CONTRACT N40085-11-0185

NAVFAC SPECIFICATION
NO. 05-11-0185

FUEL TANK TRANSITION, BUILDING TC-366

AT THE

MARINE CORPS AIR STATION, NEW RIVER, JACKSONVILLE, NORTH CAROLINA

DESIGN BY:

RMF ENGINEERING, INC.
BALTIMORE, MARYLAND 21228

A/E Contract: N40085-07-D-2612

SPECIFICATION PREPARED BY:

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05110185

PROJECT TABLE OF CONTENTS

-- End of Project Table of Contents --

LIST OF DRAWINGS

Contract drawings are as follows:

NAVFAC DWG NO.	SHEET NO.	TITLE
60010014	T0-01	Title and List of Drawings
60010015	M1-01	Mechanical Site Plan - Demolition
60010016	M2-01	Mechanical Site Plan - New Construction
60010017	M4-01	Schematics
60010018	M4-05	Details
60010019	E-102	Electrical Site Plan - Demolition
60010020	E-201	Electrical Site Plan - New Construction
60010021	E-401	Details

SECTION 01 11 00

SUMMARY OF WORK

09/08

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

The work to be performed under this project consists of providing the labor, equipment, and materials to:

a. Separate tanks 400 and 401 from a common pipe header arrangement into two different fuel dispensing systems; JP8 and B20 biofuel.

b. Tank 401 shall remain a JP8 dispensing system.

c. Tank 400 shall be thoroughly cleaned, flushed and shall be converted to a "B20" biofuel dispensing/storage system. A new submersible pump shall be provided complete with all electrical wiring, raceways, disconnect switches and circuit breakers. Provide new fuel-fill unloading pump, piping and controls. Modify existing fuel-fill piping.

d. Provide new fuel pit and new underground piping between storage tank and fuel dispensing pump. Provide new fuel dispensing pump and motor.

e. Re-work existing low sulpher diesel fuel piping at the fuel dispensing pump. One pump shall remain in operation as a low sulpher diesel. Cut and cap existing piping remaining and not to be reused.

f. Replace one existing low sulpher diesel fuel dispensing pump on pump island with a new bio-diesel fuel dispensing pump.

g. Provide power and control wiring from new fuel dispensing pump to the existing Veeder-Root #TLS350 fuel monitoring system and existing fluidmaster controller.

h. Remove painted "JP8" from storage tank exterior and provide new painted designation "B20."

i. Relocate existing domestic water service yard hydrant and post indicating valve.

1.1.2 Location

The work shall be located at Marine Corps Air Station, New River, Jacksonville, North Carolina approximately as shown on the contract drawings. The exact location shall be as determined by the Contracting Officer.

1.2 1.2 PHASED CONSTRUCTION SCHEDULE

Within the overall project schedule, commence and complete the work in phases. Complete each phase of the work within the number of calendar days assigned to each phase.

1.3 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Trees, 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.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 11 50

PROJECT PHASING
01/07

PART 1 GENERAL

1.1 SUMMARY

The intent of this Section is to identify known restrictions that will affect the timing of work and provide general phasing guidelines. The Contractor may elect to perform phasing in a different manner than what is proposed. This is acceptable as long as the phasing does not interfere with the explicit restrictions presented and that the coordination can be performed with the Government. The ultimate responsibility of phasing rests with the Contractor. All phasing must be reflected in the construction schedule and approved by the Government prior to proceeding.

1.2 MARINE CORPS BASE, CAMP LEJEUNE:

1.2.1 Shutdown Planning

In accordance with the restrictions stated in this Section, temporary shutdown or isolation of portions of the Vehicle re-fueling area and associated SCADA and electrical distribution systems may be allowed when appropriately planned, requested, and approved. Coordinate all electrical service and SCADA system outages with the Contracting Officer.

1.3 GENERAL

1.3.1 Lock-out/Tag-out

The Contractor shall notify the COTR whenever a piece of equipment must be shut down or removed and shall follow all of the Government's lock-out tag-out procedures. The actual shut down of equipment will be performed by the contractors personnel under direct supervision of the COTR.

1.3.2 Phasing Plan

Due to the operations of the vehicle re-fueling station TC366, as well as the use and occupancy of the buildings onsite and the complexity of this project, the Contractor is required to provide a detailed phasing plan for each portion of the work. This will include a very detailed "critical path" schedule showing phasing. The Contractor shall walk through the entire phasing, item by item including general construction activities, demolition, electrical systems modifications, and the Electronic Automated Fuel Metering Systems, with the COTR to demonstrate his understanding of the systems and how the work is to be phased. Prior to beginning any major work the Contractor shall obtain written approval from the Government before any service outage work can occur. Written acceptance will not be given until a phasing plan is established, these walk-throughs occur, and both are deemed acceptable. In addition, written acceptance will not be granted until all related submittals are approved and there is assurance that all materials will be on-site when it is their time to be installed. Under no circumstance will it be permitted for work to be phased where a system is sitting idle with no work being performed without a scheduled reason. It is crucial that the Contractor include and constantly update the critical path in his scheduling.

1.3.3 Temporary Items

Temporary electrical services do not have to meet the normal specification requirements, however, they have to satisfy all safety requirements and the rating of the system. The Contractor shall be responsible to maintain all temporary equipment and controls system. All temporary equipment not meeting normal specification requirements must be removed prior to final completion.

1.3.4 Access

Vehicles and maintenance personnel must have access to the fuel dispensing equipment at adjacent fuel islands and all necessary equipment that is operational during each phase of construction. Temporary access platforms to allow personnel access to equipment shall be provided by the Contractor as necessary.

1.3.5 Coordination

Electrical fuel dispensing systems and mechanical disciplines shall coordinate all associated work with the Contracting Officer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 12 00

CUTTING AND PATCHING

01/07

PART 1 GENERAL

1.1 SAW CUTTING

Saw cutting of asphalt and concrete shall be done by sawing along straight lines. The amount to be cut out shall be the minimum necessary to accommodate the new work. All exterior site work involving concrete and asphalt shall be saw cut. No flame cutting will be permitted without written permission of the Officer in Charge of Construction.

1.2 HOLES

Holes for electrical raceways in building walls and equipment enclosures shall be rotary core drilled. The size of the core drill/opening shall be the minimum necessary to accommodate the new work. Holes shall be structural reinforced with thru-bolts and steel plates where structural members are drilled. All exterior openings shall be sealed with a weatherproof two hour fire rated compound. Openings in exterior walls shall be made water tight and all areas shall be finished painted to match adjacent surfaces.

