweling material, a spall of 4 square feet or greater in the underside of deck utilizing form and pump, and a spall over 4 square feet in the top of deck utilizing form and pour material.

Trial spall repairs should be carried out using the same concrete removal and surface preparation methods, and the same materials and application methods as those to be used in the work. New trial repairs should be carried out if any changes in materials and equipment occur during the course of the work.

The formwork should be removed after a minimum of 7 days and the repairs should be checked to ensure that the requirements of this specification have been met. Hammer sounding for debonding should be conducted along with pull-off bond tests after 28 days. The tests should be performed on completed sample repairs.

The direct pull-off bond test should be conducted for the acceptance of each trial spall repair. Three individual pull-off tests should be performed in each trial spall repair in accordance with the ICRI 210.3-2004. Bond strength should not be less than 150 psi, unless failure is at least 1 inch into the existing concrete substrate. Areas

damaged by pull-off bond tests should be repaired with hand trowel mix.

If the trial sample repair is not accepted by the Contracting Officer, the Contractor should remove the repair, reapply and test the repair until the satisfactory results are obtained at no additional cost to the Government.

The quality and appearance of the sample repairs should be subject to the approval of the Contracting Officer, and if not judged satisfactory, additional sample repairs should be performed and tested until approval is attained.

The surface preparation procedures, repair materials, and application techniques used in conducting the approved sample repairs should be employed in production the repair project.

1.8 DELIVERY, STORAGE, AND HANDLING

1.8.1 Packing, Shipping, Handling, and Unloading

Inspect materials delivered to site for damage, unload and store with minimal handling. Deliver resin components and aggregate materials in original sealed containers where applicable.

1.8.2 Polymer Materials

Storage areas shall be in windowless and weatherproof, but ventilated, insulated noncombustible buildings. Store polymer materials at temperatures between 40 degrees F to 85 degrees F, unless approved by the polymer manufacture. Do not allow polymer materials to freeze.

1.8.3 Chemical Admixtures

Protect chemical admixtures and store and maintain between 40 degrees F to 90 degrees F, unless approved by the chemical admixture manufacture. Do not use any admixture that has been subjected to temperatures outside this range or in storage for longer than recommended by the manufacturer. Remove such materials from the site.

1.9 PROJECT/SITE CONDITIONS

1.9.1 Environmental Requirements

Do not place repair materials when weather conditions detrimentally affect the quality of the finished product. Do not place cement-based repair materials when the air temperature is below 40 degrees F in the shade. When air temperature is likely to exceed 90 degrees F, the cement-based repair material shall have a temperature not exceeding 85 degrees F when deposited, the difference in temperature between repair material and substrate should be not more than 10 degree F apart and the surface of such placed cement-based repair material shall be kept damp with a water fog until the approved curing medium is applied. Do not place polymer-modified repair materials when the air temperature is below 45 degrees F or above 85 degrees F unless approved by the polymer manufacturer. Placement restrictions for other materials shall be in accordance with the manufacturer's published literature. Halt work when weather conditions are potentially detrimental to the quality of repairing or bonding concrete. Follow manufacturer's instructions for weather conditions and temperature ranges.

1.9.2 Existing Conditions

1.9.2.1 Embedded Materials

The contract drawings and reference drawings do not constitute a complete description of all metal parts and other materials that may be encountered, but represent the best information available to the Government. Other items, or different locations for items shown, may exist. Exercise care to avoid drilling through functional embedded items intended to remain in service. The Contractor's selection of equipment and methods shall consider the presence of such materials, and the Government will not be responsible in any way for the effect of such items on the Contractor's equipment or progress. Where indicated, remove existing metal items to the limits noted on drawings.

1.10 SEQUENCING AND SCHEDULING

Unless otherwise specified, perform the work in such sequence that work does not damage previously completed work. Do not perform concrete removal and other operations which cause vibrations within 30 feet of repair materials that have cured less than 24 hours. Provide protective measures as required to protect completed work.

1.11 CONSTRUCTION TOLERANCES

1.11.1 Concrete Depth Removal

Remove concrete to the lines of removal indicated on the contract drawings. A tolerance of plus or minus 1 inch will be allowed about the lines indicated (except for the 1 inch clearance behind all existing reinforcing steel, which is an absolute minimum). Concrete removals that vary by more than the indicated tolerance will not be acceptable, unless approved in advance by the Contracting Officer. Unauthorized concrete removals shall be repaired by the Contractor to the satisfaction of the Contracting Officer and at no additional cost to the Government.

1.11.2 Concrete Area Removal

Area removal tolerance shall be within 25 percent of the areas indicated in the contract drawings. Concrete removals that vary by more than the indicated tolerance will not be acceptable, unless approved by the Contracting Officer or indicated in the approved Letter of Acceptance of Government's Defect Quantities. Unauthorized concrete removals shall be repaired by the Contractor to the satisfaction of the Contracting Officer at no additional cost to the Government.

1.11.3 Repair Materials and Products

Place repair materials to the lines indicated on the drawings. Construction tolerances for concrete and mortar repair materials shall meet the requirements of ACI 117.

1.12 Field Measurements

Prior to beginning any repair work, the contractor shall perform a survey of the structure to verify all repair quantities and locations indicated on the drawings. The contractor shall notify the government in writing of any discrepancies effecting the quantities, price, or schedule of the work prior to beginning construction.

Contractor shall submit the [field survey results](#) and [Letter of Acceptance of Government's Defect Quantities](#) within 30 days of award.

1.13 SAFETY

Perform all work in accordance with [EM 385-1-1](#). To protect personnel from overexposure to toxic materials, conform to the applicable [Manufacturer's Material Safety Data Sheets](#) (MSDS) or local regulation.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Concrete

2.1.1.1 [Form and Pour](#) Concrete

Concrete test data shall meet the requirements specified in Section [03 30 00](#), CONCRETE. Submit [mix design](#).

2.1.1.2 Form-and-Pump Concrete

Concrete test data shall meet the requirements specified in Section [03 30 00](#), CONCRETE. Submit [mix design](#).

2.1.2 [Pre-Packaged Material](#)

2.1.2.1 Form-and-Pump Material

The pre-packaged form and pump materials should be extended with coarse aggregate in accordance with the manufacturers written instructions. The test data should meet the performance requirements specified in Part 1.5.2.1

2.1.2.2 Hand Troweling Material

[The pre-packaged hand troweling materials should be in accordance with the manufactures written instructions. The test data should meet the performance requirements specified in Part 1.5.2.2](#)

2.1.3 Water

Water for cleaning, mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of [COE CRD-C 400](#).

2.1.4 [Reinforcing Steel](#)

Steel bars shall comply with the requirements of [ASTM A 706/A 706M](#), deformed, of the grades and sizes shown.

2.1.5 Bonding Compound

Bonding compounds shall not be permitted. Provide a roughened clean surface for bonding [in accordance with ICRI Division 310 concrete surface profile chips](#).

2.2 MIXTURE PROPORTIONING

2.2.1 Concrete

Concrete shall meet the requirements specified in Paragraph 1.5.1. [Batch tickets](#) shall be furnished for each load of concrete.

2.2.2 Pre-Packaged Material

Proportion materials in accordance with manufacturer's recommendations. Materials shall comply with the requirements of Paragraph 1.5.2.

PART 3 EXECUTION

3.1 EQUIPMENT

Assemble at the site of the work sufficient equipment that is dependable, appropriate, and adequate to accomplish the work specified and as recommended by product manufacturers. Deliver the equipment with sufficient time before the start of repairs to permit thorough inspection, calibration of weighing and measuring devices, adjustment of parts, and the making of any repairs that may be required. Machines, tools, and equipment used in the performance of the work shall be approved before the work is started and shall be maintained in satisfactory condition at all times. Maintain the equipment in good working condition.

3.1.1 Surface Preparation and Mixing Equipment

Surface preparation shall be in accordance with applicable requirements of ICRI Guideline No. [ICRI 310.1R-2008](#) and [ACI 546R](#) unless specified otherwise. Mixing equipment shall be in accordance with the specifications and manufacturers recommendations.

3.1.2 Drilling Equipment

Use percussion or rotary drilling equipment of a type suitable for the depth, diameter and material to be drilled. Use only rotary drilling equipment where vibration from percussion drilling could damage the concrete to remain or adjacent structures. Use equipment capable of maintaining the required alignment.

3.1.3 Diamond-Blade Cutting

Use diamond-blade cutting for cutting through relatively thin sections and defining limits of removal to be performed by other methods. Perform diamond blade cutting using equipment of the correct type and power and with appropriate blade composition for the material being cut. Roughen the cut surface in accordance with ICRI concrete surface profile scale CSP3 to CSP4.

3.1.4 Demolition Equipment

3.1.4.1 Hydrodemolition Equipment

Hydromilling equipment shall consist of filtering and pumping units. The equipment shall produce a highly roughened, bondable surface in accordance with ICRI concrete surface profile scale CSP5 to CSP7.

3.1.4.2 Mechanical Demolition Equipment

Use 15 pound maximum breaker for removal of concrete above and around reinforcing steel.

3.1.5 Pumping Equipment

The specified form-and-pump free-flowing repairs require pumping through a pump line to the formed cavity. Use hydraulic/swing valve pump for the best results. All pumping equipment must have adequate controls to regulate flow rates and pressure. Pressure shall be monitored with a pressure gauge.

3.2 PROTECTION

3.2.1 Protection of Existing Features

Before beginning any concrete removal work, carefully survey the structure and examine the drawings and specifications to determine the extent of the work. Take all necessary precautions to insure against damage to existing concrete or other structures to remain in place, and repair or replace any damage to such items as approved by the Contracting Officer at no additional cost to the Government. Carefully coordinate the work of this section with all other work, and construct and maintain shoring, bracing and supports, as required. Ensure that structural elements are not overloaded, and increase structural supports or add new supports as may be required as a result of any removal work performed under any part of this contract.

3.2.2 Protection of Personnel

Ensure that adequate measures are in place to protect workers, facility operation personnel and the public from injury due to the operations being performed. Provide protective measures in accordance with EM 385-1-1.

3.3 REMOVAL OF EXISTING CONCRETE

The following is intended to supplement Section 02 41 00 DEMOLITION.

3.3.1 General

Remove the existing concrete in the area to be repaired to the minimum depth indicated on the drawings. Remove concrete with care to avoid damage to adjacent structures and concrete that is not to be repaired under this contract and embedded metal that is not to be removed. Repair any such damage at no additional cost to the Government. Mark on the surface the limits of concrete removal for approval by the Contracting Officer prior to any removal.

Care must be exercised to ensure that further damage to reinforcement is not caused by the concrete removal process. Chipping operation can damage reinforcing steel and/or its bond to existing concrete if used. Constant vigilance must be exercised to assure maintenance of the necessary standards of workmanship. For this reason, a reinforcing bar locator should be used to determine the depth, size, quantity, and approximate location of the reinforcement in the concrete.

Care should be taken not to vibrate the reinforcement or otherwise cause damage to its bond to concrete adjacent to the repair area.

Do not remove metal and other embedded items exposed during the concrete removal operations without authorization of the Contracting Officer. Unless otherwise indicated, continue removal using appropriate equipment to remove sound and unsound concrete and to eliminate any offsets in the area to be repaired which would cause an abrupt change in thickness of the repair and to remove protrusions between holes. Variations in the final prepared surface shall not exceed the nominal maximum size aggregate of the repair material, except for relatively thin repairs in which case the variation shall not exceed 25 percent of the repair thickness. Any removal beyond the limits shown on the drawings shall be approved by the Contracting Officer prior to performing the additional removal. All equipment and removal methods shall comply with applicable sections of EM 385-1-1 and ACI 546R.

Concrete removal addresses deteriorated and damaged material. Some sound concrete, however, may be removed to permit structural modifications and to ensure that all unsound material is removed. The effectiveness of various removal techniques can differ for deteriorated and sound concrete. Some techniques may be more effective in sound concrete, while others may work better for deteriorated concrete.

Concrete removal techniques selected should be effective, safe, economical, environmentally friendly, and minimize damage to the concrete left in place. The removal technique chosen may have a significant effect on the length of time that a structure will be out of service. Some techniques permit a significant portion of the work to be accomplished without removing the structure from service. The same removal technique, however, may not be suitable for all portions of a given structure.

3.3.1.1 Determination of Removal Limits

Approximate locations and areas of repairs are indicated on the drawings. Determine actual locations and limits of deteriorated concrete by visual inspection and by tapping with a hammer or steel rod and listening for dull or hollow sounds. On horizontal surfaces, a chain drag may be used in lieu of the hammer or rod. Perform sounding in the presence of the Contracting Officer or authorized representative. Mark areas where sounding does not produce a solid tone with highly visible paint. After the investigation process is completed, the Contracting Officer will inspect the areas marked by the Contractor to confirm the limits of removal. Do not remove concrete from these areas until the Contracting Officer approves the areas. Upon completion of removal, sound the surface and remove any additional concrete until testing produces a solid tone.

Areas requiring repair should be modified to provide for simple layouts. The layouts shall provide for reduced boundary edge length and eliminate acute angles.

Removal of concrete around reinforcing bars shall extend to point where bar is well bonded to concrete and free of corrosion products.

In cases where apparently corroded or heavily oxidized reinforcing bars extend beyond marked repair areas into apparently sound concrete, the Contracting Officer shall direct contractor how far to extend limits of repair area.

The extent and depth of concrete removal in each repair area shall be measured and recorded on drawings by the Contractor.

3.3.1.2 Perimeter Saw Cut

For repair areas make a perpendicular saw cut at $3/4$ inch deep, but no deeper than the reinforcing steel, 2 inches outside of the area to be repaired to delineate the perimeter of the repair area and avoid feather edges. Vertical and overhead repair saw cuts shall be beveled 3 to 5 degrees to create a keyed in repair. Exercise care not to cut through existing steel reinforcement or embedded metal that is not to be removed.

The disc cut surfaces should be roughened prior to application of a repair material. It is best achieved at the same time as final surface preparation of exposed reinforcement and concrete in repair cavity is conducted. Care should be exercised when roughening the disc cut surfaces to prevent damage to the cavity edges.

3.3.1.3 Reinforcing Steel

Exposing and undercutting reinforcing steel in the repair area should be accomplished by initial concrete removal operations. The reinforcing bars exposed in the repair areas should be undercut a minimum of 1 inch. Removal of concrete around reinforcing bars should extend to the point where bars are well bonded to concrete and free of corrosion.

Following the concrete removal operation, carefully inspect the condition of all exposed reinforcing bars in accordance with ICRI 310.1R-2008.

The purpose of the inspection is to determine whether the reinforcing steel is capable of performing as intended by the design. If the cross-section of the repair has been reduced by corrosion by more than 20 percent, cut out the damaged portion and weld splice in replacement bar. Welding should be performed in accordance with Section 05 05 23 WELDING, ACI 318, and AWS D1.1/D1.1M. Cutting and welding should be performed by a welder AWS Certified to the requirements of AWS D1.4/D1.4M. Care should be exercised during the welding procedures not to overheat the existing concrete because this can induce thermal stresses on cooling and could damage the bond between existing reinforcement and concrete substrate.

Concrete reinforcement shall conform to the requirements of ASTM A 706/A 706M. Where the bond between the concrete and any reinforcing steel has been destroyed, or where the concrete deterioration is caused by corrosion of the reinforcing steel, remove the adjacent concrete to a depth that will permit cleaning of the steel and bonding of the concrete.

When uncoated reinforcing steel is exposed in the repair area application of a protective coating should not be done, because it may cause corrosion in areas immediately adjacent to a repair.

Proper cleaning of the rebar helps to assure the anode tie wires are able to make a good electrical connection. Since the anodes function on electrochemical principles, maintaining low resistance connections ensures peak performance.

3.3.2 Impacting

Take adequate precautions to prevent impact equipment from vibrating on reinforcing steel. All demolition equipment shall be subject to approval of the Contracting Officer.

3.4 MIXING MATERIALS

Make batches small enough to ensure placement before binder sets. Mix materials in accordance with manufacturer's recommendations.

3.5 SUBSTRATE SURFACE PREPARATION

3.5.1 General

Regardless of the nature of repair material and methods of its application, the repair is only as good as the surface preparation of the substrate to form a composite system with the repair material.

The surface of existing concrete and reinforcement should be prepared in accordance with applicable requirements of [ICRI 310.1R-2008](#) and [ACI 546R](#) unless specified otherwise.

After removal of concrete to the specified limits, clean the surface to which the repair material is to be applied to remove dust, debris and laitance. Perform final cleaning immediately prior to placement of the repair material.

3.5.2 Cleaning

Mechanical demolition equipment leaves the resulting surface with varying degrees of microcracks and fractures, commonly referred to as "bruising." Bruising creates a zone of weakness that will affect the bond of the repair material to the substrate. Removal subjects the concrete substrate to a wide range of dynamic loads and the resulting bruising will depend on the method used and the quality of the concrete. The depth of the bruised layer varies, but is typically on the order of [1/8 inch](#). Use hydrodemolition equipment capable of eroding the substrate concrete surface. The equipment shall produce a highly roughened, bondable surface.

Perform all cleaning operations to the satisfaction of the Contracting Officer. Protect adjacent structures and embedded items. Use potable water for cleaning operations. Perform a preliminary cleaning as soon as the chipping is completed to remove loose materials and dust particles. Clean surfaces to which new concrete is to be bonded in accordance with [ACI 546R](#), Concrete Repair Guide, Chapter 2, "Concrete Removal, Preparation, and Repair Techniques". Final cleaning shall remove all laitance, scum, dirt, oil, grease, and loose or disintegrated concrete. Perform additional surface chipping to remove coarse aggregate that is undercut by cleaning process. Perform such additional chipping as determined necessary by the Contracting Officer at no additional cost to the Government. Wire brush or hydroblast metal surfaces against which the concrete is to be placed to remove rust and other contaminants which would prevent proper bond with the concrete. Perform final cleaning immediately prior to concrete placement. Protect all work from contamination during all phases of cleanup and preparation prior to repair.

3.5.3 Rust Cleaning

Freshly cleaned reinforcing steel may rust between the time it is cleaned and the time repair material is placed. If the rust that forms is tightly bonded to the rebar that it cannot be removed by wire brushing, no action should be taken. If the rust is loosely bonded so as to inhibit bond between the steel rebar and the repair material, the reinforcement should be cleaned again before repair material is placed.

3.5.4 Waste Water Disposal

Dispose of waste water employed in demolition, curing, washing, and rinsing or concrete surfaces in a manner such that the waste water does not stain, discolor, or effect exposed surfaces of the structure, or damage the environment of the project area.

3.6 SURFACE REPAIRS

The proper repair methods, material selection, and installation are critical for a successful repair project that is capable to provide the desired serviceability and durability. Each repair application places different demands on the repair materials, and the materials should have suitable properties to meet these demands throughout the designed life of the repair.

Availability of repair materials and methods, cost effectiveness, and the technical feasibility of using them should be considered. Manufacturers or suppliers can provide assistance in the selection of repair materials and application techniques. When selecting the appropriate repair material, one should keep in mind that the technical data presented in manufacturer's literature may not be sufficient because the tests performed may not be representative of the use of the material in a particular application.

All repair materials have limitations and the specifier shall specify the materials characteristics, properties and test methods in strict accordance with ACI 364.3R, "Guide for Cementitious Repair Material Data Sheet." The range of acceptable performance criteria has to be selected using Guidance of the ACI 546.3R, "Guide for Selection of Materials for the Repair of Concrete," unless otherwise specified herein. ACI 546 R, Guide for Concrete Repair and ICRI Guideline 320.1R-1996 provide guidance for selecting application methods for repair.

The location of potential in-situ bond pull-off core locations should be identified for each discrete repair area so reinforcing steel is not encountered during final acceptance testing.

3.6.1 General

Four repair methods are specified for this project:

- a. Form and Pump material applications should be employed for all substructure vertical and overhead repair locations with repair areas of 2 square feet or greater. This includes all concrete encasement repairs of pile caps.
- b. Hand Troweling material applications should be employed for all deck soffit and substructure vertical and overhead repair locations with repair areas of less than 2 square feet.
- c. Form and pour material applications should be employed for all topical horizontal repairs.
- d. Dry Pack material applications should be employed for repairing all in-situ bond pull-off core holes.

3.6.2 Formwork

Formwork for repairs involving form-and-pump method should be constructed in accordance with [ACI 347](#), except for the calculation of form pressure. Form pressure should be designed for a minimum of 14 psi in accordance with [ACI E 706](#), Surface Repair Using Form-and-Pump Techniques. Maximum pressure exerted on formwork occurs after the formed cavity is full and pressurized. Forms should be constructed to fit tightly against existing concrete surfaces. See drawing for specifications of fiberglass forms to remain in-place permanently. Preformed foam gaskets or cast in place foam should be used to address difficult to match surfaces. Temporary forms shall be removed after 7 days.

3.6.3 Form-and-Pump Repairs

3.6.3.1 General

Form and pump repair is a method of replacing deteriorated or damaged concrete by filling the formed cavity with a repair material under pump pressure. The method is generally recommended for vertical and overhead repairs a minimum of 4 inches thick, and more than 2 square feet area, incorporating closely spaced reinforcement, when use of other repair methods may result in poor consolidation of repair material around the reinforcing steel and inadequate bond to the concrete substrate. Formwork should be constructed with strength sufficient to handle the pressure induced by hydrostatic pressure and the additional pump pressure required to consolidate the repair material. The cavity and formwork design should provide for venting the air. Venting can be accomplished by the removal profile of the prepared concrete. Pumping the cavity is started at the lowest point in vertical repairs or at an extremity in overhead repairs. Pumping continues until the material flows from an adjacent port in the formwork. Pumping continues until the cavity is completely full. During the final pressurization, the repair material is consolidated around the reinforcing steel and driven into the crevices of the prepared substrate to improve bond.

The form-and-pump repairs should be performed in accordance with [ACI E 706](#), Surface Repair Using Form-and-Pump Techniques.

The form-and-pump is an advanced multi-step repair method of preparing and constructing formwork, and pumping the repair material into the cavity confined by formwork and existing concrete substrate. Prior to construction of the formwork, any substrate surfaces that may cause air to become trapped during the pumping operations must be trimmed, or vent tubes installed.

3.6.3.2 Pumping Procedure

Pumping of the repair material mixtures should be in conformance with [ACI 304.2R](#), [ACI E 706](#) and specified requirements. Attachment of the pump line hose to the formwork can be achieved by use of plumbing fittings with flanges and ball valves.

The sequence of material placement and amount of ports into the formed cavity depends on location and geometry of the repair involved. Vertical surfaces should start at the lowest point, filling in the manner that prevents air entrapment. Arrangement of ports for pump line attachments is usually horizontal with spacing of 3 - 4 feet in grid form. Pumping continues even after material flow occurs from adjacent ports to expel air.

When the flow is without intrusion of air, the pump is temporarily shut off, the port closed off, and the pump line connected to the adjacent port that has seen flow. The sequence is continued until the cavity is filled. In some conditions, the cavity can be pumped from one port. In this situation, each adjacent port is capped off as flow occurs. It is necessary to monitor pump-line pressure with a pressure gauge to confirm cavity pressurization and prevent excessive backpressure when pumping long distances. Once the cavity is filled, the full-line pressure is available to pressurize the formed cavity. The formed cavity should target to be pressurized to a 3 to 5 psi increase in line pressure near the cavity port.

Before starting the pumping operation, there should be a direct, continuous communication established between the pump operator and crew at the formwork. The crew at the formwork should direct the pump.

Care must be exercised in the final pressurization because the excessive pump-line pressure (hydraulic pumps can exert in excess of 800 psi) may cause the form to fail. Pressure gauges should be attached to the pump line near the exit to monitor cavity pressure. If the formwork fails due to over-pressurization, the failure will generally occur as a slight movement in a form panel seam or perimeter seal.

Overhead placements are accomplished by starting at an extremity of the surface and proceeding in a fashion similar to vertical placements. Material will flow radically from the injection port to the adjacent ports.

Exterior vibrators shall be used for repair consolidation as conditions determined by the trial sample repairs require. All vibration operations should be completed prior to pressurizing the form. Vibration after pressurization may cause unwanted movement and overstressing of the form.

3.6.3.3 Curing

The form-and-pump material repairs should be cured in forms for no less than 7 days.

3.6.4 Form and Pour Repairs

3.6.4.1 General

Top surface partial depth repairs may assist in reinstating load carrying capacity in some instances but their usual function is to reinstate protection to the reinforcement locally rather than to act structurally. Conventional concretes and pre-packaged repair materials extended with aggregate are usually employed for this application.

The placement process and equipment should be arranged to deliver the material to its final position without segregation. The equipment should be adequately and properly arranged so that placing can proceed without undue delays and manpower should be sufficient to ensure the proper and timely placing, consolidating, finishing and curing of the repair.

Temperature of the repair material mixture should be between 50° and 85°F, and it should not vary more than approximately 10°F from the temperature of the substrate against which it is placed.

The material placement procedure should begin by slightly overfilling the repair cavity to allow for the reduction in volume. The repair material must fully encapsulate exposed reinforcing steel and achieve satisfactory

bond with the substrate. Vibration of the repair material should be performed by interior vibrators or vibrating screeds or both in combination.

Surface finishing (beyond floating) should not be initiated before initial set nor before bleeding water has disappeared from the repair surface.

Repair material should be carefully finished to the cross-section of existing structure. The recommended finishing procedure is to screed from the center of the repair out to the repair boundaries. This will provide the smoothest interface with the existing concrete and will develop an adequate bond at the perimeter of the repair.

Following repair consolidation the finishing operations shall be conducted in a manner in which the repair material is worked and manipulated as little as possible to produce the desired result.

All topical horizontal repairs should employ the **form-and-pour** repair method, **formwork may not be required**. Advanced planning should ensure an adequate and consistent supply of repair material during the placement operations.

The placement process and equipment should be arranged to deliver the material to its final position without segregation. The equipment should be adequately and properly arranged so that placing can proceed without undue delays and manpower should be sufficient to ensure the proper and timely placing, consolidating, finishing and curing of the repair.

3.6.4.2 Cold Weather

Comply with the requirements of **ACI 306.1**. Do not allow concrete temperature to decrease below **50 degrees F**. Obtain approval prior to placing concrete when ambient temperature is below **40 degrees F** or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain **50 degrees F** minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to **5 degrees F** in any one hour and **50 degrees F** per 24 hours after heat application.

3.6.4.3 Hot Weather Repair Operations

Hot weather is any combination of the following conditions that tends to impair the quality of freshly mixed or hardened cement-based concrete by accelerating the rate of moisture loss and rate of cement hydration, or otherwise causing detrimental results:

- a. High ambient temperature
- b. High concrete temperature
- c. Low relative humidity
- d. Wind speed
- e. Solar Radiation

Maintain required concrete temperature using Figure 2.1.5, "Effect of Concrete Temperatures, Relative Humidity, and Wind Velocity on the Rate of Evaporation of Surface Moisture From Concrete" in **ACI 305R** to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of

exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. If the evaporation rate exceeds 0.1 pound of water per square foot per hour, fog spray the exposed concrete surfaces until active moist curing is applied. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set. Concrete temperatures shall be limited to 90 degrees F at the time of placement. Internal concrete temperatures at any time during the construction shall not exceed 150 degrees F.

The following list of measures to reduce or avoid the potential problems of hot weather repair operations must be considered:

- a. Cool the material mixture;
- b. Minimize the time to transport, place, consolidate, and finish the repair;
- c. Plan the job to avoid adverse exposure to the environment; schedule placing operations during times of the day or night when the weather conditions are favorable;
- d. Protect the repair from moisture loss during placing and curing periods;
- e. Schedule a pre-placement meeting to discuss the requirements of hot weather repair operations.

Preparations should be made to transport, place, consolidate, and finish the repair material at the fastest possible time.

Delivery to the repair location should be performed so the material mixture will be placed promptly. If necessary, the repair material mixture should be cooled by using ice for part of the mixture water available for substitution.

3.6.4.4 Consolidation

The repair material must fully encapsulate exposed reinforcing steel and achieve adequate bond with the concrete substrate. The repair material should be consolidated by systematic vibration during placement.

Failure to do so, and to do it properly, may result in poor durability and rapid deterioration. Voids between the repair and substrate can cause total debonding. Voids between embedded reinforcing steel and repair material can cause early corrosion.

The vibration of the repair should be performed by interior vibrators or vibrating screeds or both in combination.

Vibrators should not be used to move repair material laterally. They

should be inserted and withdrawn at 15 to 30 degrees from the vertical, so that they quickly penetrate the layer and are withdrawn slowly to remove entrapped air. Vibrate at close intervals using a systematic pattern to ensure that all repair material is adequately consolidated. The mixture is adequately consolidated when it stops settling, air bubbles no longer emerge, and a smooth layer of mortar appears at the surface.

The operating speed of interior vibrators should be at least 4,000 vibrations per minute.

Vibration periods of 5 to 15 seconds for each penetration are usually sufficient. The amount of vibration in one spot may be gauged by surface movement and texture of the repair material, by the appearance of cement paste on surface, by the approach of the sound of the vibrator to a constant tone, and by the feel of the vibrator in the operator's hand. Systematic spacing of the points of vibration should be established to ensure that no portions of the repair material are missing.

3.6.4.5 Finishing

The repair should match the existing concrete surface in texture (smooth, broom, form, ect.) and color; it should be carefully finished to the cross-section of existing deck.

Surface finishing should not be initiated before initial set or before bleed water has disappeared from the repair material surface.

The recommended finishing procedure is to screed from the center of the repair out to the repair boundaries. This will provide the smoothest interfaces with existing concrete and will develop an adequate bond at the perimeter of the repair.

To obtain a durable surface of the repair, proper procedures should be carefully followed. Following consolidation, the operations of screeding, floating, and troweling should be performed in such a manner that the repair material will be worked and manipulated as little as possible to produce the desired result.

Over-manipulation of the concrete brings excessive fines and water to the surface, which lessens the quality of the surface, causing checking, crazing, and dusting.

The repair surface shall be hand-troweled to remove any remaining minor irregularities. The edge of a repair located next to a joint should be tooled to provide a good reservoir for joint sealing. Extra mortar from troweling can be used to fill any saw overcuts at the repair corners.

3.6.5 Hand-Trowel Applied Repairs

3.6.5.1 General

In trowel-applied repairs, the repair material is applied directly to the repair location with a trowel (or sometimes by hand). Trowel-applied materials are pressed against the substrate to develop intimate contact without voids. These repairs depend primarily on the adhesive bond between the fresh repair material and the substrate concrete for satisfactory placement. These repairs do not have the benefit of formwork to support the material until it sets, or pneumatic pressure to increase the application pressure and adhesive bond of the applied material. Coarse

aggregate is normally not included in the repair material because the coarse aggregate decrease the cohesiveness to the point where the material is weaker than the pull of gravity and falls out of the repair area before the material can set.

This repair technique is critically dependent on the skill of the mason. Masons must have proven experience in hand-troweling repairs, and close quality control should be conducted.

3.6.5.2 Concrete Surface Treatment

The final concrete surface treatment, prior to application of the repair material, should be performed in accordance with the manufacturers' instructions.

3.6.5.3 Application

Proper troweling techniques should be used to prevent the entrapment of air at the bonding surface, which will negatively affect the bond strength.

Special care must be exercised in achieving full intimate contact and consolidation of hand-troweled repair material around the exposed reinforcement.

3.6.5.4 Dry Pack Repairs

Dry packing techniques can be used in all locations, including overhead and vertical. Best applications are generally small cavities, small areas of surface honeycomb, or rib bottoms. Dry pack should not be used for relatively shallow cavities where lateral restraint cannot be obtained.

Dry packing is a repair method of placing zero-slump, or near zero-slump, concrete or mortar, by ramming into surface cavities. Sufficient water should be used to produce a mix that will stick together while being molded into a ball with the hands and will not exude water but will leave the hands damp. Any less water will not make a sound, solid pack; any more will result in excessive shrinkage and failure.

A bonding agent consisting of neat cement, cement-sand, or latex-cement-sand shall be used because dry pack lacks the extra moisture necessary to promote good bond.

Compaction densifies the repair material and provides the necessary intimate contact with the existing concrete for achieving adequate bond. Dry pack should be solidly compacted over the entire surface by a hardwood stick and a hammer. Much of the tamping should be directed at a slight angle and toward the sides of the cavity to assure maximum compaction in these areas. Each dry pack repair is usually placed in layers.

Because of the relatively small volume of most repairs and the tendency of old concrete to absorb moisture from new material, water curing is a necessary procedure at least during the first 72 hours. The best results are accomplished with a continuous 7-day moisturizing.

3.7 CURING AND PROTECTION

- a. **ACI 301** and **ACI 308R** unless otherwise specified. Prevent concrete from drying by misting surface of concrete. Begin curing immediately following final set. Avoid damage to concrete from

vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, by rain or running water, adverse weather conditions, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified moist curing period.

- b. Wet cure concrete using potable water for a minimum of 7 days. Do not allow construction loads to exceed the superimposed load which the structural member, with necessary supplemental support, is capable of carrying safely and without damage. After completion of moist cure a curing compound shall be used for the remainder of the 28 day curing period.

3.7.1 Moist Curing

3.7.1.1 Fog Spraying or Sprinkling

Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.7.1.2 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

3.7.1.3 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.7.2 Liquid Membrane-Forming Curing Compound

Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing from 7 day moist cure has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the remainder of the 28 day curing duration curing period. Do not use this method of curing where the use of Figure 2.1.5, "effect of Concrete Temperatures, Relative Humidity, and Wind Velocity on the Rate of Evaporation of Surface Moisture From Concrete" in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

3.7.2.1 Application

Mechanically agitate curing compound thoroughly during use. Use approved

power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Respray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3.7.2.2 Protection of Treated Surfaces

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.7.3 Curing Periods

Moist cure concrete using potable water for a minimum of 7 days. Continue additional curing for a total period of 28 days. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Contracting Officer.

3.8 FIELD QUALITY CONTROL

3.8.1 General

An independent material inspection and testing contractor shall perform the required field inspection and test procedures outlined in this section, on a daily basis when concrete is being delivered or when pre-packaged material is being batched on-site.

3.8.2 Preparations for Placing

A qualified licensed Professional Engineer (PE) must inspect prepared surfaces, forms, and embedded items in sufficient time prior to each placement of repair material to certify that the surfaces are ready to receive the repair material. The professional engineer shall fill out, sign, and submit the QC Inspection Checklist prior to contractor placing repair material. Blank QC Inspection Checklist included.

3.8.3 Concrete and Pre-Packaged Material Testing

3.8.3.1 Time and Mix Pot Life

Verify repair material has not exceed allowable time or pot life.

3.8.3.2 Sampling

Collect representative sample of fresh concrete or pre-packaged mortar repair material to perform test specified in conformance with ASTM C 172 and ASTM C 31/C 31M.

3.8.3.3 Temperature

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions below 50 degrees F and above 80 degrees F

for each batch (minimum) or every 10 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.8.3.4 Air Content

Test air content twice during each shift that repair material is placed. Obtain samples in accordance with ASTM C 172 and test in accordance with ASTM C 231/C 231M.

3.8.3.5 Slump

Test slump twice during each shift that repair material is produced. Obtain samples in accordance with ASTM C 172 and test in accordance with ASTM C 143/C 143M.

3.8.3.6 Consolidation and Protection

Ensure that the repair material is properly consolidated, finished, protected, and cured.

3.8.3.7 Compression Tests

Prepare compression test specimens during each shift that the repair material is produced in accordance with ASTM C 31/C 31M and cure at the site under the same conditions as the repair. Test in accordance with ASTM C 109/C 109M or ASTM C 39/C 39M.

3.8.3.8 Curing

- a. Moist-Curing Inspections - At least once each shift, and once per day on nonwork days, inspect all areas subject to moist curing. Note and record the surface moisture condition.
- b. Sheet-Curing Inspection - At least once each shift and once per day on nonwork days, inspect all areas being cured using material sheets.

Note and record the condition of the covering and the tightness of the laps and tapes.

3.8.3.9 Aggregates

Test gradation in accordance with ASTM C 136 and ASTM C 117. Determine the percent passing the No. 200 sieve by washing in accordance with ASTM C 117.

3.8.4 Action Required

3.8.4.1 Placing

The placing foreman shall not permit placing to begin until they have verified that appropriate placement, consolidation, and finishing equipment, are available. Equipment shall be in working order and have competent operators.

3.8.4.2 Time and Mix Pot Life

Dispose of material if it is beyond the designated time or pot life.

3.8.4.3 Air Content

Whenever a test result is outside the specification limits, do not deliver the concrete to the forms and adjust the dosage of the air-entrainment admixture.

3.8.4.4 Slump

Whenever a test result is outside the specification limits, do not deliver the concrete to the forms and an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the water-cementitious materials ratio does not exceed that specified in the submitted concrete mixture proportion.

3.8.4.5 Temperature

Whenever a test result is outside the specified limits, dispose of material and prepare a new batch.