1.3 PATCHING AND REPAIRS

Shall be done with materials which match the existing surfaces in strength, color, quality and surface texture when finished. All exterior penetrations shall be made watertite and finished painted to match adjacent areas.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 14 00

WORK RESTRICTIONS

01/07

PART 1 GENERAL

1.1 SPECIAL SCHEDULING REQUIREMENTS

a. Have materials, equipment, and personnel required to perform the work at the site prior to the commencement of the work. Specific items of work to which this requirement applies include:

(1) Raceways and conductors.

(2) Fuel dispensing pumps.

(3) Fuel unloading pump, motors and controls.

(4) Piping, valves, fittings, etc.

(5) Computers and software.

(6) Disconnect switches and circuit breakers.

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

1.2 CONTRACTOR ACCESS AND USE OF PREMISES

1.2.1 Station Regulations

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

1.2.2 Working Hours

Regular working hours shall consist of an eight and one-half hour period established by the Contracting Officer, Monday through Friday, excluding Government holidays.

1.2.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Provide written request at least 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer.

1.2.4 Occupied and Existing Buildings

The Contractor shall be working around existing buildings which are occupied. Do not enter the buildings without prior approval of the Contracting Officer.

1.2.5 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, and compressed air, shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours." This time limit includes time for deactivation and reactivation.

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.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

04/12

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.

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EP-1110-1-8	(1995) Construction Equipment Ownership and Operating Expense Schedule

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00,"Submittal Procedures."

SD-01 Preconstruction Submittals

Schedule of prices

1.3 SCHEDULE OF PRICES

1.3.1 Data Required

Within 15 calendar days of notice of award, prepare and deliver to Contracting Officer a schedule of prices (construction contract) on the forms furnished by the Government. Provide a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, and extended prices therefor. Schedule of prices shall be separated by individual building numbers with subtotals for each building.

1.3.2 Schedule Instructions

Payments will not be made until the schedule of prices has been submitted to and approved by the Contracting Officer. Identify the cost for site work, and include incidental work to the 5 foot line. Identify costs for the building(s), and include work out to the 5 foot line. Workout to the 5 foot line shall include construction encompassed within a theoretical line 5 feet from the face of exterior walls and shall include attendant construction, such as cooling towers, placed beyond the 5 foot line.

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 COE EP-1110-1-8.

1.5 CONTRACTOR'S PAYMENT REQUEST

1.5.1 Proper Payment Request

A proper request for payment/invoice shall comply with all requirements specified in this Section and the contract payment clauses. If any invoice does not comply with these requirements, it shall be returned with a statement of the reasons why it was not a proper invoice. A proper payment request/invoice includes the following information, completed forms, and number of copies indicated. Upon request, the Contracting Officer will furnish copies of Government forms.

a. Contractor's Invoice on NAVFAC Form 7300/30, which shall show the basis for arriving at the amount of the invoice. Submit one original and two copies.

b. Contractor's Monthly Estimate for Voucher (LANTNAVFACENGCOM Form 4-4330/110. Submit original and two copies.

c. Payment Certification. Furnish as specified in "FAR Clause 52.232-5 (c) Payments under Fixed-Price Construction Contracts." Submit one original.

d. QC Invoice Certification. Furnish as specified in Section 01 45 10, "Quality Control." Submit one original.

1.5.1.1 Progress Payments

In addition to the requirements stated in Paragraph 1.5.1, "Proper Payment Request" above, the Contractor's request for progress payments shall include the following:

a. Updated Progress Schedule: Furnish an updated progress schedule as specified in contract clause FAR 52.236-15 "Schedules for Construction Contracts" and Section 01 32 16, "Construction Progress Documentation." Submit one copy.

1.5.1.2 Final Payments

The request for final payment is submitted after completion and acceptance of all work and all other requirements of the contract. Before submitting the final invoice the Contractor shall meet with the appropriate Government representatives to determine the final invoice amount, including the assessment of liquidated damages, if any, and to make sure the final release is complete and accurate. In addition to the requirements in Paragraph 1.5.1, "Proper Payment Request" above, the Contractor's request for final payment shall include the following:

a. A final release executed on the standard form provided by the Contracting Officer. Submit two originals with final payment request.

b. NC Tax certified statement and report for the prime and each subcontractor (FAR 52.229-7). Submit two copies.

c. As-built drawings (if applicable).

d. Warranties (if applicable).

e. O&M manuals (if applicable).

f. Final payrolls (FAR 52.222-6).

g. A release for an assignment of claims (if applicable). Submit three originals.

1.5.2 Procedures for Submitting Payment Request

a. The Contractor may submit only one invoice for payment each month as the work progresses.

b. The invoice shall be delivered to the ROICC Office, Administrative Branch, between five calendar days before and five calendar days after the contract award date. Invoices received outside this schedule shall be returned to the Contractor unprocessed. The Contractor will have to wait until the following month to submit their next invoice.

c. Invoices shall be delivered during normal work hours from 7:30 AM up to 4:00 PM (EST), Monday through Friday, excluding holidays.

1.6 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of a proper payment request/invoice by 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 the following:

a. Reasonable retention and/or deductions due to defects in material or workmanship; potential liquidated damages; and/or failure to comply with any other requirements of the contract.

b. Claims which the Government may have against the Contractor under or in connection with this contract; and

c. Unless otherwise adjusted, repayment to the Government upon demand for overpayments made to the Contractor.

d. Failure to provide up to date record drawings not current as stated in Contract Clause "FAC 5252.236-9310, Record Drawings"; NC State tax certified statement and report in accordance with FAR 52.229-2; labor payrolls in accordance with FAR 52.222-6; as-built drawings in accordance with Section 01 45 10, "Quality Control"; warranties and O&M manuals; and any other requirements in the contract.

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 considerations 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 no 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 considerations 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 in the Continental United States.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

03/12

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with the Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

List of contact personnel

1.2 MINIMUM INSURANCE REQUIREMENTS

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

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

b. Automobile liability: $200,000 per person, $500,000 per occurrence, $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.

1.3 ELECTRONIC MAIL (EMAIL)

a. The Contractor is required to establish and maintain electronic mail (email) capability along with the capability to open various electronic attachments in Microsoft, Adobe Acrobat, and other similar formats.

b. Within 10 days after contract award; the Contractor shall provide the Contracting Officer a single (only one) email address for the ROICC office to send communications related to this contract correspondence. The ROICC office may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc.

c. Multiple email addresses are not authorized.

d. It is the Contractor's responsibility to make timely distribution of all ROICC email within its own organization, including field office(s).

e. The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to their email address.

1.4 CONTRACTOR PERSONNEL REQUIREMENTS

1.4.1 Subcontractors and Personnel

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

1.4.2 Identification Badges

Identification badges will be furnished without charge. Application for and use of badges will be as directed below. Immediately report instances of lost or stolen badges to the Contracting Officer. Employees are required to resubmit a complete 50 state criminal records check in order to renew their contractor badge.

1.4.3 Business Access Security Requirements

1.4.3.1 Business Access Definition

Contractor/subcontractor employees requiring installation access to MCB, Camp Lejeune or MCAS New River, N.C. must obtain a Business Access Identification Badge for that particular installation. Regularly scheduled delivery personnel, to include FEDEX, UPS, Pick-up and deliveries, should, also, follow the Business Access guidelines described below. Personnel requiring Business Access Identification Badges shall submit all documentation listed below. Badges are not required if the contracted position requires the employee to obtain a Common Access Card (CAC) which will be identified separately within the Government contract.

1.4.3.2 Installation Security Access Requirements

Contractor shall accomplish the security requirements below within 10 days after award or prior to performance under the contract.

1.4.3.3 Business Access Identification Badge Requirement

In order to obtain a Business Access Identification Badge for access to MCB, Camp Lejeune, and satellite activities, or MCAS New River, NC, all personnel providing services under this contract shall be required to present the documentation below to the following offices, as applicable:

MCB, Camp Lejeune, NC and its satellite activities. Report as follows:

1. Identification Card Center, 60 Molly Pitcher Road for badge (910-450-8444).

MCAS New River, NC. Report as follows:

1. Pass and Identification Office, Bldg AS-187 for badge (910-449-7695) and vehicle pass (910-449-5513).

1.4.3.4 Proof of Employee Citizenship or Legal Alien Status

Employers may participate in the E-verify program (1-888-464-4218, www.DHS.gov/e-verify) allowing U.S. employers to verify name, DOB, and SSN along with immigration information for non-citizens, against federal

databases in order to verify the employment eligibility of both citizens and non-citizen new hires.

1.4.3.5 Proof of Criminal Records Check

Commercial and contract employees must provide proof a complete 50 state criminal records check on an annual basis. The record check may be obtained from any of the following Internet investigative services: Kroll (former Infolink Screening Services) at www.kroll.com, Castle Branch at www.castlebranch.com, or any other investigative services company that provides records checks for all 50 states. These services also validate social security card numbers. All criminal history checks must be completed no more than 30 days prior to start date of contract. (Note: These Internet screening services are listed as possible sources for obtaining a criminal background check. The United States government and the United States Marine Corps do not endorse nor are they affiliated with any of these services).

1.4.3.6 Letter Provided By Contracting Officer Indicating Contract

Letter provided by Contracting Officer indicating contract, contract period and prime contractor. Proof of employment on a valid Government contract (e.g., a letter on company letterhead from the prime contractor including contract number and term).

1.4.3.7 Photo ID

Valid state or federal issued picture identification card. Acceptable documents include state drivers license, DMV issued photo identification, or alien registration card.

1.4.3.8 National Crime Investigation Center (NCIC) Check

Provost Marshals are authorized to conduct a national crime information center (NCIC) check of all persons entering the installation, if/where applicable, the NCIC check may include drivers's license query, wants and warrants, and criminal history.

1.4.4 Denial of Access

Installation access shall be denied if it is determined that an employee:

a. Is on the National Terrorist Watch List

b. Is illegally present in the United States.

c. Is subject to an outstanding warrant.

d. Has knowingly submitted an employment questionnaire with false or fraudulent information.

e. Has been issued a debarment order and is currently banned from military installations.

f. Is a Registered Sexual Offender.

g. Has been convicted of a felony or a drug crime within the past five years.

h. Individuals who have received a DUI/DWI in the last year may be allowed access to the installation, but will not be permitted to drive on the installation.

i. Any reason the Installation Commander deems reasonable for the good order and discipline.

1.4.5 Appeal Process

All appeals should be directed to the Base Inspector's Office for any individual that has been denied access to the Base.

1.4.6 Display of Badges

Contractors/subcontractors shall prominently display their badges on their person at all times. Upon completion/termination of this contract or an individual's employment, the Contractor shall collect and turn in to the Pass & ID Office all badges. If the Contactor fails to obtain the employee's badge, the Pass & ID Office will be notified within 24 hours. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.4.7 Contractor and Subcontractor Vehicle Requirements

Each vehicle to be used in contract performance shall show the Contractor's or subcontractor's name so that it is clearly visible and shall always display a valid state license plate and safety inspection sticker. To obtain a vehicle decal, which will be valid for one year or contract period, whichever is shorter, Contractor or subcontractor vehicle operators shall provide to the Vehicle Registration Office, 60 Molly Pitcher Road (910-451-1158) or to MCAS, Building AS-187 (910-449-5513) for vehicle decal:

a. An installation sponsor request forwarded to provost Marshall office

b. A valid form of Federal or state government I.D.

c. If driving a motor vehicle, a valid driver's license, vehicle registration and proof of insurance

Upon completion/termination of this contract or an individual's employment, the Contractor shall collect and turn in to Vehicle Registration all Government vehicle decals. If any are not collected, the Contractor shall notify the Vehicle Registration Office within 24 hours.

1.4.8 Security Checks

Contractor personnel and vehicles shall only be present in locations relevant to contract performance. All Contractor personnel entering the base shall conform to all Government regulations and are subject to such checks as may be deemed necessary to ensure that violations do not occur. Employees shall not be permitted on base when such a check reveals that their presence would be detrimental to the security of the base. Subject to security regulations, the Government will allow access to an area for servicing equipment and/or performing required services. Upon request, the Contractor shall submit to the Contracting Officer questionnaires and other forms as may be required for security purposes.

1.4.9 Subcontractor Special Requirements

1.4.9.1 Telecommunication and High Voltage Work

When telecommunications and high voltage work is required, all work associated with telecommunications and high voltage shall be accomplished by a first tier subcontractor. The contractor must possess a valid North Carolina Public Utility - Electrical, contractor's license and be insured to do such work in the State of North Carolina.

1.5 DISCLOSURE OF INFORMATION

Contactor shall comply as follows:

(a) The Contractor shall not release to anyone outside the Contractor's organization any unclassified information, regardless of medium (e.g., film, tape, document), pertaining to any part of this contract or any program related to this contact, unless -

(1) The Contracting Officer has given prior written approval; or

(2) The information is otherwise in th public domain before the date of release.