3.8.4.6 Curing

- a. Moist-Curing Corrective Action - When a daily inspection report lists an area of inadequate curing, take immediate corrective action, and extend the required curing period for such areas by one (1) day.
- b. Sheet-Curing Corrective Action - When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, promptly repair the tears and holes or replace the sheets, close the joints, and extend the required curing period for those areas by 1 day.

3.8.4.7 Laboratory Test Results

If compression test results fall outside of specified limits, remove defective material and install material meeting specified limits.

3.8.5 Final Inspection and Acceptance Testing

Following completion of the work, inspect surfaces for damage, staining, and other distresses. Inspect repairs for cracking, crazing, delamination, unsoundness, staining and other defects. Inspect the finish and surface tolerances of the repairs to verify that all requirements have been met. Repair all surfaces exhibiting defects as directed at no cost to the Government when defects are due to Contractor workmanship or procedures. Contractor to submit [procedures to repair defective work](#) prior to completing repairs.

Perform repair acceptance pull-off bond testing in accordance with the [ICRI 210.3-2004](#), "Guide to Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials" and [ASTM C 1583/C 1583M](#). Bond strength should not be less than [150 psi](#), unless failure is at least [1 inch](#) into the existing concrete substrate. Areas damaged by pull-off bond tests should be repaired with [dry pack repair material](#).

Perform completed repair acceptance pull-off bond testing at ages consistent with the trial repair pull off testing. [Perform bond pull-off test quantities in accordance with ICRI 210.3-2004](#). Perform a minimum of three pull off tests on hand troweled repairs.

The location of each individual test in designated test areas should be selected by the Contracting Officer prior to repair application and marked on a drawing in order to avoid cutting the reinforcing steel during the test performance.

The following acceptance criteria should be satisfied:

- a. Minimum Bond Strength
No individual test result is below 75% of the specified pull-off bond strength.
- b. Average Bond Strength
Average pull-off bond strength of the specimens is not less than the specified strength.

3.8.6 Reports

Report the results of all tests and inspections conducted at the project site informally at the end of each shift and in writing weekly and deliver within 3 days after the end of each weekly reporting period.

Reports on lab tests shall be submitted with 35 days of pouring operations.

3.8.7 Manufacturer Field Service

Provide, at no additional cost to the Government, the services of the manufacturer's experienced technical representative during mixture proportioning, planning and production. The manufacturer's representative shall be available for consultation by both the Contractor and the Contracting Officer during mixture proportioning, planning, and production of the materials and shall be on-site immediately prior to and during at least the first placement of the material, and at other times if directed.

3.9 CLEAN UP

Clean all surfaces of concrete and adjacent facilities which are stained by dirt, oil, grease, fuel, or other byproducts that are created by the construction operations with detergent and pressure wash. Dispose of debris in accordance with applicable local, state, and federal laws.

3.10 PROTECTION PRIOR TO ACCEPTANCE

Do not permit vehicular or heavy equipment traffic on the repair surfaces until the repair material obtained the designed strength. Permit light local traffic on the concrete surfaces at the end of the curing period, if approved by the Contracting Officer. Where shelter or other protective measures are provided for repair during inclement weather, maintain such protective measures until the repair material has cured and discontinuance of the measures is authorized.

3.11 FINAL ACCEPTANCE

All defects shall be inspected and documented prior to any repair being completed. Contractor shall submit procedure to Government and A/E for approval prior to repairing any defects.

Contractor to repair all cracks in repairs prior to the end of the warranty period at the 11 month period.

PIER 1902 REPAIRS
AUTEC Site 1

Work Order No. 1302903
Andros Island, Bahamas

<u>QC INSPECTION CHECKLIST</u>			
PROJECT:		CONTRACTOR	NAME:
PROJECT LOCATION:			ADDRESS:
			PHONE:
DEFECT ID:		PROFESSIONAL ENGINEER	NAME:
DEFECT LOCATION:			LICENSE NUMBER:

<u>INSPECTION TASKS</u>		
TASK:	DATE COMPLETED:	PROFESSIONAL ENGINEER SIGNATURE:
DETERMINATION OF REMOVAL LIMITS		
CONCRETE DEMOLITION		
CONCRETE DEPTH REMOVAL		
SUBSTRATE SURFACE PREPARATION		
RUST CLEANING		
ANODES INSTALLED		
CONTINUITY TEST		
PULL-OFF BOND TEST CORE LOCATION MARKED		
FORMWORK INSTALLED		
FORMWORK SEALED		
FORM REMOVAL		
FIELD QUALITY CONTROL		
FINAL INSPECTION		
PULL-OFF BOND TEST		
FINAL ACCEPTANCE		

<u>REPAIR QUANTITIES</u>		
TASK:	QUANTITY:	DATE INSTALLED:
REINFORCING STEEL (LBS)		
ANODES (EA)		
CONCRETE (SF)		

-- End of Section --

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

05/14

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 213R	(2014) Guide for Structural Lightweight-Aggregate Concrete
ACI 301	(2010; Errata 2011) Specifications for Structural Concrete
ACI 302.1R	(2004; Errata 2006; Errata 2007) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(1996; R 2008) Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2010) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 306R	(2010) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI 318	(2011; Errata 1 2011; Errata 2 2012; Errata 3-4 2013) Building Code Requirements for Structural Concrete and Commentary
ACI 347	(2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete

- ACI SP-15 (2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References
- ACI SP-2 (2007; Abstract: 10th Edition) ACI Manual of Concrete Inspection
- ACI SP-66 (2004) ACI Detailing Manual
- AMERICAN HARDBOARD ASSOCIATION (AHA)
- AHA A135.4 (1995; R 2004) Basic Hardboard
- AMERICAN WELDING SOCIETY (AWS)
- AWS D1.4/D1.4M (2011) Structural Welding Code - Reinforcing Steel
- ASTM INTERNATIONAL (ASTM)
- ASTM A1064/A1064M (2013) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- ASTM A615/A615M (2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- ASTM A706/A706M (2014) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- ASTM A767/A767M (2009) Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- ASTM A780/A780M (2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- ASTM A934/A934M (2013) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- ASTM A955/A955M (2014) Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement
- ASTM A996/A996M (2014) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
- ASTM C1017/C1017M (2013) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
- ASTM C1077 (2014) Standard Practice for Laboratories

Testing Concrete and Concrete Aggregates
for Use in Construction and Criteria for
Laboratory Evaluation

ASTM C1107/C1107M	(2014) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1218/C1218M	(1999; R 2008) Standard Specification for Water-Soluble Chloride in Mortar and Concrete
ASTM C1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C138/C138M	(2013a) Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2012) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C172/C172M	(2014) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C192/C192M	(2013a) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231/C231M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C295/C295M	(2012) Petrographic Examination of Aggregates for Concrete
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C311/C311M	(2013) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete

ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C330/C330M	(2014) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C39/C39M	(2014a) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/C42M	(2013) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C567/C567M	(2014) Determining Density of Structural Lightweight Concrete
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C78/C78M	(2012; E 2013) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM C94/C94M	(2014a) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2013) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D5759	(2012) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2012) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E329	(2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in

Construction

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP

(2009; 28th Ed) Manual of Standard Practice

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1

(2009) DOC Voluntary Product Standard PS
1-07, Structural Plywood

1.2 DEFINITIONS

- a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, and ground granulated blast-furnace slag.
- b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.
- c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.
- d. "Complementary cementing materials" (CCM) include coal fly ash, granulated blast-furnace slag, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.
- e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.
- f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.
- g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.
- h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.
- i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.
- j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and

size distribution), cementitious content and age (level of hydration).

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

- Concrete Curing Plan
- Quality Control Plan; G
- Quality Control Personnel Certifications; G
- Quality Control Organizational Chart
- Laboratory Accreditation
- Form Removal Schedule

SD-02 Shop Drawings

- Permanent Fiberglass Formwork; G
- Reinforcing steel; G

SD-03 Product Data

- Joint sealants
- Joint filler
- Materials for Forms
- Recycled Aggregate Materials
- Cementitious Materials
- Concrete Curing Materials
- Reinforcement
- Admixtures
- Biodegradable Form Release Agent
- Pumping Concrete
- Finishing Plan

SD-05 Design Data

- Concrete mix design; G
- Formwork Calculations

SD-06 Test Reports

- Concrete mix design; G
- Fly ash
- Pozzolan
- Ground granulated blast-furnace slag
- Aggregates
- Tolerance report

Compressive strength tests; G

Unit weight of structural concrete

Ion concentration

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

VOC Content for form release agents, curing compounds, and concrete penetrating sealers

Material Safety Data Sheets

Forest Stewardship Council (FSC) Certification

Field Testing Technician and Testing Agency

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.5.1.1 Epoxy Coated Reinforcing Steel

Record coating lot on each shipping notice and carefully identify and re-tag bar bundles from bending plant. Provide systems for handling coated bars which have padded contact areas such as, nylon slings, all free of dirt and grit. Lift bundled coated bars with strong back, multiple supports, or platform bridge to prevent sagging and abrasion. Pad bundling

bands where in contact with bars. Do not drop or drag bars or bundles. Store coated bars both in shop and in field, aboveground, on wooden or padded cribbing. Space the dunnage close enough to prevent excessive sags. Stack large quantities of straight bars with adequate protective blocking between layers. Schedule deliveries of epoxy coated bars to the job site to avoid the need for long term storage. Protect from direct sunlight and weather. Cover bars to be stored longer than 12 hours at the job site with opaque polyethylene sheeting or other suitable equivalent protective material.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Formwork Calculations

ACI 347. Include design calculations indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components. Furnish drawings and calculations of shoring and re-shoring methods proposed for floor and roof slabs, spandrel beams, and other horizontal concrete members. Calculations must indicate concrete pressure with both live and dead loads, along with material types.

1.6.1.2 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, complementary cementitious materials, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, complementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted within the last six months. Obtain mix design approval from the contracting officer prior to concrete placement.

1.6.2 Shop Drawings

1.6.2.1 Formwork

Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of contract drawings are unacceptable. Submit **form removal schedule** indicating element and minimum length of time

for form removal.

Design, fabricate, erect, support, brace, and maintain formwork so that it is capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

1.6.2.2 Reinforcing Steel

ACI SP-66. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

1.6.3 Control Submittals

1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with **ACI 308.1**.

1.6.3.2 Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal must include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete is to be pumped.

1.6.3.3 Finishing Plan

Submit proposed material and procedures to be used in obtaining the finish of the top surface. Include qualification of person to be used for obtaining floor tolerance measurement, description of measuring equipment to be used, and a sketch showing lines and locations the measuring equipment will follow.

1.6.3.4 VOC Content for form release agents, curing compounds, and concrete penetrating sealers

Submit certification for the form release agent, curing compounds, and concrete penetrating sealers that indicate the VOC content of each product.

1.6.3.5 Material Safety Data Sheets

Submit Material Safety Data Sheets (MSDS) for all materials that are regulated for hazardous health effects. MSDS must be readily accessible during each work shift to employees when they are at the construction site.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with **ASTM C618** for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.4.2 Ground Granulated Blast-Furnace Slag

Submit test results in accordance with **ASTM C989/C989M** for ground granulated blast-furnace slag. Submit test results performed within 6 months of submittal date.

1.6.4.3 Aggregates

ASTM C1260 for potential alkali-silica reactions, ASTM C295/C295M for petrographic analysis.

1.6.5 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the Contracting Officer, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site.

1.6.6 Quality Control Personnel Certifications

The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

Submit American Concrete Institute certification for the following:

- a. CQC personnel responsible for inspection of concrete operations.
- b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.
- c. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

1.6.6.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five (5) similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

1.6.6.2 Field Testing Technician and Testing Agency

Submit data on qualifications of proposed testing agency and technicians for approval by the Contracting Officer prior to performing testing on concrete.

- a. Work on concrete under this contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with ACI SP-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI SP-2.
- b. Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.
- c. Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

1.6.7 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of [ASTM C1077](#) and be Cement and Concrete Reference Laboratory (CCRL) inspected.

1.6.8 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with [ASTM C1077](#), including [ASTM C78/C78M](#) and [ASTM C1260](#). The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

- a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.
- b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by [ASTM C31/C31M](#).
- c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

1.7 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

- a. Supply 100 percent outside air 24 hours a day.
- b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between [55 degrees F](#) and [84 degrees F](#) and humidity is between 30 percent and 60 percent.
- c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.7.1 Submittals for Environmental Performance

- a. Provide data indication the percentage of post-industrial pozzolan (fly ash, blast furnace slag) cement substitution as a percentage of the full product composite by weight.
- b. Provide data indicating the percentage of post-industrial and post-consumer recycled content aggregate.
- c. Provide product data indicating the percentage of post-consumer recycled

steel content in each type of steel reinforcement as a percentage of the full product composite by weight.

- d. Provide product data stating the location where all products were manufactured
- e. For projects using FSC certified formwork, provide chain-of-custody documentation for all certified wood products.
- f. For projects using reusable formwork, provide data showing how formwork is reused.
- g. Provide MSDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.
- h. Provide MSDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

1.8 QUALIFICATIONS FOR WELDING WORK

Welding procedures must be in accordance with [AWS D1.4/D1.4M](#).

Verify that [Welder qualifications](#) are in accordance with [AWS D1.4/D1.4M](#) or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

PART 2 PRODUCTS

2.1 MATERIALS FOR FORMS

Provide wood, plywood, plastic, carton, or steel. Use plywood or steel forms where a smooth form finish is required.

2.1.1 Wood Forms

Use lumber as specified in Section [06 10 00 ROUGH CARPENTRY](#) and as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with [NIST PS 1](#), B-B concrete form panels or better or [AHA A135.4](#), hardboard for smooth form lining.

2.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to [NIST PS 1](#), B-B, concrete form, not less than [5/8-inch](#) thick.

2.1.2 Permanent Fiberglass Forms

Provide permanent fiberglass forms per contract drawings.

2.2 FORM TIES AND ACCESSORIES

Provide a form tie system that does not leave mild steel after break-off or removal any closer than [2 inches](#) from the exposed surface. Do not use wire alone. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.3 CONCRETE MIX DESIGN

2.3.1 Contractor-Furnished Mix Design

ACI 211.1, ACI 301, and ACI 318 ACI 304.2R except as otherwise specified. Indicate the compressive strength (f'c) of the concrete for each portion of the structure(s) as specified below. Where faster set time is required, use Type III cement before using calcium chloride with approval from the contracting officer.

2.3.1.1 Concrete Toppings

Proportion normal-weight concrete mixture as follows:

- a. Minimum Compressive Strength: 20.6 MPa 4000 psi at 28 days.
- b. Maximum Water-Cementitious Materials Ratio: 0.50.
- c. Slump Limit: 5 inches, plus or minus 1 inch.
- d. Air Content: 3.0 percent, plus or minus 1.5 percent at point of delivery.

2.3.1.2 Frame Members

Proportion normal-weight concrete mixture as follows:

- a. Minimum Compressive Strength: 20.7 MPa 3000 psi at 28 days.
- b. Maximum Water-Cementitious Materials Ratio: 0.50
- c. Slump Limit: 5 inches.
- d. Air Content: 3.0 percent, plus or minus 1.5 percent at point of delivery.

2.3.1.3 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified are the responsibility of the Contractor. Base mixture proportions on compressive strength as determined by test specimens fabricated in accordance with ASTM C192/C192M and tested in accordance with ASTM C39/C39M. Samples of all materials used in mixture proportioning studies must be representative of those proposed for use in the project and must be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Base trial mixtures having proportions, consistencies, and air content suitable for the work on methodology described in ACI 211.1. In the trial mixture, use at least three different water-cementitious material ratios for each type of mixture, which must produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cementitious material ratio allowed must be based on equivalent water-cementitious material ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan by weight equivalency method. Design laboratory trial mixture for maximum permitted slump and air content. Each combination of material proposed for use must have separate trial mixture, except for accelerator or retarder use can be provided without separate

trial mixture. Report the temperature of concrete in each trial batch. For each water-cementitious material ratio, at least three test cylinders for each test age must be made and cured in accordance with [ASTM C192/C192M](#) and tested in accordance with [ASTM C39/C39M](#) for 7, 28 days. From these results, plot a curve showing the relationship between water-cementitious material ratio and strength for each set of trial mix studies. In addition, plot a curve showing the relationship between 7 and 28 day strengths.

2.3.1.4 Required Average Strength of Mix Design

The selected mixture must produce an average compressive strength exceeding the specified strength by the amount indicated in [ACI 301](#), but may not exceed the specified strength at the same age by more than 20 percent. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation must be calculated and the required average compressive strength must be determined in accordance with [ACI 301](#).

2.3.2 Ready-Mix Concrete

Provide concrete that meets the requirements of [ASTM C94/C94M](#).

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by [ASTM C94/C94M](#):

Type and brand cement

Maximum size of aggregate

Amount and brand name of admixtures

Total water content expressed by water cementitious material ratio

2.3.3 Concrete Curing Materials

Provide concrete curing material in accordance with [ACI 301](#) Section 5 and [ACI 308.1](#) Section 2. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound.

2.4 MATERIALS

2.4.1 Cementitious Materials

For exposed concrete, use one manufacturer and one source for each type of cement, ground slag, fly ash, and pozzolan.

2.4.1.1 Fly Ash

[ASTM C618](#), Class F, except that the maximum allowable loss on ignition must not exceed 3 percent. Class F fly ash for use in mitigating Alkali-Silica Reactivity must have a Calcium Oxide (CaO) content of less than 8 percent and a total equivalent alkali content less than 1.5 percent.

Add with cement provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, provide the maximum amount of fly ash permissible that meets the code requirements for

cement content. Report the chemical analysis of the fly ash in accordance with [ASTM C311/C311M](#). Evaluate and classify fly ash in accordance with [ASTM D5759](#).

2.4.1.2 Raw or Calcined Natural Pozzolan

Natural pozzolan must be raw or calcined and conform to [ASTM C618](#), Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction and must have an ignition loss not exceeding 3 percent. Class N pozzolan for use in mitigating Alkali-Silica Reactivity must have a Calcium Oxide (CaO) content of less than 13 percent and total equivalent alkali content less than 3 percent.

2.4.1.3 Ultra Fine Fly Ash and Ultra Fine Pozzolan

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) must conform to [ASTM C618](#), Class F or N, and the following additional requirements:

- a. The strength activity index at 28 days of age must be at least 95 percent of the control specimens.
- b. The average particle size must not exceed 6 microns.
- c. The sum of SiO₂ + Al₂O₃ + Fe₂O₃ must be greater than 77 percent.

2.4.1.4 Ground Granulated Blast-Furnace Slag

[ASTM C989/C989M](#), Grade 100.