(b) Requests for approval shall identify the specific information to be released, the medium to be used, and the purpose for the release. The Contractor shall submit its request to the Contracting Officer at least 45 days before the proposed date for release.

(c) The Contractor agrees to include a similar requirement in each subcontract under this contract. Subcontractors shall submit requests for authorization to release through the prime contractor to the Contracting Officer.

1.6 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 (CQ) representative is required on the contract, then that individual shall also have fluent English communication skills.

NOTE: If training and experience requirements of Section 01 45 10, "Quality Control" and 01 35 29, "Safety and Occupational Health Requirements" have been met the supervisor may also serve as QC Manager and Site Safety and Health Officer (SSHO).

1.7 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 of prices, shop drawings, and other submittals, scheduling programming, and prosecution of the work. Major subcontractors who will engage in the work shall also attend.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 32 16

CONSTRUCTION PROGRESS DOCUMENTATION

04/12

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Construction schedule

Equipment delivery schedule

1.2 CONSTRUCTION SCHEDULE

Within 21 days after receipt of the Notice of Award, prepare and submit to the Contracting Officer for approval a Critical Path Method (CPM), Network Schedule in accordance with the terms in Contract Clause "FAR 52.236-15, Schedules for Construction Contracts," except as modified in this contract. Primavera P6 will be utilized to produce and update all progress schedules.

1.3 EQUIPMENT DELIVERY SCHEDULE

1.3.1 Initial Schedule

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

a. Description.

b. Date of the purchase order.

c. Promised shipping date.

d. Name of the manufacturer or supplier.

e. Date delivery is expected.

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

1.4 NETWORK ANALYSIS SYSTEM (NAS)

The Contractor shall use the critical path method (CPM) to schedule and control construction activities. The schedule shall identify as a minimum:

a. Construction time for all major systems and components;

b. Manpower requirements for each activity;

c. Major submittals and submittal processing time; and

d. Major equipment lead time.

1.4.1 CPM Submittals and Procedures

The Contractor shall use the critical path method (CPM) to schedule and control project activities. Project schedules shall be prepared and maintained using Primavera P6, Primavera SureTrak or current mandated scheduling program. Save files in Concentric P6 or current mandated scheduling program file format, compatible with the Governments version of the scheduling program. The network analysis system shall be kept current, with changes made to reflect the actual progress and status of the construction.

1.5 UPDATED SCHEDULES

Update the construction schedule and equipment delivery schedule at monthly intervals or when schedule has been revised. Reflect any changes occurring since the last update. Submit copies of the purchase orders and confirmation of the delivery dates as directed.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES

12/10

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Government-Furnished Information

Submittal register will be delivered to the contractor in hard copy format. Register will have the following fields completed, to the extent that will be required by the Government during subsequent usage.

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

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 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. The Contracting Officer is approving authority for all submittals.

1.2 DEFINITIONS

1.2.1 Submittal

Shop drawings, product data, samples, and administrative submittals presented for review and approval. Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.2.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.

b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

c. Samples: Physical examples of products, materials, equipment,

assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

d. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.2.3 Submittal Descriptions (SD)

SD-01 Preconstruction Submittals

Certificates of insurance
Surety bonds
List of proposed subcontractors
List of proposed products
Construction Progress Schedule
Submittal schedule
Schedule of values
Health and safety plan
Work plan
Quality control 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 or equipment for some portion of the work.

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

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 checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements 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 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.

SD-08 Manufacturer's Instructions

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

SD-10 Operation and Maintenance Data

Data intended to be incorporated in operations and maintenance manuals.

SD-11 Closeout Submittals

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

As-built drawings

Special warranties

Posted operating instructions

Training plan

1.2.4 Approving Authority

Person authorized to approve submittal.

1.2.5 Work

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

1.3 SUBMITTALS

Submit the following in accordance with the requirements of this section.

SD-11 Closeout Submittals

Submittal register

Complete Submittal Package 1 CD

1.4 USE OF SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Use the hard copy submittal register furnished by the Government or other approved format. 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.

1.4.1 Submittal Register

Submit submittal register as a hard copy. Submit with quality control plan and project schedule required by Section 01 45 10, "Quality Control" and Section 01 32 16, "Construction Progress Documentation." Do not change data in columns (c), (d), (e), and (f) as delivered by the government. Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register:

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.

1.4.2 Contractor Use of Submittal Register

Update the following fields in the government-furnished submittal register.

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.

1.4.3 Approving Authority Use of Submittal Register

Update the following fields in the government-furnished submittal register.

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to contractor.

1.4.4 Contractor Action Code and Action Code

Entries used will be as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.4.5 Copies Delivered to the Government

Deliver one copy of submitted register updated by contractor to government with each invoice request.

1.5 PROCEDURES FOR SUBMITTALS

1.5.1 Reviewing, Certifying, Approving Authority

QC organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. The Contracting Officer is the approving authority for all submittals.

1.5.2 Constraints

a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.

b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.

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

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

1.5.3 Scheduling

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 requirements to resubmit.

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

c. For submittals requiring review by fire protection engineer, allow review period, beginning when government receives submittal from QC organization, of 45 working days for return of submittal to the contractor. Period of review for each resubmittal is the same as for initial submittal.

1.5.4 Variations

Variations from contract requirements require Government approval pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to government.

1.5.4.1 Considering Variations

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

1.5.4.2 Proposing Variations

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

1.5.4.3 Warranting That Variation Are Compatible

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

1.5.4.4 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.

1.5.5 Contractor's Responsibilities

a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

b. Transmit submittals to QC organization in accordance with schedule on approved Submittal Register, and to prevent delays in the work, delays to government, or delays to separate contractors.

c. Advise contracting officer of variation, as required by paragraph entitled "Variations."

d. Correct and resubmit submittal as directed by approving

authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.

e. Furnish additional copies of submittal when requested by contracting officer, to a limit of 20 copies per submittal.

f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.

g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.

1.5.6 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, "Actions Possible."

(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 N40085-11-B-0185, 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)

g. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. 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.

1.5.7 Government's Responsibilities

When approving authority is contracting Officer, the Government will:

a. Note date on which submittal was received from QC manager, on each submittal for which the contracting officer is approving authority.

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 "Actions Possible" and with markings appropriate for action indicated.

1.5.8 Actions Possible

Submittals will be returned with one of the following notations:

a. 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.

b. Submittals marked "approved" "approved as submitted" authorize contractor to proceed with work covered.

c. Submittals marked "approved as noted" authorize contractor to proceed with work as noted provided contractor takes no exception to the notations.

d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.6 FORMAT OF SUBMITTALS

1.6.1 Complete Submittal Package

Contractor shall make electronic copies of all submittals, including the transmittal sheet, and provide a CD/DVD containing all submittals for project close out.

The CD/DVD shall be marked "Complete Submittal Package - Contract #N40085-11-B-0185."

1.6.2 Transmittal Form

Transmit each submittal, except sample installations and sample panels, to office of approving authority. Transmit submittals with transmittal form prescribed by contracting officer and standard for project. The transmittal form shall identify contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

1.6.3 Identifying Submittals

Identify submittals, except sample panel and sample installation, 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. Section number of the specification section by which submittal is required.

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

e. When a resubmission, alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.

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

g. Product identification and location in project.

1.6.4 Format for Product Data

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

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

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for

project.

1.6.5 Format for Shop Drawings

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

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

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

d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

1.6.6 Format of Samples

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

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

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

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

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

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

(6) Color Selection Samples: 2 by 4 inches.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: 100 square feet.

b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

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

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

final clean up of project.

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

1.6.7 Format of Administrative Submittals

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

b. Operation and Maintenance Manual Data: Submit in accordance with Section 01 78 23, "Operation and Maintenance Data." Include components required in that section and the various technical sections.

1.7 QUANTITY OF SUBMITTALS

1.7.1 Number of Copies of Product Data

a. Submit five copies of submittals of product data requiring review and approval only by the Contracting Officer. Submit three copies of submittals of product data for operation and maintenance manuals.

1.7.2 Number of Copies of Shop Drawings

Submit shop drawings in compliance with quantity requirements specified for product data.

1.7.3 Number of Samples

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

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

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.7.4 Number of Copies of Administrative Submittals

a. Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for product data.

b. Submit administrative submittals required under "SD-19 Operation and Maintenance Manuals" to conform to Section 01 78 23, "Operation and Maintenance Data."

1.8 FORWARDING SUBMITTALS

1.8.1 Samples and Submittalsr

Except as otherwise noted, submit samples and submittals to:

RMF Engineering, Inc.
5520 Research Park Drive, Suite 300
Baltimore, MD 21228

1.8.1.1 Administrative Submittals

Submit administrative submittals for asbestos/lead removal and environmental protection plan to the Resident Officer in Charge of Construction (ROICC/OICC).

1.8.1.2 Fire Protection and Fire Alarm System Submittals

Submit fire protection and fire alarm system submittals to ROICC/OICC.

1.8.1.3 TAB Submittals

Submit to ROICC/OICC for all projects.

1.8.2 Shop Drawings, Product Data, and O&M Data

As soon as practicable after award of the contract, and before procurement or fabrication, submit shop drawings, product data and O&M Data required in the technical sections of this specification.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 35 29

SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS

06/11

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z359.1	(1992; R 1999) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

ASME B30.3	(1996) Construction Tower Cranes
ASME B30.5	(2000) Mobile and Locomotive Cranes
ASME B30.8	(2000) Floating Cranes and Floating Derricks
ASME B30.22	(2000) Articulating Boom Cranes

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2002) Potable Fire Extinguishers
NFPA 241	(2000) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 51B	(2003) Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2011) National Electrical Code
NFPA 70E	(2004) 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) 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 1910.94	Ventilation
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1919	Gear Certification
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP)

Activity Hazard Analysis (AHA)

Crane Critical Lift Plan

Crane Work Plan

Proof of qualifications for Crane Operators

SD-06 Test Reports

Reports

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

Accident Reports

Monthly Exposure Reports

Regulatory Citations and Violations

Crane Reports

SD-07 Certificates

Confined Space Entry Permit

Certificate of Compliance (Crane)

Third Party Certification of Barge-Mounted Mobile Cranes

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

1.3 DEFINITIONS

a. Associate Safety Professional (ASP). An individual who is currently

certified by the Board of Certified Safety Professionals.

b. Certified Construction Health & Safety Technician (CHST). An individual who is currently certified as a CHST by the Board of Certified Safety Professionals.

c. Certified Industrial Hygienist (CIH). An individual who is currently certified as a CIH by the American Board of Industrial Hygiene.

d. Certified Safety Professional (CSP). An individual who is currently certified as a CSP by the Board of Certified Safety Professionals.

e. Certified Safety Trained Supervisor (STS). An individual who is currently certified as an STS by the Board of Certified Safety Professionals.

f. Competent Person for Fall Protection. A person who is cabable 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.

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

h. Low-slope roof. A roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

i. 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.

j. Multi-Employer Work Site (MEWS). A multi-employer work site, as defined by OSHA, is one in which many employers occupy the same site. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors.

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

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

m. 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;

(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.

n. Site Safety and Health Officer (SSHO). The superintendent or other qualified or competent person who is responsible for the on-site safety and health required for the project.

o. Steep roof. A roof having a slope greater than 4 in 12 (vertical to horizontal).

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

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

1.4 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

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

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, work performed shall comply with USACE EM 385-1-1, and the following 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 shall apply.

1.6 DRUG PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employee uses illegal drugs or consumes alcohol during work hours. Ensure there are

no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine, or saliva specimens and test the injured and involved employees for the influence of drugs and alcohol. A copy of the test shall be made available to the Contracting Officer upon request.

1.7 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.7.1 Personnel Qualifications

Work performed under this contract shall meet Level 2.

1.7.1.1 Site Safety and Health Officer (SSHO)

Site Safety and Health Officer (SSHO) shall be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The SSHO shall meet the following requirements:

Level 1:
Worked on similar projects.
10-hour OSHA construction safety class or equivalent within last 3 years.
Competent person training as needed.

Level 2:
A minimum of 3 years safety work on similar project.
30-hour OSHA construction safety class or equivalent within last 3 years.
Competent person training as needed.

Level 3:
A minimum of 5 years safety work on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years.
Competent person training as needed.

Level 4:
A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency: 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.

Level 5:
An Associate Safety Professional (ASP), Certified Safety Trained Supervisor (STS) and/or Construction Health & Safety Technician (CHST).
A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the

last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency: 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.

Level 6: A
Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH).
A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency: 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.

1.7.1.2 Certified Safety Professional (CSP) and/or Certified Industrial hygienist (CIH)

Provide a Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH) at the work site to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The CSP and/or CIH shall be the safety and occupational health "competent person" as defined by USACE EM 385-1-1. The CSP and/or CIH shall have no other duties than safety and occupational health management, inspections, and/or industrial hygiene.