2.4.1.5 Portland Cement

Provide cement that conforms to [ASTM C150/C150M](#), Type I, IA, II, or IIA, with tri-calcium aluminates (C3A) content less than 10 percent and a maximum cement-alkali content of 0.80 percent Na₂O_e (sodium oxide) equivalent. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

2.4.2 Water

Water must comply with the requirements of [ASTM C1602/C1602M](#). Minimize the amount of water in the mix. Improve workability by adjusting the grading rather than by adding water. Water must be potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete. Submit test report showing water complies with [ASTM C1602/C1602M](#).

2.4.3 Aggregates

[ASTM C33/C33M](#), except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Provide aggregates that do not contain any substance which may be deleteriously reactive with the alkalis in the cement. Submit test report showing compliance with [ASTM C33/C33M](#).

Fine and coarse aggregates must show expansions less than 0.08 percent at 28 days after casting when testing in accordance with [ASTM C1260](#). Should the test data indicate an expansion of 0.08 percent or greater, reject the aggregate(s) or perform additional testing using [ASTM C1567](#) using the Contractor's proposed mix design. In this case, include the mix design low alkali portland cement and one of the following supplementary cementitious

materials:

1. GGBF slag at a minimum of 40 percent of total cementitious
2. Fly ash or natural pozzolan at a minimum of total cementitious of
 - a. 30 percent if (SiO₂ plus Al₂O₃ plus Fe₂O₃) is 65 percent or more,
 - b. 25 percent if (SiO₂ plus Al₂O₃ plus Fe₂O₃) is 70 percent or more,
 - c. 20 percent if (SiO₂ plus Al₂O₃ plus Fe₂O₃) is 80 percent or more,
 - d. 15 percent if (SiO₂ plus Al₂O₃ plus Fe₂O₃) is 90 percent or more.

If a combination of these materials is chosen, the minimum amount must be a linear combination of the minimum amounts above. Include these materials in sufficient proportion to show less than 0.08 percent expansion at 28 days after casting when tested in accordance with [ASTM C1567](#).

Aggregates must not possess properties or constituents that are known to have specific unfavorable effects in concrete when tested in accordance with [ASTM C295/C295M](#).

2.4.3.1 Aggregates/Combined Aggregate Gradation (Floor Slabs Only)

[ASTM C33/C33M](#), uniformly graded and as follows: Nominal maximum aggregate size of 1 inch. A combined sieve analysis must indicate a well graded aggregate from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 (0.3mm) sieve, and less than 8 percent may be retained on sieves finer than No. 50 (0.3mm). Provide sand that is at least 50 percent natural sand.

2.4.3.2 Aggregates for Lightweight Concrete

[ASTM C330/C330M](#).

2.4.4 Nonshrink Grout

[ASTM C1107/C1107M](#).

2.4.5 Admixtures

[ASTM C494/C494M](#): Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. Submit product data for admixtures used in concrete.

2.4.5.1 High Range Water Reducer (HRWR) (Superplasticizers)

[ASTM C494/C494M](#), Type F and Type G (HRWR retarding admixture) and [ASTM C1017/C1017M](#).

2.4.6 Expansion/Contraction Joint Filler

[ASTM D1751](#) or [ASTM D1752](#) Type I or II. Material must be 1/2 inch thick.

2.4.7 Joint Sealants

Submit manufacturer's product data, indicating VOC content.

2.4.7.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D6690 or ASTM C920, Type M, Class 25, Use T.

2.4.7.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C920, Type M, Grade NS, Class 25, Use T.

2.5 REINFORCEMENT

2.5.1 Reinforcing Bars

ACI 301 unless otherwise specified. Use deformed steel. ASTM A615/A615M with the bars marked A, Grade 60; or ASTM A996/A996M with the bars marked R, Grade 60, or marked A, Grade 60. Submit mill certificates for reinforcing bars.

2.5.1.1 Galvanized Reinforcing Bars

Provide galvanized reinforcing bars that conform to ASTM A767/A767M, Class II with galvanizing after fabrication.

2.5.1.2 Weldable Reinforcing Bars

Provide weldable reinforcing bars that conform to ASTM A706/A706M and ASTM A615/A615M and Supplement S1, Grade 60, except that the maximum carbon content must be 0.55 percent.

2.5.1.3 Epoxy-Coated Reinforcing Bars

Provide epoxy-coated reinforcing bars that conform to ASTM A934/A934M, Grade 60.

2.5.1.4 Stainless Steel Reinforcing Bars

ASTM A955/A955M.

2.5.2 Mechanical Reinforcing Bar Connectors

ACI 301. Provide 125 percent minimum yield strength of the reinforcement bar.

2.5.3 Wire

2.5.3.1 Welded Wire Reinforcement

ASTM A1064/A1064M.

2.5.3.2 Steel Wire

Wire must conform to ASTM A1064/A1064M.

2.5.4 Reinforcing Bar Supports

Supports include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place.

Provide wire bar type supports of coated or non-corrodible material

conforming to **ACI SP-66** and **CRSI 10MSP**. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar support. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer coated wire bar supports.

Legs of supports in contact with formwork must be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

PART 3 EXECUTION

3.1 EXAMINATION

Do not begin installation until substrates have been properly constructed; verify that substrates are level.

If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.

Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

3.2.1 General

Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

3.2.2 Edge Forms and Screed Strips for Slabs

Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

3.2.3 Reinforcement and Other Embedded Items

Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

3.3 FORMS

Provide forms, shoring, and scaffolding for concrete placement in accordance with **ACI 301** Section 2 and 5 and **ACI 347**. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete **0.75 inch** unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris.

3.3.1 Coating

Before concrete placement, coat the contact surfaces of forms with a form release agent.

3.3.2 Reuse

Reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised. Wood forms must not be clogged with paste and must be capable of absorbing high water-cementitious material ratio paste.

3.3.3 Forms for Standard Rough Form Finish

Provide formwork in accordance with [ACI 301](#) Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction.

3.3.4 Forms for Standard Smooth Form Finish

Provide formwork in accordance with [ACI 301](#) Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view.

3.3.5 Form Ties

Provide ties in accordance with [ACI 301](#) section 2.

3.3.6 Tolerances for Form Construction

Construct formwork to ensure that after removal of forms and prior to patching and finishing of formed surfaces, provide concrete surfaces in accordance with tolerances specified in [ACI 301](#) Section 5 and [ACI 117](#).

3.3.7 Removal of Forms and Supports

After placing concrete, removal of forms must be in accordance with [ACI 301](#) Section 2 except as modified by approved form removal schedule.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

[ACI 301](#) and [ACI SP-66](#). Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 General

Provide details of reinforcement that are in accordance with [ACI 301](#) and [ACI SP-66](#) and as specified.

3.4.2 Reinforcement Supports

Support reinforcement in accordance with [ACI 301](#) Section 3. Supports for coated or galvanized bars must also be coated with electrically compatible material for a distance of at least **2 inches** beyond the point of contact with the bars.

3.4.3 Epoxy Coated Reinforcing

Epoxy Coated Reinforcing must meet the requirements of [ASTM A934/A934M](#) including Appendix X2, "Guidelines for Job Site Practices" except as otherwise specified herein.

3.4.3.1 Epoxy Coated Reinforcing Steel Placement and Coating Repair

Carefully handle and install bars to minimize job site patching. Use the same precautions as described in paragraph EPOXY COATED REINFORCING STEEL. Do not drag bars over other bars or over abrasive surfaces. Keep bar free of dirt and grit. When possible, assemble reinforcement as tied cages prior to final placement into the forms. Support assembled cages on padded supports. It is not expected that coated bars, when in final position ready for concrete placement, are completely free of damaged areas; however, excessive nicks and scrapes which expose steel is cause for rejection. Criteria for defects which require repair and for those that do not require repair are as indicated. Inspect for defects and provide required repairs prior to assembly. After assembly, reinspect and provide final repairs.

- a. Immediately prior to application of the patching material, manually remove any rust and debonded coating from the reinforcement by suitable techniques employing devices such as wire brushes and emery paper. Exercise care during this surface preparation so that the damaged areas are not enlarged more than necessary to accomplish the repair. Clean damaged areas of dirt, debris, oil, and similar materials prior to application of the patching material.
- b. Do repair and patching in accordance with the patching material manufacturer's recommendations. These recommendations, including cure times, must be available at the job site at all times.
- c. Allow adequate time for the patching materials to cure in accordance with the manufacturer's recommendation prior to concrete placement.
- d. Rinse placed reinforcing bars with fresh water to remove chloride contamination prior to placing concrete.

3.4.4 Splicing

As indicated. For splices not indicated [ACI 301](#). Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus 2 inches. [AWS D1.4/D1.4M](#). Approve welded splices prior to use. Repair the cut ends of hot-dipped galvanized reinforcement steel to completely coat exposed steel, [ASTM A780/A780M](#).

3.4.5 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

3.4.6 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against

displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.7 Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

Provide fabrication tolerances that are in accordance with [ACI 318](#) and [ACI SP-66](#).

Provide hooks and bends that are in accordance with [ACI 318](#) and [ACI SP-66](#).

Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

Tolerance on nominally square-cut, reinforcing bar ends must be in accordance with [ACI SP-66](#).

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

- a. Bar lengths, depths, and bends beyond specified fabrication tolerances
- b. Bends or kinks not indicated on drawings or approved shop drawings
- c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.4.8 Placing Reinforcement

Place reinforcement in accordance with [ACI 301](#) and [ACI SP-66](#).

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with [ACI 318](#), [ACI SP-66](#) and [CRSI 10MSP](#). Do not use supports to support runways for concrete conveying equipment and similar construction loads.

Support welded wire reinforcement as required for reinforcing bars.

Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form.

Unless otherwise indicated, numbers, type, and spacing of supports must conform to [ACI SP-66](#).

Bending of reinforcing bars partially embedded in concrete is permitted only as specified in [ACI SP-66](#) and [ACI 318](#).

3.4.9 Spacing of Reinforcing Bars

Spacing must be as indicated. If not indicated, spacing must be in accordance with the [ACI 318](#) and [ACI SP-66](#).

Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

3.4.10 Concrete Protection for Reinforcement

Concrete protection must be in accordance with the [ACI 318](#) and [ACI SP-66](#), but not less than indicated on the drawings.

3.4.11 Welding

Welding must be in accordance with [AWS D1.4/D1.4M](#).

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

[ASTM C94/C94M](#), [ACI 301](#), [ACI 302.1R](#) and [ACI 304R](#), except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

3.5.2 Mixing

[ASTM C94/C94M](#), [ACI 301](#) and [ACI 304R](#). Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 84 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete in accordance with [ACI 301](#) Section 5.

3.6.1 Pumping

[ACI 304R](#) and [ACI 304.2R](#). Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed [2 inches](#) at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

[ACI 213R](#). Presoak or presaturate aggregates. Cement content must be minimum of [564 pounds per cubic yard](#) and be sufficient to accommodate a [4 to 6 inch](#) slump.

3.6.2 Cold Weather

[ACI 306.1](#). Do not allow concrete temperature to decrease below [50 degrees F](#). Obtain approval prior to placing concrete when the ambient temperature is below [40 degrees F](#) or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain [50 degrees F](#) minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to [37 degrees F](#) in any 1 hour and [50 degrees F](#) per 24 hours after heat application.

3.6.3 Hot Weather

Maintain required concrete temperature using Figure 4.2 in [ACI 305R](#) to prevent the evaporation rate from exceeding [0.2 pound of water per square foot](#) of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.6.4 Bonding

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave

laitance, loosened particles of aggregate, nor damaged concrete at the surface.

Obtain bonding of fresh concrete that has set as follows:

At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; roughened and cleaned surface of set concrete must be dampened, but not saturated, immediately prior to placing of fresh concrete.

At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; the roughened and cleaned surface of set concrete must be dampened but not saturated and covered with a cement grout coating.

Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

3.7 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

3.7.1 Mixing Equipment

Before concrete pours, designate on-site area approved by the Contracting Officer for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

3.7.2 Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

3.7.3 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and/or packaging material. Return excess cement to supplier. Institute deconstruction and construction waste separation and recycling for use in manufacturer's programs. When such a program is not available, seek local recyclers to reclaim the materials.

3.8 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.8.1 Defects

Repair surface defects in accordance with ACI 301 Section 5.

3.8.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified must be finished with wood floats to even surfaces. Finish must match adjacent finishes.

3.8.3 Formed Surfaces

3.8.3.1 Tolerances

ACI 117 and as indicated.

3.8.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0. Patch holes and defects in accordance with ACI 301.

3.8.3.3 Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with ACI 301.

3.9 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI 301 and ACI 302.1R, unless otherwise specified. Where straightedge measurements are specified, Contractor must provide straightedge.

3.9.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.9.1.1 Pavement

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straightedge to check slope and flatness; correct and refloat as necessary. Obtain final finish by a burlap drag. Drag a strip of clean, wet burlap from 3 to 10 feet wide and 2 feet longer than the pavement width across the slab. Produce a fine, granular, sandy textured surface without disfiguring marks. Round edges and joints with an edger having a radius of 1/8 inch.

3.9.1.2 Concrete Toppings Placement

The following requirements apply to the placement of toppings of concrete on base slabs that are either freshly placed and still plastic, or on hardened base slabs.

- a. Placing on a Fresh Base: Screed and bull float the base slab. As soon as the water sheen has disappeared, lightly rake the surface of the base slab with a stiff bristle broom to produce a bonding surface for the topping. Immediately spread the topping mixture evenly over the roughened base before final set takes place.
- b. Bonding to a Hardened Base: When the topping is to be bonded to a floated or troweled hardened base, roughen the base by scarifying, grit-blasting, scabbling, planing, flame cleaning, or acid-etching to lightly expose aggregate and provide a bonding surface. Remove dirt, laitance, and loose aggregate by means of a stiff wire broom. Keep the

clean base wet for a period of 12 hours preceding the application of the topping. Remove excess water and apply a 1:1:1/2 cement-sand-water grout, and brush into the surface of the base slab. Do not allow the cement grout to dry, and spread it only short distances ahead of the topping placement. Do not allow the temperature differential between the completed base and the topping mixture to exceed 41 degrees F at the time of placing.

3.9.2 Remedies for Out of Tolerance Work

Contractor is required to repair and retest any floors not meeting specified tolerances. Prior to repair, Contractor must submit and receive approval for the proposed repair, including product data from any materials proposed. Repairs must not result in damage to structural integrity of the floor. For floors exposed to public view, repairs must prevent any uneven or unusual coloring of the surface.

3.9.3 Curbs

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

3.10 JOINTS

3.10.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate construction joints as follows:

3.10.1.1 Maximum Allowable Construction Joint Spacing

- a. In walls at not more than 60 feet in any horizontal direction.
- b. In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet.

3.10.1.2 Construction Joints for Constructability Purposes

- a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.
- b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.
- c. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used

for slabs.

3.10.2 Isolation Joints

Provide joints at points of contact between slabs and vertical surfaces, and elsewhere as indicated.

Fill joints with premolded joint filler strips $1/2$ inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than $3/4$ inch in depth where joint is sealed with sealing compound and not less than $1/4$ inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor must clean groove of foreign matter and loose particles after surface has dried.

3.11 CURING AND PROTECTION

ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that adsorb VOCs.

3.11.1 Curing Periods

ACI 301 Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

3.11.2 Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.11.3 Curing Unformed Surfaces

Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

Unless otherwise specified, accomplish final curing of unformed surfaces by

any of curing methods specified, as applicable.

Accomplish final curing of concrete surfaces to receive liquid floor hardener of finish flooring by moisture-retaining cover curing.

3.11.4 Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 37 degrees F in any 1 hour nor 80 degrees F in any 24-hour period.

3.11.5 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.11.6 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.12 FIELD QUALITY CONTROL

3.12.1 Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C31/C31M for making test specimens.

3.12.2 Testing

3.12.2.1 Slump Tests

ASTM C143/C143M. Take concrete samples during concrete placement/discharge.

The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.12.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders

and slump tests are made.

3.12.2.3 Compressive Strength Tests

ASTM C39/C39M. Make six 6 inch by 12 inch test cylinders for each set of tests in accordance with **ASTM C31/C31M**, **ASTM C172/C172M** and applicable requirements of **ACI 305R** and **ACI 306R**. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold two cylinders in reserve. Take samples for strength tests of each mix design of and for concrete placed each day not less than once a day, nor less than once for each 100 cubic yards of concrete for the first 500 cubic yards, then every 500 cubic yards thereafter, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. Concrete compressive tests must meet the requirements of **ACI 318** Section 5.6. Retest locations represented by erratic core strengths. Where retest does not meet concrete compressive strength requirements submit a mitigation or remediation plan for review and approval by the contracting officer. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.12.2.4 Air Content

ASTM C173/C173M or **ASTM C231/C231M** for normal weight concrete . Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.12.2.5 Unit Weight of Structural Concrete

ASTM C567/C567M and **ASTM C138/C138M**. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

3.12.2.6 Ion Concentration

ACI 318. Determine water soluble ion concentration in accordance with **ASTM C1218/C1218M**. Perform test once for each mix design.

3.12.2.7 Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

Failure to meet compressive strength tests as evaluated

Reinforcement not conforming to requirements specified

Concrete which differs from required dimensions or location in such a manner as to reduce strength

Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified

Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration

Poor workmanship likely to result in deficient strength

Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the contracting officer.

3.12.2.8 Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.12.2.9 Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with [ASTM C42/C42M](#), and as follows:

Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.

Test cores after moisture conditioning in accordance with [ASTM C42/C42M](#) if concrete they represent is more than superficially wet under service.

Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.

Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

3.13 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the

Contracting Officer for approval before any corrective work is accomplished.

3.13.1 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

3.13.2 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the Contracting Officer prior to proceeding.