1.7.1.3 Associate Safety professional (ASP), Certified Safety Trained Supervisor (STS) and/or Construction Health and Safety Technician (CHST).

Provide an Associate Safety Professional (ASP); Certified Safety Trained Supervisor (STS); and/or Construction Health & Safety Technician (CHST) at the work site to perform safety management, surveillance, inspections, and safety enforcement for the Contractor to meet the designated safety level in paragraph 1.6.1. The ASP, STS, and/or CHST shall be the safety and occupational health "competent person" as defined by USACE EM 385-1-1. The ASP, STS, and/or CHST shall be at the work site at all times whenever work or testing is being performed and shall conduct and document daily safety inspections. The ASP, STS, and/or CHST shall have no other duties other than safety and occupational health management, inspections, and enforcement on this contract.

1.7.1.4 Competent Person for Confined Space Entry

Provide a competent person meeting the requirements of EM 385-1-1 who is assigned in writing by the Designated Authority to assess confined spaces and who possesses demonstrated knowledge, skill and ability to:

a. Identify the structure, location, and designation of confined and permit-required confined spaces where work is done;

b. Calibrate and use testing equipment including but not limited to, oxygen indicators, combustible gas indicators, carbon monoxide indicators, and carbon dioxide indicators, and to interpret accurately the test results of that equipment;

c. Perform all required tests and inspections specified in 29 CFR 1910.146 and 29 CFR 1915 Subpart B;

d. Assess hazardous conditions including atmospheric hazards in confined space and adjacent spaces and specify the necessary protection and precautions to be taken;

e. Determine ventilation requirements for confined space entries and operations;

f. Assess hazards associated with hot work in confined and adjacent space and determine fire watch requirements; and,

g. Maintain records required.

When the work involves marine operations that handle combustible or hazardous materials, this qualified person shall be a NFPA certified marine chemist.

1.7.1.5 Competent Person for the Health Hazard Control and Respiratory Protection Program

Provide a competent person meeting the requirements of EM 385-1-1 who is:

a. Capable by education, specialized training and/or experience of anticipating, recognizing, and evaluating employee exposure to hazardous chemical, physical and biological agents in accordance with USACE EM 385-1-1, Section 6.

b. Capable of spe cifying necessary controls and protective actions to ensure worker health.

1.7.1.6 Crane Operators

Crane operators shall meet the requirements in USACE EM 385-1-1, Section 16 and Appendix G. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacitates of 50,000 pounds or greater, crane operators shall be designated as qualified by a source that qualifies crane operators (i.e., union, a government agency, or an organization that tests and qualifies crane operators). Proof of current qualifications shall be provided.

1.7.2 Personnel Duties

1.7.2.1 Site Safety and Health Officer (SSHO)/Superintendent

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. Safety inspection logs shall be attached to the Contractors' daily 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. A list of unresolved safety and health deficiencies shall be posted on the safety bulletin board.

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

h. Ensure an approved "Special Permission Energized Electrical Work Permit" prior to starting any activity on energized electrical systems.

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

1.7.2.2 Certified Safety Professional (CSP), Certified Industrial Hygienist (CIH), Associate Safety Professional (ASP), Certified Safety Trained Supervisor (STS), and/or Certified Construction Health & Safety Technician (CHST)

a. Perform safety and occupational health management, surveillance, inspections, and safety enforcement for the project.

b. Perform as the safety and occupational health "competent person" as defined by USACE EM 385-1-1.

c. Be on site whenever work or testing is being performed.

d. Conduct and document safety inspections.

e. Shall have no other duties other than safety and occupational health management, inspections, and enforcement on this contract.

If the CSP, CIH, ASP, STS, CHST is appointed as the SSHO all duties of that position shall also be performed.

1.7.3 Meetings

1.7.3.1 Preconstruction Conference

a. The Contractor will be informed, in writing, of the date of the preconstruction conference. The purpose of the preconstruction conference is for the Contractor and the Contracting Officer's representatives to become acquainted and explain the functions and operating procedures of their respective organizations and to reach mutual understanding relative to the administration of the overall project's Accident Prevention Plan (APP) before the initiation of work.

b. 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).

c. The Contractor shall 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, a schedule for the preparation, submittal, review, and acceptance of AHAs shall be established to preclude project delays.

d. 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. Work shall not begin until there is an accepted APP.

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

1.7.3.2 Weekly Safety Meetings

Conduct weekly safety meetings at the project site for all employees. The Contracting Officer will be informed of the meeting in advance and be allowed attendance. Minutes showing contract title, signatures of attendees and a list of topics discussed shall be attached to the Contractors' daily report.

1.7.3.3 Work Phase Meetings

The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection. The analysis should be used during daily inspections to ensure the implementation and effectiveness of safety and health controls.

1.8 TRAINING

1.8.1 New Employee Indoctrination

New employees (prime and sub-contractor) will be informed of specific site hazards before they begin work. Documentation of this orientation shall be kept on file at the project site.

1.8.2 Periodic Training

Provide Safety and Health Training in accordance with USACE EM 385-1-1 and the accepted APP. Ensure all required training has been accomplished for all onsite employees.

1.8.3 Training on Activity Hazard Analysis (AHA)

Prior to beginning a new phase, training will be provided to all affected employees to include a review of the AHA to be implemented.

1.9 ACCIDENT PREVENTION PLAN (APP)

The Contractor shall 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 Preparation of Accident Prevention Plan". Where a paragraph or subparagraph element is not applicable to the work to be performed indicate "Not Applicable" next to the heading. Specific requirements for some of the APP elements are described below at paragraph 1.8.1. The APP shall be job-specific and shall 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. Any portions of the Contractor's overall safety and health program referenced in the APP shall be included in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer and any designated CSP and/or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. The Contracting Officer reviews and comments on the Contractor's submitted APP and accepts it when it meets the requirements of the contract provisions.

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

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any unforeseen hazard become evident during the performance of work, the project superintendent shall inform the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, all necessary action shall be taken by the Contractor to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment.

Copies of the accepted plan will be maintained at the resident engineer's office and at the job site. The APP shall be continuously reviewed and amended, as necessary, throughout the life of the contract. Unusual or high-hazard activities not identified in the original APP shall be incorporated in the plan as they are discovered.

1.9.1 EM 385-1-1 Contents

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

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

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

c. Confined Space Entry Plan. Develop a confined space entry plan in accordance with USACE EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

d. Health Hazard Control Program. The Contractor shall designate a competent and qualified person to establish and oversee a Health Hazard Control Program in accordance with USACE EM 385-1-1, Section 6. The program shall ensure that employees, on-site Government representatives, and others, are not adversely exposed to chemical, physical and biological agents and that necessary controls and protective actions are instituted to ensure health.

e. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted movile crane's hoists) at any radius of lift; lifts involving more thatn one crane or hoist; lifts of personnel; and lifts involving more than rigging or operation, sensitive equipment, or unusual safety risks. The plan shall be submitted 15 calendar day6s prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.c.18. and the following:

(1) For lifts of personnel, the plan shall demonstrate compliance with the requirements of 29 CFR 1926.500(g).

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

f. Alcohol and Drug Abuse Plan

(1) Describe plan for random checks and testing with pre-employment screening in accordance with the DFAR Clause subpart 252.223-7004, "Drug Free Work Force."

(2) Description of the on-site prevention program

g. Fall Protection and Prevention (FP&P) Plan. The plan shall be site specific and address all fall hazards in the work place and during different phases of construction. It shall 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 plan. The plan shall 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. Fall Protection and Prevention Plan shall be revised every six months for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. The accepted Fall Protection and Prevention Plan shall be kept and maintained at the job site for the duration of the project. The Fall Protection Plan shall be included in the Accident Prevention Plan (APP)

h. Training Records and Requirements. List of mandatory training and certifications which are applicable to this project (e.g. explosive actuated tools, confined space entry, fall protection, crane operation, vehicle operator, forklift operators, personal protective equipment); list of requiremetns for periodic retraining/certification; outline requirements for supervisory and employee safety meetings.

i. Occupant Protection Plan. The safety and health aspects of lead-based paint removal, prepared in accordance with Section 02 83 19.00 10 Lead Based Paint Hazard Abatement, Target Housing & Child Occupied Facilities, 02 82 33.13 20 Removal/Control and Disposal of Lead Containig Paint.

j. Lead Compliance Plan. The safety and health aspects of lead work, prepared in accordance with Section 02 83 13.00 20 Lead in Construction.

k. Asbestos Hazard Abatement Plan. The safety and health aspects of asbestos work, prepared in accordance with Section 02 2 16.00, "Engineering Control of Asbestos Containing Materials"

l. Site Safety and Health Plan. The safety and health aspects prepared in accordance with this section.

m. PCB Plan. The safety and health aspects of Polychlorinated Biphenyls work, prepared in accordance with Sections 02 84 33, "Removal and Disposal of Polychlorinated Biphenyls (PCBs) and 02 61 23, "Removal and Disposal of PCB Contaminated Soils)".

n. Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02 41 00.00 40, Demolition" and referenced sources. Include engineering survey as applicable.

o. Excavation Plan. The safety and health aspects prepared in accordance with Section 3100, Earthwork.

p. Crane Work Plan. The contractor shall provide a crane work plan to the Contracting Officer for acceptance. The crane work plan shall include the specific model of each crane and a drawing identifying their locations (exact), the dimensions, wheel sizes, number of wheels, wheel spacing, tire pressure(s), number of axles, axle spacing, minimum wheel load to be exerted during operatins and maximum outrigger load to

be exerted during operations. The Contractor shall allow at least 10 working days for acceptance/non-acceptance of the crane work plan. No crane operations shall begin prior to written acceptance of the crane plan by the Government. ROICC shall be the government approving authority.

1.10 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE EM 385-1-1. Submit the AHA for review at least 15 calendar days prior to the start of each phase. Format subsequent AHA as amendments to the APP. An AHA will be developed by the Contractor for every operation involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or subcontractor is to perform work. The analysis must identify and evaluate hazards and outline the proposed methods and techniques for the safe completion of each phase of work. At a minimum, define activity being performed, sequence of work, specific safety and health hazards anticipated, control measures (to include personal protective equipment) to eliminate or reduce each hazard to acceptable levels, equipment to be used, inspection requirements, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall protection methods used. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include requirements for safeguarding excavations. An activity requiring an AHA shall not proceed until the AHA has been accepted by the Contracting Officer's representative and a meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activity, including on-site Government representatives. The Contractor shall document meeting attendance at the preparatory, initial, and follow-up phases of quality control inspection. The AHA shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations. 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.

Activity hazard analyses shall be updated as necessary to provide an effective response to changing work conditions and activities. The on-site superintendent, site safety and health officer and competent persons used to develop the AHAs, including updates, shall sign and date the AHAs before they are implemented.

The activity hazard analyses shall be developed 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 t othe prime contractor for submittal to the Contracting Offficer.

1.11 DISPLAY OF SAFETY INFORMATION

Within 1 calendar days after commencement of work, erect a safety bulletin board at the job site. The following information shall be displayed on the safety bulletin board in clear view of the on-site construction personnel, maintained current, and protected against the elements and unauthorized

removal:

a. Map denoting the route to the nearest emergency care facility.

b. Emergency phone numbers.

c. Copy of the most up-to-date APP.

d. Current AHA(s).

e. OSHA 300A Form.

f. OSHA Safety and Health Protection-On-The-Job Poster.

g. Confined space entry permit.

h. Hot work permit.

i. A sign indicating the number of hours worked since last lost workday accident.

j. Safety and Health Warning Posters.

1.12 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.

1.13 EMERGENCY MEDICAL TREATMENT

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

1.14 REPORTS

1.14.1 Accident Reports

a. For recordable injuries and illnesses, and property damage accidents resulting in at least $2,000 in damages, the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) form or USACE Accident Report Form 3394 and provide the report to the Contracting Officer within 1 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. For a weight handling equipment accident (including rigging gear accidents) the Prime Contractor shall conduct an accident investigation 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. Crane operations shall not proceed 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.

1.14.2 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Information shall 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.

1.14.3 Monthly Exposure Reports

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

1.14.4 Regulatory Citations and Violations

Contact the Contracting Officer immediately of any OSHA or other regulatory agency inspection or visit, and provide the Contracting Officer with a copy of each citation, report, and contractor response. Correct violations and citations promptly and provide written corrective actions to the Contracting Officer.

1.14.5 Crane Reports

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

1.14.6 Certificate of Compliance

The Contractor shall provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a blank certificate). Certificate shall state 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 shall comply with 29 CFR 1926 and USACE EM 385-1-1 section 16 and Appendix H. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. For cranes at DOD activities in foreign countries, the Contractor shall certify that the crane and rigging gear conform to the appropriate host country safety standards. The Contractor shall 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). These certifications shall be posted on the crane.

1.14.7 Third Party Certification of Barge-Mounted Mobile Cranes

Barge-mounted mobile cranes shall be certified in accordance with 29 CFR 1919 by an OSHA accredited person.