-- End of Section --

SECTION 03 45 33

PRECAST STRUCTURAL CONCRETE

04/08

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 ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

- AASHTO HB-17 (2002; Errata 2003; Errata 2005, 17th Edition) Standard Specifications for Highway Bridges
- AASHTO T 259 (2002; R 2012) Standard Method of Test for Resistance of Concrete to Chloride Ion Penetration

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

- ACI 304R (2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
- ACI 305R (2010) Specification for Hot Weather Concreting
- ACI 309R (2005) Guide for Consolidation of Concrete
- ACI 318 (2011; Errata 1 2011; Errata 2 2012; Errata 3-4 2013) Building Code Requirements for Structural Concrete and Commentary

AMERICAN HARDBOARD ASSOCIATION (AHA)

- AHA A135.4 (1995; R 2004) Basic Hardboard

AMERICAN WELDING SOCIETY (AWS)

- AWS D1.1/D1.1M (2012; Errata 2011) Structural Welding Code - Steel
- AWS D1.4/D1.4M (2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

- ASTM A123/A123M (2012) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A153/A153M (2009) Standard Specification for Zinc

Coating (Hot-Dip) on Iron and Steel
Hardware

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A27/A27M	(2010) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A307	(2010) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A325	(2010) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A36/A36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2009) Standard Specification for Ferritic Malleable Iron Castings
ASTM A496/A496M	(2007) Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
ASTM A497/A497M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A563	(2007a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A615/A615M	(2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A82/A82M	(2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A934/A934M	(2013) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM C1107/C1107M	(2014) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1202	(2012) Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM C1218/C1218M	(1999; R 2008) Standard Specification for Water-Soluble Chloride in Mortar and Concrete

ASTM C1260	(2007) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C330/C330M	(2014) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C618	(2012) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C94/C94M	(2014a) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2013) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM F436	(2011) Hardened Steel Washers
ASTM F844	(2007a) Washers, Steel, Plain (Flat), Unhardened for General Use

PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

PCI MNL-116	(1999) Manual for Quality Control for Plants and Production of Structural Precast Concrete Products, 4th Edition
PCI MNL-120	(2010) PCI Design Handbook - Precast and Prestressed Concrete, 6th Edition

1.2 SYSTEM DESCRIPTION

The work includes the provision of precast non-prestressed concrete herein referred to as precast members. Precast members shall be the product of a manufacturer specializing in the production of precast concrete members.

1.2.1 Design Requirements

Design precast members in accordance with [ACI 318](#) and the [PCI MNL-120](#). Design precast members (including connections) for the design load conditions and spans indicated, and handling and erection stresses, and for additional loads imposed by openings and supports of the work of other trades. Design precast members for handling without cracking in accordance with the [PCI MNL-120](#). Concrete toppings shall be used in establishing the design strength of the precast members.

1.2.1.1 Loads

Loadings for members and connections shall include all dead load, live load, applicable lateral loads such as wind and earthquake, applicable construction loads such as handling, erection loads, and other applicable loads.

1.2.1.2 Drawing and Design Calculation Information

Submit drawings and design calculations indicating complete information for the fabrication, handling, and erection of the precast member. Drawings shall not be reproductions of contract drawings. [Design calculations, drawings of precast members](#) (including connections) shall be made by a registered professional engineer experienced in the design of precast concrete members, and submitted for approval prior to fabrication. The drawings shall indicate, as a minimum, the following information:

a. Plans, elevations and other drawing views showing the following:

- (1) Member piece marks locating and defining products furnished by the manufacturer.
- (2) Headers for openings.
- (3) Location and size of openings .
- (4) Relationships to adjacent material.
- (5) Joints and openings between members and between members and other construction.
- (6) Location of field installed anchors.
- (7) Erection sequences and handling requirements
- (8) Areas receiving toppings and magnitude of topping thickness. Identify areas where topping is an integral part of the structural capacity of the precast members.
- (9) Lifting and erection inserts

b. Elevations, sections and other details for each member showing the following:

- (1) Connections between members and connections between members and other construction.
- (2) Connections for work of other trades and cast-in items and their relation to other trades.
- (3) Dimensioned size and shape for each member with quantities, position and other details of reinforcing steel, anchors, inserts and other embedded items.
- (4) Lifting, erection and other handling devices and inserts.
- (5) Surface finishes of each member.
- (6) Estimated cambers

- c. Strength properties for concrete, steel and other materials.
- d. Methods for storage and transportation.
- e. Description of loose, cast-in and field hardware.
- f. All dead, live, handling, erection and other applicable loads used in the design.

1.3 MODIFICATION TO REFERENCE

In the ACI publications, the advisory provisions shall be considered to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears; reference to the "Building Official," the "Structural Engineer" and the "Architect/Engineer" shall be interpreted to mean the Contracting Officer.

1.4 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 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Drawings of precast members; G

Drawings of precast prestressed concrete members; G

SD-03 Product Data

Anchorage and lifting inserts and devices

Bearing pads

SD-04 Samples

Surface finish

Submit two 12 by 12 by 2 inch thick sample panels representative of the color and finish for each type of precast member requiring a finish Grade B surface finish.

SD-05 Design Data

Precast concrete members design calculations; G,

Concrete mix design; G

SD-06 Test Reports

Contractor-furnished mix design; G

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other

test for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained versus sieve size. Test reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

Cement

Pozzolan

Water-Reducing Admixture

Accelerating Admixture

SD-07 Certificates

Quality control procedures

Submit quality control procedures established in accordance with **PCI MNL-116** by the precast manufacturer.

Construction Records

Construction records of the manufacturing, handling, and erection of the precast prestressed concrete members shall be submitted.

Epoxy-coated steel bars

Written certification for coating material and coated bars shall be submitted with the delivery of the bars.

SD-11 Closeout Submittals

Concrete **batch ticket** information

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Manufacturer Qualifications

PCI MNL-116. Plants shall be certified by the PCI Plant Certification Program for Category C1 work. At the Contracting Officer's option, PCI Plant quality control program records shall be available for review.

PCI MNL-116. Where panels are manufactured by specialists in plants not currently enrolled in the PCI "Quality Control Program," provide a product quality control system in accordance with **PCI MNL-116** and perform concrete and aggregate quality control testing using an approved, independent commercial testing laboratory. Submit test results to the Contracting Officer.

1.5.1.2 Designer Qualifications

The designer shall be a registered professional engineer experienced in the design of precast concrete.

1.5.1.3 Erector Qualifications

The erector shall be regularly engaged for at least three years in the erection of precast structural concrete similar to the requirements of this project.

1.5.1.4 Welding Qualifications

Provide **AWS D1.1/D1.1M** qualified welders who are currently certified at contract award date and have maintained their certificates over the past year.

1.5.2 Regulatory Requirements

Provide precast members in conformance with **ACI 318** and **AWS D1.4/D1.4M**.

1.5.3 Concrete Mix Design

Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, ground slag, and admixtures, and applicable reference specification. Provide mix proportion data using at least three different water-cement ratios for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregates changes.

1.5.4 Certificates: Record Requirement

ASTM C94/C94M. Submit mandatory **batch ticket** information for each load of ready-mixed concrete.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Transportation

1.6.1.1 Transporting Members

In transporting members by truck, railroad car, or barge, provision shall be made for supporting the members with adequate bracing to ensure their maintaining the vertical position and damping of dangerous vibrations. Trucks with double bolsters are satisfactory provided the members are fully seated on the outer bolsters at not more than **3 feet** or the depth of the member from the end and the inner bolster is not more than **8 feet** from the end of the member or the designated pickup point. Adequate padding material shall be provided between tie chains or cables to preclude chipping of concrete.

1.6.1.2 Lateral Deflection or Vibration

Any noticeable indication of lateral deflection or vibration during transportation shall be corrected by rigid bracing between members or by means of lateral trussing.

1.6.2 Storage

1.6.2.1 Storage Areas

Storage areas for precast members shall be stabilized, and suitable foundations shall be provided, so differential settlement or twisting of members will not occur.

1.6.2.2 Stacked members

Stacked members shall be separated and supported by battens placed across the full width of each bearing point. Battens shall be arranged in vertical planes at a distance not greater than the depth of the member from designated pickup points. Battens shall not be continuous over more than one stack of precast units. Stacking of members shall be such that lifting devices will be accessible and undamaged. The upper members of a stacked tier shall not be used as storage areas for shorter members or equipment.

1.6.3 Handling of Members

The location of pickup points for handling of the members and details of the pickup devices shall be shown in shop drawings. Members shall be handled only by means of approved devices at designated locations. Members shall be maintained in an upright position at all times and picked up and supported as shown in approved shop drawings.

PART 2 PRODUCTS

2.1 CONTRACTOR-FURNISHED MIX DESIGN

ACI 318. The minimum compressive strength of concrete at 28 days shall be 6,000, unless otherwise indicated. For marine exposure, ensure a dense concrete free of shrinkage cracks, with a minimum degree of permeability. The maximum water cement ratio shall be 0.40.

2.2 MATERIALS

2.2.1 Cement

ASTM C150/C150M, Type II with a maximum alkali content of 0.40 percent. If no satisfactory test results are available (made within the past six months) to prove that the cement alkali content is less than 0.40 percent, then it shall be assumed that the cement contains greater than 0.40 percent alkali. Cement certificates shall include test results in accordance with **ASTM C150/C150M**, including equivalent alkalies indicated in the optional chemical requirements.

2.2.1.1 Fly Ash and Pozzolan

ASTM C618, Type N, F, or C, except that the maximum calcium oxide content shall be 8.0 percent, the maximum available alkalies shall be 1.5 percent, and the maximum allowable loss on ignition shall be 6 percent for Type N and F. Class C shall not be used with reactive aggregates.

2.2.1.2 Ground Iron Blast-Furnace Slag

ASTM C989/C989M, Grade 100 or 120.

2.2.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete, [ACI 318](#).

2.2.3 [Aggregates](#)

2.2.3.1 [Aggregates Selection](#)

[ASTM C33/C33M](#), Size 57, except as modified herein. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalis in the cement, nor in an amount sufficient to cause excessive expansion of concrete. Prior to fabrication, submit certified test reports for the following tests specified in [ASTM C33/C33M](#):

- a. Grading
- b. Amount of material finer than No. 200 sieve
- c. Organic impurities
- d. Soundness
- e. Clay lumps and friable particles
- f. Coal and lignite
- g. Weight of slag
- h. Abrasion of coarse aggregate
- i. Fineness modulus

2.2.3.2 [Alkali-Silica Reactivity](#)

Evaluate and test fine and coarse aggregates to be used in all concrete for alkali-aggregate reactivity in accordance with [ASTM C1260](#). Test both coarse aggregate size groups if from different sources. Evaluate the fine and coarse aggregates separately and in combination, which matches the Contractor's proposed mix design proportioning, [utilizing the modified version of ASTM C1260](#). Test results of the combination must have a measured expansion equal to or less than 0.08 percent at 16 days after casting. [Modify ASTM C1260 as follows to included one of the following options:](#)

- a. Utilize the Contractor's proposed low alkali portland cement and Class F fly ash or Class N pozzolan in combination with the proposed aggregate percentage for the test proportioning. Use Class F fly ash or Class N pozzolan in the range of 25 percent to 40 percent of the total cementitious material by mass. Determine the quantity that will meet all the requirements of these specifications and that will lower the expansion equal to or less than 0.08 percent at 16 days after casting. Class C fly ash shall not be used with reactive aggregates.
- b. Utilize the Contractor's proposed low alkali portland cement and ground granulated blast furnace (GGBF) slag in combination with the proposed aggregate percentage for the test proportioning. Use GGBF

slag in the range of 40 percent to 50 percent of the total cementitious material by mass. Determine the quantity that will meet all the requirements of these specifications and that will lower the expansion equal to or less than 0.08 percent at 16 days.

c. Utilize the Contractor's proposed low alkali portland cement and a lithium nitrate admixture. The lithium nitrate admixture may be used in combination with either Class "F" fly ash, Class N pozzolan, or ground granulated blast furnace (GGBF) slag, at a dosage rate as recommended by the manufacturer.

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

2.2.3.3 Aggregates for Lightweight Concrete

ASTM C330/C330M.

2.2.4 Grout

2.2.4.1 Nonshrink Grout

ASTM C1107/C1107M.

2.2.4.2 Cementitious Grout

Shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method.

2.2.5 Admixtures

2.2.5.1 Accelerating

ASTM C494/C494M, Type C or E.

2.2.5.2 Water Reducing

ASTM C494/C494M, Type A, E, or F.

2.2.6 Reinforcement

2.2.6.1 Reinforcing Bars

ASTM A615/A615M, Grade 60.

Epoxy-coated steel bars shall comply with the requirements of ASTM A934/A934M, including written certifications for coating material and coated bars, sample of coating material, and 0.5 pounds of patching material.

2.2.6.2 Wire

ASTM A82/A82M or ASTM A496/A496M.

2.2.6.3 Welded Wire Fabric

ASTM A185/A185M or ASTM A497/A497M.

2.2.7 Metal Accessories

Provide ASTM A123/A123M or ASTM A153/A153M galvanized.

2.2.7.1 Inserts

ASTM A47/A47M, Grade 32510 or 35018, or ASTM A27/A27M Grade U-60-30.

2.2.7.2 Structural Steel

ASTM A36/A36M.

2.2.7.3 Bolts

ASTM A307; ASTM A325.

2.2.7.4 Nuts

ASTM A563.

2.2.7.5 Washers

ASTM F844 washers for ASTM A307 bolts, and ASTM F436 washers for ASTM A325 bolts.

2.2.8 Bearing Pads

2.2.8.1 Elastomeric

AASHTO HB-17, for plain neoprene bearings.

2.2.8.2 Hardboard (Interior Only)

AHA A135.4, class as specified by the precast manufacturer.

2.2.9 Grout

2.2.9.1 Cementitious Grout

Shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.

2.2.9.2 Nonshrink Grout

Nonshrink grout shall conform to ASTM C1107/C1107M and shall be a commercial formulation suitable for the application proposed.

2.3 PRODUCTION QUALITY CONTROL PROCEDURES

PCI MNL-116 unless specified otherwise.

2.3.1 Forms

Brace forms to prevent deformation. Forms shall produce a smooth, dense surface. Chamfer exposed edges of columns and beams $3/4$ inch, unless otherwise indicated. Provide threaded or snap-off type form ties.

2.3.2 Reinforcement Placement

ACI 318 for placement and splicing. Reinforcement may be preassembled before placement in forms. Provide exposed connecting bars, or other approved connection methods, between precast and cast-in-place construction. Remove any excess mortar that adheres to the exposed connections.

2.3.3 Inserts

When the ends of the prestressed member will be exposed, recess the prestressing stands using inserts. After detensioning, remove inserts and fill the recess with nonshrink grout.

2.3.4 Concrete

2.3.4.1 Concrete Mixing

ASTM C94/C94M. Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

2.3.4.2 Concrete Placing

ACI 304R, **ACI 305R** for hot weather concreting and **ACI 309R**, unless otherwise specified.

2.3.4.3 Concrete Curing

Commence curing immediately following the initial set and completion of surface finishing. Provide curing procedures to keep the temperature of the concrete between **50 and 190 degrees F**. When accelerated curing is used, apply heat at controlled rate and uniformly along the casting beds. Monitor temperatures at various points in a product line in different casts.

2.3.5 Surface Finish

Repairs located in a bearing area shall be approved by the Contracting Officer prior to repairs. Precast members containing hairline cracks which are visible and are less than **0.01 inches** in width, may be accepted, except that cracks larger than **0.005 inches** in width for surfaces exposed to the weather shall be repaired. Defects that involve more than **36 square inches** of concrete shall be grounds for rejection. Any precast member that is structurally impaired or contains honeycombed section deep enough to expose stressing tendons or reinforcing shall be rejected. Defects shall be repaired or rejected as specified in paragraph "Defects."

2.3.5.1 Unformed Surfaces

Roughen top surface to bond with topping slab.

2.3.5.2 Formed Surfaces

PCI MNL-116 (Appendix A - Commentary), Chapter 3, for grades of surface

finishes.

- a. Unexposed Surfaces: Provide a standard grade surface finish.
- b. Exposed Surfaces: Provide a Grade B surface finish. The combined area of acceptable defective areas shall not exceed 0.2 percent of the exposed to view surface area, and the patches shall be indistinguishable from the surrounding surfaces when dry.

2.3.6 Acceptance/Rejection of Defects

2.3.6.1 Minor Defects

All honeycombed areas, chipped corners, air pockets over 1/4 inch in diameter, and other minor defects involve less than 36 square inches of concrete shall be repaired. Form offsets of fins over 1/8 inch shall be ground smooth. All unsound concrete shall be removed from defective areas prior to repairing. All surfaces permanently exposed to view shall be repaired by a blend of portland cement and white cement properly proportioned so that the final color when cured will be the same as adjacent concrete.

2.3.6.2 Major Defects

Major defects are those which involve more than 36 square inches of concrete or expose stressing tendons or reinforcing steel. If one or more major defects appear in a member, it shall be rejected. Cracks of a width of more than 0.01 inch shall be cause for rejection of the member.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

2.4.1 Chloride Ion Concentration Test

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

2.4.2 Chloride Ion Penetration Test

To ensure the durability of concrete in marine environment, concrete shall be proportioned to have the chloride ion penetration test in accordance with ASTM C1202, and be below 1500 coulombs for concrete specimens tested at 28 days. Alternatively, a ponding test in accordance with AASHTO T 259 may be performed to validate chloride ion penetration in accordance with ASTM C1202.

2.4.3 Factory Inspection

At the option of the Contracting Officer, precast units shall be inspected by the QC Representative prior to being transported to the job site. The Contractor shall give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the Government's right to enforce contractual provisions after units are transported or erected.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to erection, and again after installation, precast members shall be checked for damage, such as cracking, spalling, and honeycombing. As directed by the Contracting Officer, precast members that do not meet the surface finish requirements specified in Part 2 in paragraph entitled "Surface Finish" shall be repaired, or removed and replaced with new precast members.

3.2 ERECTION

Precast members shall be erected after the concrete has attained the specified compressive strength, unless otherwise approved by the precast manufacturer. Erect in accordance with the approved shop drawings. [PCI MNL-116](#) and [PCI MNL-120](#) (Chapter 8), for tolerances. Provide a 1:500 tolerance, if no tolerance is specified. Brace precast members, unless design calculations submitted with the shop drawings indicate bracing is not required. Follow the manufacturer's recommendations for maximum construction loads. Place precast members level, plumb, square, and true within tolerances. Align member ends.

3.3 BEARING SURFACES

Shall be flat, free of irregularities, and properly sized. Size bearing surfaces to provide for the indicated clearances between the precast member and adjacent precast members or adjoining field placed surfaces. Correct bearing surface irregularities with nonshrink grout. Provide bearing pads where indicated or required. Do not use hardboard bearing pads in exterior locations. Place precast members at right angles to the bearing surface, unless indicated otherwise, and draw-up tight without forcing or distortion, with sides plumb.

3.4 ANCHORAGE

Provide anchorage for fastening work in place. Conceal fasteners where practicable. Make threaded connections up tight and nick threads to prevent loosening.

3.5 WELDING

[AWS D1.4/D1.4M](#) for welding connections and reinforcing splices. Protect the concrete and other reinforcing from heat during welding. Weld continuously along the entire area of contact. Grind smooth visible welds in the finished installation. Welding of epoxy-coated reinforcing is not allowed.

3.6 OPENINGS

Holes or cuts requiring reinforcing to be cut, which are not indicated on the approved shop drawing, shall only be made with the approval of the Contracting Officer and the precast manufacturer. Drill holes less than [12 inches](#) in diameter with a diamond tipped core drill.

3.7 GALVANIZING REPAIR

Repair damage to galvanized coatings using [ASTM A780/A780M](#) zinc rich paint for galvanized surfaces damaged by handling, transporting, cutting,

welding, bolting, or acid washing. Do not heat surfaces to which repair paint has been applied.

3.8 GROUTING

Clean and fill keyways between precast members, and other indicated areas, solidly with nonshrink grout or cementitious grout. Provide reinforcing where indicated. Remove excess grout before hardening.

3.9 CONCRETE TOPPING

Provide as indicated and as specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.10 CONSTRUCTION RECORDS

Complete construction records shall be kept of the manufacturing, handling, and erection of the precast-prestressed concrete members. Records shall be kept for, but not limited to, the following items:

- a. Specifications of material used in the manufacture of the members.
- b. Time-temperature history of the concrete members from casting to the transfer of the prestress force.
- c. Records of the tendon stressing operation including initial prestress force, measured elongation, how it was measured, and how the tendons were stressed and destressed.
- d. Records of inspection of the members before and after the prestress force is transferred to the members.
- e. Records of the inspection of the members each time they are moved.
- f. Records of any defects in the member and any corrective measures taken.

-- End of Section --

SECTION 09 90 00

PAINTS AND COATINGS
05/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100 (2001; Supplements 2002-2008)
Documentation of the Threshold Limit
Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D235 (2002; R 2012) Mineral Spirits (Petroleum
Spirits) (Hydrocarbon Dry Cleaning Solvent)

ASTM D4214 (2007) Standard Test Method for Evaluating
the Degree of Chalking of Exterior Paint
Films

ASTM D523 (2008) Standard Test Method for Specular
Gloss

MASTER PAINTERS INSTITUTE (MPI)

MPI 101 (Oct 2009) Epoxy Anti-Corrosive Metal
Primer

MPI 107 (Oct 2009) Rust Inhibitive Primer
(Water-Based)

MPI 108 (Oct 2009) High Build Epoxy Coating, Low
Gloss

MPI 163 (Oct 2009) Exterior W.B. Light Industrial
Coating, Semi-Gloss, MPI Gloss Level 5

MPI 164 (Oct 2009) Exterior W.B. Light Industrial
Coating, Gloss, MPI Gloss Level 6

MPI 72 (Oct 2009) Polyurethane, Two Component,
Pigmented, Gloss

MPI 79 (Oct 2009) Alkyd Anti-Corrosive Metal
Primer

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP-01 (2000) Environmentally Preferable Product

Specification for Architectural and
Anti-Corrosive Paints

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4	(2007; E 2004) Brush-Off Blast Cleaning
SSPC Guide 6	(2004) Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations
SSPC Guide 7	(2004; E 2004) Guide to the Disposal of Lead-Contaminated Surface Preparation Debris
SSPC PA 1	(2000; E 2004) Shop, Field, and Maintenance Painting of Steel
SSPC PA Guide 3	(1982; E 1995) A Guide to Safety in Paint Application
SSPC QP 1	(1998; E 2004) Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)
SSPC SP 1	(1982; E 2004) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2007) Near-White Blast Cleaning
SSPC SP 12/NACE No.5	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP 2	(1982; E 2000; E 2004) Hand Tool Cleaning
SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning
SSPC VIS 4/NACE VIS 7	(1998; E 2000; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 1-2010; Changes 1-3 2010; Changes 4-6 2011; Change 7 2012) Safety and Health Requirements Manual
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U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24 (2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313 (Rev D; Notice 1) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

FED-STD-595 (Rev C; Notice 1) Colors Used in Government Procurement

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

29 CFR 1910.1000 Air Contaminants

29 CFR 1910.1001 Asbestos

29 CFR 1910.1025 Lead

29 CFR 1926.62 Lead

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. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-03 Product Data

Manufacturer's Technical Data Sheets

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in **FED-STD-313**.

SD-10 Operation and Maintenance Data

Coatings:

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on mooring hardware on a minimum of three similar projects within the past three years. List information by individual and include the following:

- a. Name of individual and proposed position for this work.
- b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be

contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.3.2 SSPC QP 1 Certification

All contractors and subcontractors that perform surface preparation or coating application shall be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of [SSPC QP 1](#) prior to contract award, and shall remain certified while accomplishing any surface preparation or coating application. The painting contractors and painting subcontractors must remain so certified for the duration of the project. If a contractor's or subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in contractor certification status.

1.4 QUALITY ASSURANCE

1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that conform to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

Another required testing is Batch Quality Conformance Testing to prove conformance of the manufacturer's paint to the specified MPI standard. This testing is accomplished before the materials are delivered to the job site. Provide testing for paint products. Test paint products as specified in the paragraph "Testing Procedure".

1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide [one quart](#) samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide [Qualification Testing](#) for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph

"Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.5 REGULATORY REQUIREMENTS

1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.4 Asbestos Content

Materials shall not contain asbestos.

1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.5.6 Silica

Abrasive blast media shall not contain free crystalline silica.

1.5.7 Human Carcinogens

Materials shall not contain ACGIH 0100 confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and

special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26.00 25 GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
- b. 29 CFR 1910.1000.
- c. ACGIH 0100, threshold limit values.
- d. The appropriate OSHA standard in 29 CFR 1910.1025 and 29 CFR 1926.62 for surface preparation on painted surfaces containing lead. Removal and disposal of coatings which contain lead is specified in Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD." Additional guidance is given in SSPC Guide 6 and SSPC Guide 7. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.
- e. The appropriate OSHA standards in 29 CFR 1910.1001 for surface preparation of painted surfaces containing asbestos. Removal and disposal of coatings which contain asbestos materials is specified in Section 02 82 14.00 10 ASBESTOS HAZARD CONTROL ACTIVITIES. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.

1.8 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation. Isolate area of application from rest of

project when applying high-emission paints or coatings.

1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than 5 degrees F above dew point;
- b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.9 COLOR SELECTION

Color Coding For Shore-To-Ship Utility Connections: Paint hose connection fittings and shut-off valves the designated color. In addition to color coding provide 2 inch high stenciled letters using black stencil paint, clearly designating service for each connection.

Color Coding for Shore-to-Ship Utility Connections

<u>Service</u>	<u>Color</u>	<u>FED-STD-595 No.</u>
Potable Water*	Blue	15044
Water Provided for Fire Protection**	Red	11105
Chilled Water	Striped Blue/White	15044/17886
Oily Waste Water	Striped Yellow/Black	13538/17038
Sewer	Gold	17043
Steam	White	17886
High Pressure Air	Gray	16081
Low Pressure Air	Tan	10324
Fuel	Yellow	13655

* This includes connections serving domestic functions.

** This includes non-potable salt water or, at some locations, fresh water connections provided for fire protection (may also include flushing and cooling requirements). Note: This does not include waterfront fire hydrants.

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of

coats.

1.10 LOCATION AND SURFACE TYPE TO BE PAINTED

1.10.1 Painting Included

Where a surface is indicated to be painted, include the following unless indicated otherwise.

- a. All existing mooring hardware.
- b. Repaired portion of existing light poles.
- c. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- d. Existing coated surfaces that are damaged during performance of the work.

1.10.1.1 Exterior Painting

1.10.2 Definitions and Abbreviations

1.10.2.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.10.2.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.10.2.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.10.2.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.10.2.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface

degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.10.2.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.10.2.7 EXT

MPI short term designation for an exterior coating system.

1.10.2.8 INT

MPI short term designation for an interior coating system.

1.10.2.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.10.2.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.10.2.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.10.2.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with [ASTM D523](#). Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.10.2.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.10.2.14 Paint

See Coating definition.

1.10.2.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.10.2.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents. Comply with applicable regulations regarding toxic and hazardous materials.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, corrosion and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

- a. Test existing finishes for lead before sanding, scraping, or removing. If lead is present, refer to paragraph Toxic Materials.

- b. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, [ASTM D235](#). Allow surface to dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.
- c. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.
- d. The requirements specified are minimum. Comply also with the [application instructions](#) of the paint manufacturer.
- e. Previously painted surfaces specified to be repainted or damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.
- f. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.
- g. Chalk shall be removed so that when tested in accordance with [ASTM D4214](#), the chalk resistance rating is no less than 8.
- h. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.
- i. Edges of chipped paint shall be feather edged and sanded smooth.
- j. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.
- k. New, proposed coatings shall be compatible with existing coatings.

3.2.2 Existing Coated Surfaces with Minor Defects

Sand and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligating, chalking, and irregularities due to partial peeling of previous coatings.

3.2.3 Removal of Existing Coatings

Remove existing coatings from the following surfaces:

- a. Surfaces containing large areas of minor defects;
- b. Surfaces containing more than 20 percent peeling area; and
- c. Surfaces designated by the Contracting Officer, such as surfaces where rust shows through existing coatings.

3.2.4 Substrate Repair

- a. Repair substrate surface damaged during coating removal;
- b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and

- c. Clean and prime the substrate as specified.

3.3 PREPARATION OF METAL SURFACES

3.3.1 Existing and New Ferrous Surfaces

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with **SSPC SP 1** to remove oil and grease. Where shop coat is missing or damaged, clean according to **SSPC SP 3**, or **SSPC SP 10/NACE No. 2**. Water jetting to **SSPC SP 12/NACE No.5** WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.
- b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with **SSPC SP 10/NACE No. 2/SSPC SP 12/NACE No.5** WJ-2.

3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in **SSPC SP 2** and **SSPC SP 3**. As a visual reference, cleaned surfaces shall be similar to photographs in **SSPC VIS 3**.

For abrasive blast cleaned surfaces, the requirements are stated in **SSPC 7/NACE No.4**, **SSPC SP 6/NACE No.3**, and **SSPC SP 10/NACE No. 2**. As a visual reference, cleaned surfaces shall be similar to photographs in **SSPC VIS 1**.

For waterjet cleaned surfaces, the requirements are stated in **SSPC SP 12/NACE No.5**. As a visual reference, cleaned surfaces shall be similar to photographs in **SSPC VIS 4/NACE VIS 7**.

3.4 APPLICATION

3.4.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with **SSPC PA 1**. **SSPC PA 1** methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces.

Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats.

- a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.
- b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.
- c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

3.4.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.4.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.4.4 Coating Systems

- a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table

Table

- b. Minimum Dry Film Thickness (DFT): Apply paints, primers and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
- c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
 - (1) One coat of primer.
 - (2) One coat of undercoat or intermediate coat.
 - (3) One topcoat to match adjacent surfaces.
- e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.5 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
- b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.
- c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
- d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.
- e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.
- f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.6 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate

temperature. Place materials defined as hazardous or toxic waste in designated containers.

3.7 PAINT TABLES

All DFT's are minimum values. Use only materials having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels.

3.7.1 EXTERIOR PAINT TABLES

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. Existing steel that has been spot-blasted to SSPC SP 6/NACE No.3:

1. Surface previously coated with alkyd or latex:

Waterborne Light Industrial Coating
MPI REX 5.1C-G5 (Semigloss)
Spot Primer: Intermediate: Topcoat:
MPI 79 MPI 163 MPI 163
System DFT: 5 mils

MPI REX 5.1C-G6 (Gloss)
Spot Primer: Intermediate: Topcoat:
MPI 79 MPI 164 MPI 164
System DFT: 5 mils

2. Surface previously coated with epoxy:

Waterborne Light Industrial
a. MPI REX 5.1L-G5 (Semigloss)
Spot Primer: Intermediate: Topcoat:
MPI 101 MPI 163 MPI 163
System DFT: 5 mils

MPI REX 5.1L-G6 (Gloss)
Spot Primer: Intermediate: Topcoat:
MPI 101 MPI 164 MPI 164
System DFT: 5 mils

Pigmented Polyurethane
b. MPI REX 5.1H-G6 (Gloss)
Spot Primer: Intermediate: Topcoat:
MPI 101 MPI 108 MPI 72
System DFT: 8.5 mils

B. Existing steel blast cleaned to SSPC SP 10/NACE No. 2:

1. Waterborne Light Industrial

MPI EXT 5.1R-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 101 MPI 108 MPI 163
System DFT: 8.5 mils

MPI EXT 5.1R-G6 (Gloss)
Primer: Intermediate: Topcoat:

PIER 1902 REPAIRS
AUTECH Site 1

Work Order No. 1302903
Andros Island, Bahamas

STEEL / FERROUS SURFACES

MPI 101 MPI 108 MPI 164
System DFT: 8.5 mils

2. Pigmented Polyurethane

MPI EXT 5.1J-G6 (Gloss)

Primer: Intermediate: Topcoat:
MPI 101 MPI 108 MPI 72
System DFT: 8.5 mils

-- End of Section --

SECTION 26 00 00.00 20

BASIC ELECTRICAL MATERIALS AND METHODS

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 in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D709 (2001; R 2007) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100 (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms

IEEE C2 (2012; Errata 2012; INT 1 2012; INT 2 2012; INT 3 2012) National Electrical Safety Code

IEEE C57.12.28 (2005; INT 3 2011) Standard for Pad-Mounted Equipment - Enclosure Integrity

IEEE C57.12.29 (2005) Standard for Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to certain sections of Division 02, EXISTING CONDITIONS, Division 11, EQUIPMENT and Division 13, SPECIAL CONSTRUCTION. This section applies to all sections of Division 26 and 33, ELECTRICAL and UTILITIES, of this project specification unless specified otherwise in the individual sections. This section has been incorporated into, and thus, does not apply to, and is not referenced in the following sections.

1.3 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as

defined in IEEE 100.

- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be 60 Hz, 480Y/277 volts and 208Y/120 volts secondary, three phase, four wire. Final connections to the power distribution system at the existing manhole and concrete bunker electrical receptacle locations shall be made by the Contractor as directed by the Contracting Officer.

1.5 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.5.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.6 QUALITY ASSURANCE

1.6.1 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.

1.6.2 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.

1.6.2.1 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.

1.6.2.2 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.

1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.8 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

- a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- c. Safety precautions.
- d. The procedure in the event of equipment failure.
- e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.9 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.10 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, **0.125 inch** thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be **one by 2.5 inches**. Lettering shall be a minimum of **0.25 inch** high normal block style.

1.11 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

- a. When the enclosure integrity of such equipment is specified to be in accordance with **IEEE C57.12.28** or **IEEE C57.12.29**, such as for pad-mounted transformers, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of **7 by 10 inches** with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal **2 inch** high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPS0710D72 or approved equal.

1.12 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to **IEEE C2**, **NFPA 70**, and requirements specified herein.

1.13 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which

shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in Section 09 90 00 PAINTS AND COATINGS and the section specifying the associated electrical equipment.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

-- End of Section --

SECTION 26 05 33

DOCKSIDE POWER CONNECTION STATIONS

01/07

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 A167 (2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- ASTM B33 (2010) Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
- ASTM D1535 (2012) Specifying Color by the Munsell System
- ASTM D2240 (2005; R 2010) Standard Test Method for Rubber Property - Durometer Hardness
- ASTM D709 (2001; R 2007) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- IEEE 100 (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
- IEEE 386 (2006; INT 1 2011) Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V
- IEEE C2 (2012; Errata 2012; INT 1 2012; INT 2 2012; INT 3 2012) National Electrical Safety Code
- IEEE C57.12.28 (2005; INT 3 2011) Standard for Pad-Mounted Equipment - Enclosure Integrity
- IEEE C57.13 (2008) Standard Requirements for Instrument Transformers

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

- NETA ATS (2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C12.1 (2008) Electric Meters Code for
Electricity Metering

ANSI C12.7 (2005) Requirements for Watthour Meter
Sockets

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2014; AMD 1 2013; Errata 1 2013; AMD 2
2013; Errata 2 2013) National Electrical
Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-C-24368/1 (1987; Rev B) Connector Assemblies; Plug,
Power Transfer, Shore to Ship and Ship to
Ship, 500 Volts, 500 Amperes, 60 Hertz,
Symbol Number 1160

MIL-C-24368/2 (1987; Rev B) Connector Assemblies;
Receptacle, and Receptacle-Cabled, Power
Transfer, Shore to Ship and Ship to Ship,
500 Volts, 500 Amperes, 60 Hertz, Symbol
Number 1161

MIL-DTL-24643/3 (2009; Rev E) Cable, Electrical, -20
Degrees C to +90 Degrees, 600 Volts, Types
LSSHOF, LSDHOF, LSTHOF, and LSFHOF

UNDERWRITERS LABORATORIES (UL)

UL 489 (2009; Reprint Jun 2011) Molded-Case
Circuit Breakers, Molded-Case Switches,
and Circuit-Breaker Enclosures

UL 50 (2007; Reprint Apr 2012) Enclosures for
Electrical Equipment, Non-environmental
Considerations

UL 94 (1996; Reprint Jan 2012) Standard for
Tests for Flammability of Plastic
Materials for Parts in Devices and
Appliances

1.2 RELATED REQUIREMENTS

Section 26 08 00 APPARATUS INSPECTION AND TESTING applies to this section,
with the additions and modifications specified herein.

1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms
used in these specifications, and on the drawings, shall be as defined in
IEEE 100.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

600 V Power Connection Station; G

Ship Service Emergency Trip Panel; G

Include wiring diagrams and installation details of equipment indicating layout and arrangement, control panels, accessories, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. Submittals shall include the nameplate data, size, and capacity. Submittals shall also include applicable federal, military, industry, and technical society publication references.

SD-03 Product Data

600 V Single Pole Connectors; G

Industrial Service Auxiliary Devices; G

Metering Accessories; G

Flexible Power Cable; G

SD-06 Test Reports

Paint Coating System; G

600 V Single Pole Connector Compatibility Tests; G

600 V Single Pole Connector Torque Test; G

Power Receptacle and Plug Assembly Tests; G

Acceptance Checks and Tests; G

SD-10 Operation and Maintenance Data

600 V Power Connection Station, data package 5; G

Ship Service Emergency Trip Panel; G

1.5 QUALITY ASSURANCE

1.5.1 Drawings

Furnish drawings that include, but are not limited to, the following:

- a. One-line diagram including breakers, fuses, current transformers, and meters.
- b. Outline drawings including front elevation, section views, footprint, and overall dimensions.
- c. Markings and NEMA nameplate data, including fuse information (manufacturer's name, catalog number, and ratings).
- d. Circuit breaker type, interrupting rating, and trip devices, including available settings.
- e. Three-line diagrams and elementary diagrams and wiring diagrams with terminals identified, and indicating prewired interconnections between items of equipment and the interconnection between the items.
- f. Manufacturer's instruction manuals and published time-current curves (on full size logarithmic paper) of the main secondary breaker and largest secondary feeder device. These shall be used by the designer of record to provide breaker settings that will insure protection and coordination are achieved.

1.5.2 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.

1.5.3 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 and the component parts of the item shall be the products of the same manufacturer.

1.5.3.1 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.

1.5.3.2 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.

1.6 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.7 MAINTENANCE

1.7.1 Operation and Maintenance Data

Submit Operation and Maintenance Manuals in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 600 V POWER CONNECTION STATION

Ship service and industrial service power connection station assemblies shall include enclosure, power receptacles, auxiliary devices, metering accessories, and related wiring. Each power connection station shall have the number of circuits indicated and each circuit shall provide three-phase, three-wire service.

2.1.1 Enclosure Integrity

Enclosure shall be UL 50 listed, type 3R, fabricated entirely of ASTM A167 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. Ventilating or similar openings in equipment shall be designed so that foreign objects inserted through these openings are deflected from energized parts. Paint enclosure ASTM D1535 light grey No. 61. Paint coating system shall comply with IEEE C57.12.28.

2.1.2 600 V Single Pole Connectors

Insulated connectors shall be rated for 600 volts, 690 amperes, 60 hertz, single pole, continuous duty operation. Connectors shall be compatible with Leviton and Duraline cam-type positive latching ball nose connectors. Insulation and protective caps shall be ethylene propylene thermoplastic rubber (EPTR) colored black phase A, white phase B, and red phase C, conforming to the following:

- a. Constant Service Temperature Range: minus 81 degrees F to 275 degrees F
- b. Flammability: UL 94 HB Rated
- c. Electrical: UL Relative Thermal Index (RTI): 212 degrees F) minimum
- d. Durometer Hardness: ASTM D2240, 55 - 65A

2.1.2.1 Panel Mount Connectors

Provide 15 degree angled, panel mount female connectors (receptacles) with threaded stud terminations. Each receptacle shall be provided with a

protective cap attached via wirelon. Panel Mount Connectors (receptacles) indicated to have electric interlock switches shall have a thru-center plunger that engages a single-pole double-throw, water-tight aluminum housed "roller lever actuated" switch upon insertion of a connector plug. UL listed switch shall be electrically rated for 100,000 cycles at 10 amps, 125/250 VAC, and mechanically rated for 20,000,000 cycles.

2.1.2.2 Cable Mount In-Line Connectors

Male and female cable mount in-line connectors (plugs) shall be designed for terminating on 500 kcmil cables with a crimp-type connection. The connectors shall lock together so that they can not twist or turn loose unless a push button release mechanism is engaged. The insulated sleeve shall be mechanically secured to the connector contacts to give a minimum of 700 pounds shear force.

2.1.3 600 V Power Receptacle

Rated for 500 volts, 500 amperes, 60 hertz, three-pole, continuous duty operation. Power receptacle assembly shall conform to MIL-C-24368/2. Provide receptacle assembly with factory potted cable pigtails. Cable pigtails shall be a minimum of 4 feet in length and 3-1/c Type LSSHOF-500 cables conforming to MIL-DTL-24643/3. Provide each receptacle with provisions for interlocking the receptacle with its respective feeder circuit breaker so that breaker will trip automatically if an attempt is made to remove the plug from the receptacle and when the receptacle cover is opened.

2.1.4 Industrial Service Auxiliary Devices

Provide the following auxiliary devices for each industrial service power connection station circuit.

2.1.4.1 Shunt Trip Pushbutton Control

Provide NEMA Q600 rated, 30 millimeter, heavy duty industrial type, normally-open, momentary, red pushbutton behind a spring return cover, each circuited to shunt trip one circuit breaker.

2.1.4.2 Fusing

Provide a fuse block mounted in the enclosure containing one fuse per phase to protect the voltage input to the watt hour meter and circuit breaker shunt trip.

2.1.4.3 Circuit Breaker

UL 489. 100 percent rated, non-fused, current limiting, molded case circuit breaker, 480 VAC, 400 amperes, 3-pole, 200 kaic short circuit current interrupting rating, with a 480 V shunt trip.

2.1.4.4 Circuit Breaker Operating Mechanism

Provide flexible cable mechanism with flange mounted disconnect handle for each circuit breaker as indicated.

2.1.5 Metering Accessories

Provide watt-hour meter and current transformers for each industrial

service power connection station circuit.

2.1.5.1 Watt-hour Meter

Provide a socket-mounted, electronic programmable outdoor watt-hour meter mounted on door of cabinet. Meter shall either be programmed at the factory or shall be programmed in the field. When field programming is performed, turn field programming device over to the Contracting Officer at completion of project. Meter shall be coordinated to system requirements and conform to ANSI C12.1.

- a. Design: Provide watt-hour meter for use on a three-phase, 3-wire, 480 volt system with 3 current transformers. Include necessary KYZ pulse initiation hardware for Energy Monitoring and Control System (EMCS).
- b. Class: 20; Form: 45S, accuracy: plus or minus 1.0 percent; Finish: Class II
- c. Cover: Polycarbonate and lockable to prevent tampering and unauthorized removal.
- d. Kilowatt-hour Register: Five digit electronic programmable type
- e. Demand Register:
 - 1. Provide solid state.
 - 2. Meter reading multiplier: Indicate multiplier on the meter face.
 - 3. Demand interval length: Shall be programmed for 15 minutes with rolling demand up to six subintervals per interval.
- f. Socket: ANSI C12.7. Provide NEMA Type 3R, box-mounted socket, ringless, having manual circuit-closing bypass and having jaws compatible with requirements of the meter. Cover unused hub openings with blank hub plates. Provide manufacturers standard enclosure color unless otherwise indicated.

2.1.5.2 Current Transformers

IEEE C57.13. Provide butyl-molded window type current transformers with 600 volt insulation, 10 kV BIL. Provide three current transformers with characteristics listed in the following table.

<u>CT Ratio</u>	<u>RF</u>	<u>Meter Accuracy Class</u>
400/5	4.0	0.3 thru B-0.2

2.1.5.3 Watt-hour Meter/Current Transformer Cabinet

Cabinet shall be NEMA 3R fabricated of 12 gauge stainless steel and shall have hinged front door with vault handle. Paint enclosure ASTM D1535 light grey No. 61. Paint coating system shall comply with IEEE C57.12.28.

2.1.6 Enclosure Configurations

- a. Enclosures for ship service stations shall be configured as indicated. All three receptacles of the same circuit shall be mounted on a common

plate. Each plate shall have handles on both ends and shall be bolted to the front cover so that it can be removed from the front without disconnecting the incoming circuit power cables. Each section shall include a full width ground bus. Each section shall have a hinged pad lockable door. Provide nameplates to identify each phase designation and each circuit number as indicated.

- b. Enclosures for industrial service stations shall be configured as indicated. All three receptacles of the same circuit shall be mounted on a common plate. Each plate shall have handles on both ends and shall be bolted to the front cover so that it can be removed from the front without disconnecting the power cable. Include a full width internal ground bus and a ground bus with four NEMA spaced lug mounting holes on the exterior as indicated. Mount the circuit breakers, and current transformers on inside of enclosure. The handle for the circuit breaker operating mechanism shall be located on the rear flange. Mount watt-hour meters on rear hinged covers. Mount shunt trip pushbuttons on side cover as indicated.

2.2 5 KV POWER CONNECTION STATION

5 kV power connection station assemblies shall include enclosure, 5 kV power receptacles, dead-front high-voltage deadbreak junctions, and insulated high-voltage connectors. Each power connection station shall have the number of circuits indicated and each circuit shall provide three-phase, three-wire service.

2.2.1 Enclosure Integrity

IEEE C57.12.28 fabricated entirely of ASTM A167 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 with padlockable two-door front and removable center post. Side and rear covers shall be bolt-on. Doors shall be 36 inch wide with full height continuous hinge and door stops to allow doors to be secured open at 90 degrees. Paint enclosure ASTM D1535 light grey No. 61. Paint coating system shall comply with IEEE C57.12.28.

2.2.2 5 kV Cable Couplers

Provide high voltage cable couplers rated for 15,000 volts, 500 amperes, 60 hertz, three-phase, continuous duty operation, and configured with three insulated phase contacts, one ground contact, and one isolated ground check contact. Couplers shall be aluminum with epoxy powder coating and include hypalon gaskets and seals, all stainless steel hardware and three-bolt quick flip or 90 degree turn connection feature. Receptacles shall be equipment mount type with provisions for terminating 750 kcmil cables and include Live End Covers. Provide one cable mount type plug with weatherproof cover and provisions for terminating 750 kcmil cables for each receptacle. Turn plugs over to the contracting officer. Coupler pairs shall have provisions for padlocking have a mechanical interlock that allows key release only after the coupler pair is locked.

- a. Voltage ratings: Withstand voltages shall comply with IEEE 386 voltage ratings and characteristics of connectors rated 14.4 kV rms phase-to-phase.
- b. Current ratings: Short-time current ratings shall comply with IEEE 386 current ratings and characteristics of 600 A connectors.

2.2.3 Separable Insulated Connectors and Accessories

IEEE 386. 5 kV, 95 kV BIL.

2.2.3.1 Deadbreak Junctions

Provide 600 A deadbreak junctions with two interfaces. Brackets shall be stainless steel.

2.2.3.2 Insulated High-Voltage Connectors

Provide 600 Ampere deadbreak connectors.

2.2.4 Flexible Power Cable

ASTM B33, NEMA WC 58/ICEA S-75-381. Flexible power cable Type SH, 5 kV single conductor.

2.2.5 Enclosure Configuration

Enclosures shall be configured as indicated. Include a full width ground bus. A power cable terminated with a 600-ampere deadbreak connector shall connect each phase of each receptacle to one of the 600-ampere one-piece deadbreak apparatus bushings of a deadbreak junction. The remaining apparatus bushing for each deadbreak junction shall be used for connection of the incoming circuit power cables terminated with 600-ampere deadbreak connectors. Provide nameplates to identify each phase designation and each circuit number.

2.3 SHIP SERVICE EMERGENCY TRIP PANEL

Provide a stainless steel NEMA 3R cabinet sized as necessary with a color red pushbutton cover mounted behind the front door. Pushbutton shall be rated for 10 amperes continuous at 600 volts, heavy duty, watertight, momentary contact, marked "SHIP SERVICE EMERGENCY TRIP".

2.4 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.5 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

2.6 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment having a nominal rating exceeding 600 volts.

- a. When the enclosure integrity of such equipment is specified to be in accordance with **IEEE C57.12.28**, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPS0710D72 or approved equal.

2.7 SOURCE QUALITY CONTROL

2.7.1 Paint Coating System

Submit **IEEE C57.12.28** paint coating system performance requirement tests.

2.7.2 600 V Single Pole Connector Compatibility Tests

Conduct the following tests in the sequence noted on a male in-line connector mated with a Leviton or Duraline female in-line connector and a female in-line connector mated with a Leviton or Duraline male in-line connector with each connector terminated on a bare 500 kcmil copper conductor. After completion of the tests, inspect assemblies. There shall be no evidence of damage to the connectors. Assemblies shall be satisfactory for immediate return to service at full ratings without maintenance or repair. Contracting Officer or his designated representative will witness the tests. A factory-certified report of the specified tests previously performed on identical units of each rating will be acceptable.

2.7.2.1 Impact Test

Drop each mated connector set in a horizontal position from a height of 36-inches onto a concrete floor 50 times.

2.7.2.2 Pull Strain Test

Apply a 500-lb straight pull on each mated connector set for a duration of 5-minutes.

2.7.2.3 Shear Test

Apply a 100-lb perpendicular pull on each mated connector set for a duration of 5-minutes.

2.7.2.4 Torque Test

Apply a 100 ft-lb torque on each mated connector set for a duration of 5-minutes.

2.7.2.5 Heat Rise Test

Apply 400 amperes through each mated connector set for duration of 30-minutes. Record temperature rise at surface of each mated connector set via infrared scanning equipment. Temperature rise shall be less than 45 degree C.

2.7.2.6 Moisture Resistance Test

Subject the mated connectors to a water spray maintained at 5-psi, with a collection rate of 18-in/hr, at a distance of 5-feet, for one hour. Verify that no water penetrated the connection.

2.7.2.7 Dielectric Voltage Withstand Test

Wrap the mated connectors in conductive foil and apply a test potential of 2200 VAC between the conductor and the foil for a period of 5-minutes. Dielectric breakdown shall constitute a failed test.

2.7.2.8 Insulation Resistance Test

Wrap the mated connectors in conductive foil and using a Megger insulation resistance tester with an open circuit output of 500 VDC, measure the insulation resistance between the conductor and foil. Resistance measurement shall be greater than 100 Megohms.

2.7.3 600 V Single Pole Connector Torque Test

Conduct a torque test on three male and three female cable mount in-line connectors as follows: With the metal connector part rigidly secured, apply a rotating (twisting) force of 700 lbs on the insulating sleeve. The insulating sleeve shall not break free and spin around the connector metal part. Contracting Officer or his designated representative will witness the tests. A factory-certified report of the specified tests previously performed on identical units of each rating will be acceptable.

2.7.4 Power Receptacle and Plug Assembly Tests

Conduct design, production, and quality assurance tests, as required by MIL-C-24368/1 and MIL-C-24368/2, at the manufacturer's plant during fabrication and assembly of power receptacle and plug assemblies. After completion of tests, inspect assemblies. There shall be no evidence of damage to the receptacle or plug assembly. Assemblies shall be satisfactory for immediate return to service at full ratings without maintenance or repair. Contracting Officer or his designated representative will witness the tests. A factory-certified report of the specified tests previously performed on identical units of each rating will be acceptable.

2.7.5 5 kV Cable Coupler Design Tests

Furnish reports which include results of AC withstand voltage, DC withstand voltage, impulse withstand voltage, short time current, and current cycling design tests performed in accordance with IEEE 386.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

3.2 POWER CONNECTION STATION GROUNDING

Ground in accordance with NFPA 70. Maximum resistance from assembly to ground shall be 3 ohms.

3.3 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in Section 09 90 00 PAINTS AND COATINGS.

3.4 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.5 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.6 FIELD QUALITY CONTROL

3.6.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.6.1.1 Power Connection Stations and Control Panels

- a. Visual and mechanical inspection performed in accordance with inspection and test procedures for Switchgear and Switchboard Assemblies.
- b. System function tests.

3.6.1.2 Current Transformers

- a. Visual and mechanical inspection in accordance with inspection and test procedures for Instrument Transformers.
- b. Electrical tests in accordance with inspection and test procedures for Instrument Transformers.

3.6.1.3 Watt-hour Meters

- a. Visual and mechanical inspection in accordance with inspection and test procedures for Metering Devices.
- b. Electrical tests in accordance with inspection and test procedures for Metering Devices.

3.6.1.4 Circuit Breakers

- a. Visual and mechanical inspection in accordance with inspection and test procedures for Circuit Breakers, Air, Insulated-Case/Molded-Case.
- b. Perform Electrical tests in accordance with inspection and test procedures for Circuit Breakers, Air, Insulated-Case/Molded-Case.

3.7 DEMONSTRATION

Upon completion of the work and at a time approved by the Contracting Officer, the Contractor shall provide instructions by a qualified instructor to the Government personnel in the proper operation and maintenance of the equipment. Government personnel shall receive training comparable to the equipment manufacturer's factory training. The duration of instruction shall be for not less than one 8 hour working day for instruction of operating and maintenance personnel.

-- End of Section --

SECTION 26 08 00

APPARATUS INSPECTION AND TESTING
08/08

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 within the text by the basic designation only.

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS (2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

1.2 RELATED REQUIREMENTS

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, the "DOR" designation following the "G" designation identifies that the submittal shall be reviewed by the Designer of Record (DOR). Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Acceptance tests and inspections; G, DOR

SD-07 Certificates

Qualifications of organization, and lead engineering technician; G, DOR

Acceptance test and inspections procedure; G, DOR

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and generation equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first tier subcontractor. No work required by this section of the specification shall be performed by a second tier subcontractor.

- a. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials,

devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with **NETA ATS**.

- b. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

1.4.2 Acceptance Tests and Inspections Reports

Submit certified copies of inspection reports and test reports. Reports shall include certification of compliance with specified requirements, identify deficiencies, and recommend corrective action when appropriate. Type and neatly bind test reports to form a part of the final record. Submit test reports documenting the results of each test not more than 10 days after test is completed.

1.4.3 Acceptance Test and Inspections Procedure

Submit test procedure reports for each item of equipment to be field tested at least 45 days prior to planned testing date. Do not perform testing until after test procedure has been approved.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 ACCEPTANCE TESTS AND INSPECTIONS

Testing organization shall perform acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with **NETA ATS**, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in **NETA ATS** are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Contracting Officer shall be notified at least 14 days in advance of when tests will be conducted by the testing organization. Perform acceptance tests and inspections on applicable equipment and systems specified in the following sections:

- a. Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION
- b. Section 26 23 00 SWITCHBOARDS AND SWITCHGEAR

3.2 SYSTEM ACCEPTANCE

Final acceptance of the system is contingent upon satisfactory completion

of acceptance tests and inspections.

3.3 PLACING EQUIPMENT IN SERVICE

A representative of the approved testing organization shall be present when equipment tested by the organization is initially energized and placed in service.

-- End of Section --

SECTION 33 11 00

WATER DISTRIBUTION
02/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	(2008; Errata 2010) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110/A21.10	(2012) Ductile-Iron and Gray-Iron Fittings for Water
AWWA C111/A21.11	(2012) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C153/A21.53	(2011) Ductile-Iron Compact Fittings for Water Service
AWWA C203	(2008) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
AWWA C500	(2009) Metal-Seated Gate Valves for Water Supply Service
AWWA C502	(2005) Dry-Barrel Fire Hydrants
AWWA C508	(2009; Addenda A 2011) Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS
AWWA C509	(2009) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(2010) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	(2005; Errata 2005) Standard for Disinfecting Water Mains
AWWA C701	(2012) Standard for Cold-Water Meters - Turbine Type for Customer Service
AWWA C706	(2010) Direct-Reading, Remote-Registration Systems for Cold-Water Meters
AWWA C900	(2007; Errata 2008) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated

Fittings, 4 In. Through 12 In. (100 mm
Through 300 mm), for Water Distribution

AWWA C901 (2008) Polyethylene (PE) Pressure Pipe and
Tubing, 1/2 In. (13mm) Through 3 In. (76
mm), for Water Service

ASME INTERNATIONAL (ASME)

ASME B18.2.2 (2010) Standard for Square and Hex Nuts

ASME B18.5.2.1M (2006; R 2011) Metric Round Head Short
Square Neck Bolts

ASME B18.5.2.2M (1982; R 2010) Metric Round Head Square
Neck Bolts

ASTM INTERNATIONAL (ASTM)

ASTM A307 (2010) Standard Specification for Carbon
Steel Bolts and Studs, 60 000 PSI Tensile
Strength

ASTM A563 (2007a) Standard Specification for Carbon
and Alloy Steel Nuts

ASTM D2774 (2012) Underground Installation of
Thermoplastic Pressure Piping

ASTM D2855 (1996; R 2010) Standard Practice for
Making Solvent-Cemented Joints with
Poly(Vinyl Chloride) (PVC) Pipe and
Fittings

ASTM D3139 (1998; R 2011) Joints for Plastic Pressure
Pipes Using Flexible Elastomeric Seals

ASTM F402 (2005; R 2012) Safe Handling of Solvent
Cements, Primers, and Cleaners Used for
Joining Thermoplastic Pipe and Fittings

ASTM F477 (2010) Standard Specification for
Elastomeric Seals (Gaskets) for Joining
Plastic Pipe

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 704 (2012) Standard System for the
Identification of the Hazards of Materials
for Emergency Response

UNDERWRITERS LABORATORIES (UL)

UL 246 (2011; Reprint Aug 2011) Hydrants for
Fire-Protection Service

UL 262 (2004; Reprint Oct 2011) Gate Valves for
Fire-Protection Service

UL 312 (2010) Check Valves for Fire-Protection Service

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3 (1992) Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (Nominal Diameters 4-36 Inches)

1.2 DESIGN REQUIREMENTS

1.2.1 Water Service Lines

Provide water service lines indicated as 6 inch lines from existing water the points indicated. Water service lines shall be polyvinyl chloride (PVC) plastic pipe or ductile-iron or steel pipe. Provide water service line appurtenances as specified and where indicated. Submit design calculations of water piping.

1.3 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 SUBMITTAL PROCEDURES:

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Hydrants

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-05 Design Data

Design calculations of water piping

SD-06 Test Reports

Bacteriological Disinfection.

Test results from commercial laboratory verifying disinfection

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling
Lining

Fire hydrants

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 production control tests have been performed at the intervals or frequency specified in the 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.

SD-08 Manufacturer's Instructions

Delivery, storage, and handling

Installation procedures for water piping

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.4.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

1.4.2.1 Coated and Wrapped Steel Pipe

Handle steel pipe with coal-tar epoxy coating in accordance with the provisions of [AWWA C203](#).

1.4.2.2 Polyethylene (PE) Pipe, Fittings, and Accessories

Handle PE pipe, fittings, and accessories in accordance with [AWWA C901](#).

1.4.2.3 Miscellaneous Plastic Pipe and Fittings

Handle Polyvinyl Chloride (PVC) pipe and fittings in accordance with the manufacturer's recommendations. Store plastic piping and jointing materials that are not to be installed immediately under cover out of direct sunlight.

Storage facilities shall be classified and marked in accordance with [NFPA 704](#) with classification as indicated in [NFPA 704](#).

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

For underground applications 12 inches or less in diameter shall be PVC and under the pier side shall be stainless steel type 316.

2.1.1.1 Polyvinyl Chloride (PVC) Plastic Piping

- a. Pipe and Fittings: Pipe, [AWWA C900](#), shall be plain end or gasket bell end, Pressure Class 150 (DR 18) with cast-iron-pipe-equivalent OD.
- b. Fittings for PVC pipe: Fittings shall be gray iron or ductile iron, [AWWA C110/A21.10](#) or [AWWA C153/A21.53](#), and have cement-mortar [lining](#), [AWWA C104/A21.4](#), standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph. Iron fittings and specials shall be cement-mortar lined in accordance with [AWWA C104/A21.4](#).
- c. Joints and Jointing Material: Joints for pipe shall be push-on joints, [ASTM D3139](#). Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints [ASTM D3139](#), or compression-type joints/mechanical joints, [ASTM D3139](#) and [AWWA C111/A21.11](#). Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, [ASTM F477](#). Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, [AWWA C111/A21.11](#), respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in [ASTM D3139](#).

2.1.2 Valves, Hydrants, and Other Water Main Accessories

2.1.2.1 Gate Valves on Buried Piping

[AWWA C500](#), [AWWA C509](#), or [UL 262](#). Unless otherwise specified, valves conforming to: (1) [AWWA C500](#) shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for

the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends or resilient-seated gate valves 3 to 12 inches in size, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 250 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to sleeve-type mechanical coupling. Valve ends and gaskets for connection to sleeve-type mechanical coupling shall conform to the applicable requirements specified for the joint or coupling. Valves shall be of one manufacturer.

2.1.2.2 Gate Valves in Valve Pit(s) and Aboveground Location

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with solid-wedge gates and flanged ends, (2) AWWA C509 shall be nonrising stem type with flanged ends, and (3) UL 262 shall be inside-screw type, shall have solid or one-piece type gate and flanged ends, and shall be designed for a hydraulic working pressure of 250 psi. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves 2-1/2 inch size shall be nonrising stem type or inside-screw type. Valves 2-1/2 inch size shall have solid-wedge gates or solid or one-piece type gates. Provide valves with handwheels that open by counterclockwise rotation of the valve stem. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. Valves shall be of one manufacturer.

2.1.2.3 Check Valves

Swing-check type, AWWA C508 or UL 312. Valves conforming to: (1) AWWA C508 shall have stainless steel body and cover and flanged ends, and (2) UL 312 shall have stainless steel body and cover, flanged ends, and designed for a working pressure of 150 psi. Materials for UL 312 valves shall conform to the reference standards specified in AWWA C508. Valves shall have clear port opening. Valves shall be spring-loaded.

2.1.2.4 Fire Hydrants

Dry-barrel type. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.

- a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6 inch inlet, 5 1/4 inch valve opening, one 4 1/2 inch pumper connection, and two 2 1/2 inch hose connections. Inlet shall have mechanical-joint end only; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502.

2.1.2.5 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes

shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Cast-iron boxes shall have a minimum cover and wall thickness of $3/16$ inch. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be $5-1/4$ inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.1.2.6 Valve Pits

Valve pits shall be constructed at locations indicated or as required above and in accordance with the details shown.

2.1.2.7 Turbine Type Meters

Turbine type meters shall conform to AWWA C701 Class I. The main casing shall be bronze with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct reading remote register designed in accordance with AWWA C706. Meters shall comply with the accuracy and capacity requirements of AWWA C701.

2.1.2.8 Meter Vaults

Large meters shall be installed in reinforced concrete vaults manufactured in accordance with Section 03 41 33 PRECAST STRUCTURAL PRETENSIONED. Large meters shall be installed in reinforced concrete vaults in accordance with the details shown on the drawings.

2.1.2.9 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For stainless steel pipe, the middle ring shall be of stainless steel. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type, ASTM A307, Grade A, with nuts, ASTM A563, Grade A; or round-head square-neck type bolts, ASME B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be $5/8$ inch in diameter. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint. Mechanical couplings shall provide a tight flexible joint under all reasonable conditions, such as pipe movements caused by expansion, contraction, slight setting or shifting in the ground, minor variations in trench gradients, and traffic vibrations. Couplings shall be of strength not less than the adjoining pipeline.

2.1.2.10 Tracer Wire for Nonmetallic Piping

Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.2 WATER SERVICE LINE MATERIALS

2.2.1 Piping Materials

2.2.1.1 Plastic Piping

Comply with "Polyvinyl Chloride (PVC) Plastic Piping" subparagraph under paragraph "Water Distribution Main Materials".

2.2.1.2 Stainless Steel Piping

Comply with utility notes in the drawings.

2.2.1.3 Insulating Joints

Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

2.2.2 Water Service Line Appurtenances

2.2.2.1 Check Valves

Check valves shall be designed for a minimum working pressure of 150 psi or as indicated. Valves shall have a clear waterway equal to the full nominal diameter of the valve. Valves shall open to permit flow when inlet pressure is greater than the discharge pressure, and shall close tightly to prevent return flow when discharge pressure exceeds inlet pressure. The size of the valve, working pressure, manufacturer's name, initials, or trademark shall be cast on the body of each valve. Valves 2 inches and larger shall be outside lever and spring type.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Location of Water Lines

Do not lay water lines in the same trench with fuel lines.

a. Water Piping Installation Parallel With Sewer Piping

Normal Conditions: Lay water piping at least 10 feet horizontally from a sewer or sewer manhole whenever possible. Measure the distance edge-to-edge.

Unusual Conditions: When local conditions prevent a horizontal separation of 10 feet, the water piping may be laid closer to a sewer or sewer manhole provided that:

- (1) The bottom (invert) of the water piping shall be at least 18 inches above the top (crown) of the sewer piping.

- (2) Where this vertical separation cannot be obtained, the sewer piping shall be constructed of AWWA-approved water pipe and pressure tested in place without leakage prior to backfilling. Approved waste water disposal method shall be utilized.
- (3) The sewer manhole shall be of watertight construction and tested in place.

b. Installation of Water Piping Crossing Sewer Piping

- (1) Normal Conditions: Water piping crossing above sewer piping shall be laid to provide a separation of at least 18 inches between the bottom of the water piping and the top of the sewer piping.
- (2) Unusual Conditions: When local conditions prevent a vertical separation described above, use the following construction:
 - (a) Sewer piping passing over or under water piping shall be constructed of AWWA-approved ductile iron water piping, pressure tested in place without leakage prior to backfilling.
 - (b) Water piping passing under sewer piping shall, in addition, be protected by providing a vertical separation of at least 18 inches between the bottom of the sewer piping and the top of the water piping; adequate structural support for the sewer piping to prevent excessive deflection of the joints and the settling on and breaking of the water piping; and that the length, minimum 20 feet, of the water piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer piping.

- c. Sewer Piping or Sewer Manholes: No water piping shall pass through or come in contact with any part of a sewer manhole.

3.1.1.2 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation.

Depth of cover over top of pipe shall not be less than 3 feet.

3.1.1.3 Installation of Tracer Wire

Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

3.1.1.4 Penetrations

Pipe passing through walls of valve pits and structures shall be provided with ductile-iron or Schedule 40 steel wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

3.1.1.5 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

3.1.2 Special Requirements for Installation of Water Service Piping

3.1.2.1 Installation of Metallic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of AWWA C600 for pipe installation, unless otherwise specified.

a. Jointing:

- (1) Flanged Joints: Make flanged joints up tight, taking care to avoid undue strain on flanges, valves, fittings, and accessories.

3.1.2.2 Installation of Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D2774 and ASTM D2855, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F402.

- ##### a. Jointing: Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.2.3 Location of Meters

Vaults shall be installed at the locations shown on the drawings. The meters shall be centered in the vaults to allow for reading and ease of removal or maintenance.

3.1.3 Disinfection

Prior to disinfection, obtain Contracting Officer approval of the proposed method for disposal of waste water from disinfection procedures. Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the

range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the [test results](#) prior to the new water piping being placed into service. Disinfection of systems supplying nonpotable water is not required.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

Prior to hydrostatic testing, obtain Contracting Officer approval of the proposed method for disposal of waste water from hydrostatic testing. The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing, except that water and electric power needed for field tests will be furnished by the Contracting Officer. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

3.2.2 Testing Procedure

Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains and water service lines in accordance with the requirements of [AWWA C600](#) for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on joints shall not exceed the amounts given in [AWWA C600](#); no leakage will be allowed at joints made by any other method. Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of [UBPPA UNI-B-3](#) for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in [UBPPA UNI-B-3](#), except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed. Test steel water mains in accordance with applicable requirements of [AWWA C600](#) for hydrostatic testing. The amount of leakage on steel pipelines with rubber-gasketed bell-and-spigot joints shall not exceed [20 gallons per 24 hours per inch](#) of pipe diameter per mile of pipeline; no leakage will be allowed at joints made by any other method. Repair of welded joints to stop leakage shall be done by welding only. Test water service lines in accordance with applicable requirements of [AWWA C600](#) for hydrostatic testing. No leakage will be allowed at plastic pipe joints or flanged joints.

3.2.3 Special Testing Requirements

For pressure test, use a hydrostatic pressure [50 psi](#) greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than [2 inches](#) in diameter, hydrostatic test pressure shall be not less than [200 psi](#). Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at

the same time and at the same test pressure as the pressure test.

3.3 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --

SECTION 35 59 13.19

ARCH-TYPE RUBBER MARINE FENDERS

04/06

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.

ASME INTERNATIONAL (ASME)

ASME B18.21.1 (2009) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A479/A479M (2012) Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

ASTM D1149 (2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber

ASTM D2000 (2012) Standard Classification System for Rubber Products in Automotive Applications

ASTM D2240 (2005; R 2010) Standard Test Method for Rubber Property - Durometer Hardness

ASTM D395 (2003; R 2008) Standard Test Methods for Rubber Property - Compression Set

ASTM D412 (2006a; E 2008; R 2008) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

ASTM D471 (2012a) Standard Test Method for Rubber Property - Effect of Liquids

ASTM D573 (2004; R 2010) Standard Test Method for Rubber - Deterioration in an Air Oven

ASTM D575 (1991; R 2012) Rubber Properties in Compression

ASTM D624 (2000; R 2012) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

ASTM F593 (2002; R 2008; E 2012) Stainless Steel Bolts, Hex Cap Screws, and Studs

ASTM F594 (2009; E 2011) Standard Specification for

Stainless Steel Nuts

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-PRF-907

(2004; Rev F) Antiseize Thread Compound,
High Temperature

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. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fender

Hardware

SD-05 Design Data

Reaction--energy--percent compression curve

Dimension

Fender material specifications

Design calculations

SD-06 Test Reports

Minimum Tensile Strength

Shore Hardness (Durometer)

Modulus at 400 Percent Elongation

Maximum Compression Set

Tear Resistance

Minimum Elongation

Ozone Resistance

Low Temperature Impact Resistance

Water Absorption

Heat Resistance

Compression Deflection Resistance

Fender Compression Test

Angular Fender Compression Test

Tests shall have been performed on the specified fender within

the past 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, manufacture and make as that proposed to be supplied.

SD-08 Manufacturer's Instructions

Installation Instructions

1.3 DELIVERY HANDLING AND STORAGE

Fenders shall be undamaged when delivered and shall be handled and stored so as to prevent damage, such as bending or abrading end fittings, cutting of rubber, or damage to coating of hardware. Protect fenders from exposure to damaging liquids, oils, greases and extended exposure to sunlight.

PART 2 PRODUCTS

2.1 CONFIGURATION

Fender shall be extruded and shall be continuous in the length indicated. The fenders shall have a truncated "A" cross section shape and be attached to the structure at the base, the widest dimension, of the arch. The connecting hardware shall be fully exposed. No encased hardware or molded fenders shall be allowed. The fender and hardware shall be designed and factory tested to the loads per linear foot of fender specified in paragraph entitled "PERFORMANCE," for angles of approach of 0 and 15 degrees. Fender anchor bolts and method of anchorage shall be of the size and spacing required by the manufacturer's design and testing; however, the size and spacing of anchor bolts indicated on the drawings shall be construed to be the minimum required, unless exceeded by the requirements of the fender manufacturer's design.

2.2 ELASTOMER

The elastomer shall be the ethylene propylene dimonomer (EPDM), as specified in ASTM D2000, with the following properties:

<u>ELASTOMER PROPERTY REQUIREMENTS</u>	
Minimum Tensile Strength (ASTM D412)	16 Mpa 2320 psi
Shore Hardness(Durometer) (ASTM D2240)	Shore A
Modulus at 350 Percent Elongation (ASTM D412)	6.2 Mpa 900 psi
Maximum Compression Set (ASTM D395 Method B, Maximum Percent 22 Hr. at 158 Degrees F)	30 Percent
Tear Resistance (ASTM D624; DIE B Min. 150 lb/in)	400 lb/in 70 kN/m

<u>ELASTOMER PROPERTY REQUIREMENTS</u>	
Minimum Elongation (ASTM D412)	350 Percent
Ozone Resistance (ASTM D1149 Exposure Method B; 70h Bent Loop at 100 Degrees F; 50pphm) Method B1 100 hr	No Cracks
Water Absorption (ASTM D471 Method B; 70h 212 Degrees F; Volume Change <u>plus</u> 5 Percent	10.0 Percent
Heat Resistance (ASTM D573; 70h at 212 Degrees F Ch Tensile, Elong. minus 25 Percent, Hardness plus 10	Shall exceed requirements
Compression Deflection Resistance (ASTM D575 Method B; 3 S Dwell at 73 Degrees F	Shall exceed requirements

2.3 HARDWARE

2.3.1 Plates and Angles

ASTM A479/A479M, Type 316L stainless steel for plates, angles, and miscellaneous hardware required to attach the fenders to the structure.

2.3.2 Nuts, Bolts, and Washers

ASTM F593 or ASTM F594, Group 2 (316 alloy) stainless steel for nuts and bolts. ASME B18.21.1 for washers, except fabricate washers of 316 alloy stainless steel.

2.3.3 Antiseize Compound

MIL-PRF-907.

2.4 PERFORMANCE

When vertically compressed by a plate extending the full length and width of a one foot section of the fender, the fender shall absorb 29,000 foot pounds of energy plus 10 percent when 48 percent compressed (i.e., to a dimension of 52 percent of its original height) with a corresponding load of not more than 25,700 pounds plus 10 percent.

2.4.1 FENDER COMPRESSION TEST

Compress fender along its longitudinal axis between two parallel flat plate surfaces to a compressed dimension of 48 percent of its original height. Record load and the corresponding deflection at 1/4 inch increments and plot as a graph of load versus deflection. The Load-Deflection curve shall then be integrated to generate an Energy-Deflection curve for the fender. After compression of the fender to 48 percent of its original height, the fender shall be rebound to 98 percent of its original height within ten

minutes after the load is removed.

2.4.2 ANGULAR FENDER COMPRESSION TEST

Compress fender along its longitudinal axis between two flat plate surfaces, at an angle of 15 degrees to each other, to a compressed dimension of 48 percent of its original height. Record load and the corresponding deflection at 1/4 inch increments and plot as a graph of load versus deflection. The Load-Deflection curve shall then be integrated to generate an Energy-Deflection curve for the fender. After compression of the fender to 48 percent of its original height, the fender shall rebound to 98 percent of its original height within 10 minutes after the load is removed.

PART 3 EXECUTION

3.1 INSTALLATION

Install fenders with the fender longitudinal axis vertical. Install the fenders in the position and at the spacing indicated on the drawings.

3.1.1 Antiseize Compound

Coat threads of bolts prior to applying washers and nuts. Recoat bolt thread projection beyond nut after tightening.

-- End of Section --