1.15 HOT WORK

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

a. Oil painting materials (paint, brushes, empty paint cans, etc.), and all flammable liquids shall be removed from the facility at quitting time. All painting materials and flammable liquids shall be stored outside in a suitable metal locker or box and will require re-submittal with non-hazardous materials.

b. Accumulation of trays, paper, shavings, sawdust, boxes and other packing materials shall be removed from the facility at the close of each workday and such material disposed of in the proper containers located away from the facility.

c. The storage of combustible supplies shall be a safe distance from structures.

d. Area outside the facility undergoing work shall be cleaned of trash, paper, or other discarded combustibles at the close of each workday.

e. All portable electric devices (saws, sanders, compressors, extension chord, lights, etc.) shall be disconnected at the close of each workday. When possible, the main electric switch in the facility shall be deactivated.

f. When starting work in the facility, Contractors shall require their personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency phone number 911. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED IMMEDIATELY.

g. Obtain services from th FIRE DIVISION 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.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

The Contractor shall provide permanent signs integral to or securely attached to access covers for all required confined spaces. Signs wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER -" in bold letters a minimum of 25 mm(one inch) in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" shall be red and readable from 1.52 m(5 feet).

2.2 FALL PROTECTION ANCHORAGE

Fall protection anchorage, conforming to ANSI Z359.1, installed under the supervision of a qualified person in fall protection, shall be left in place for continued customer use and so identified by signage stating the capacity of the anchorage (strength and number of persons who may be tied-off to it at any one time).

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

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

3.1.1 Hazardous Material Use

Each hazardous material must receive approval prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material. Any work or storage involving hazardous chemicals or materials must be done in a manner that will not expose Government or Contractor employees to any unsafe or unhealthful conditions. Adequate protective measures must be taken to prevent Government or Contractor employees from being exposed to any hazardous condition that could result from the work or storage. The Prime Contractor shall keep a complete inventory of hazardous materials brought onto the work-site. Approval by the Contracting Officer of protective measures and storage area is required prior to the start of the work.

3.1.2 Hazardous Material Exclusions

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

3.1.3 Unforeseen Hazardous Material

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

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, the Contractor shall 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 FALL HAZARD PROTECTION AND PREVENTION

The Contractor shall establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. The program shall 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 escape procedures.

3.3.1 Training

The Contractor shall institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, the Contractor shall provide training for each employee who might be exposed to fall hazards. A competent person for fall protection shall provide the training. Training requirements shall be in accordance with USACE EM 385-1-1, section 21.A.16.

3.3.2 Fall Protection Equipment

The Contractor shall enforce use of the fall protection equipment designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is on a surface 1.8 m(6 feet) or more above lower levels. Fall protection systems such as guardrails, personnel fall arrest system, safety nets, etc., are required when working within 1.8m (6 feet) of any leading edge. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, paragraphs 05.I. and 05.J. 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 may be 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 and USACE EM 385-1-1.

3.3.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ANSI Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest 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 1.8 m (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.

3.3.3 Fall Protection for Roofing Work

Fall protection controls shall be implemented based on the type of roof being constructed and work being performed. The roof area to be accessed shall be evaluated for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

(1) For work within 1.8 m (6 feet) of an edge, on low-slope roofs, personnel shall be protected from falling by use of personal fall arrest systems, guardrails, or safety nets. A safety monitoring system is not adequate fall protection and is not authorized.

(2) For work greater than 1.8 m (6 feet) from an edge, warning lines shall be erected and installed in accordance with 29 CFR 1926.500 and USACE EM 385-1-1.

b. Steep Roofs: Work on steep roofs requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also includes residential or housing type construction.

3.3.4 Safety Nets

If safety nets are used as the selected fall protection system on the project, they shall be provided at unguarded workplaces, leading edge work or when working over water, machinery, dangerous operations and or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, fall arrest systems or restraint/positioning systems are impractical. Safety nets shall be tested immediately after installation with a drop test of 181.4 kg (400 pounds) dropped from the same elevation a person might fall, and every six months thereafter.

3.3.5 Existing Anchorage

Existing anchorages, to be used for attachment of personal fall arrest equipment, shall be certified (or re-certified) by a qualified person for fall protection in accordance with ANSI Z359.1. Exiting horizontal lifeline achorages shall be certified (or re-certified) by a registered professional engineer with experience in designing horizontal lifeline systems.

3.3.6 Horizontal Lifelines

Horizontal lifelines shall be designed, installed, certified and used under the supervision of a qualified person for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500).

3.3.7 Guardrail Systems

Guardrails shall consist of top and mid-rails, post and toe boards. The top edge height of standard railing must be 42 inches plus or minus 3 inches above the walking/working level. When mid-rails are used, they must be installed at a height midway between the top edge of the guardrail system and the walking/working level. Posts shall be placed no more than 8 feet apart (29 CFR 1926.500 and USACE EM 385-1-1).

3.3.8 Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contracator must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. A Rescue and Evacuation Plan shall be prepared by the contractor 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. The Rescue and Evaluation Plan shall be included in 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).

3.4 PERSONAL PROTECTIVE EQUIPMENT

All personnel who enter a construction site area shall wear Personal Protective Equipment (PPE) at all times as outlined in the EM 385 1-1. In addition to the requirements of the EM 385 1-1, Safety Glasses (ANSI Z87.1) and High-Visibility Apparel (ANSI 107-2004 Performance Class II, Shirt or Vest) will be worn at all times on construction sites. Hearing protection is required in noise hazard areas or when performing noise hazard tasks. Mandatory PPE on all construction sites includes:

a. Hard Hats

b. Safety Glasses

c. High-Visibility Shirt or Vest

d. Safety-Toed Shoes or Boots

3.5 SCAFFOLDING

Employees shall be provided 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 to scaffold platforms greater than 6 m (20 feet) in height shall be accessed by use of a scaffold stair system. Vertical ladders commonly provided by scaffold system manufacturers shall not be used for accessing scaffold platforms greater than 6 m (20 feet) in height. The use of an adequate gate is required. Contractor shall 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. Special care shall be given 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. Work platforms shall be placed 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.

3.5.1 Stilts

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

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.

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

3.6.2 Weight Handling Equipment

a. Cranes must be equipped with:

(1) Load indicating devices (LIDs) and a boom angle or radius indicator,

(2) or load moment indicating devices (LMIs).

(3) Anti-two block prevention devices.

(4) Boom hoist hydraulic relief valve, disconnect, or shutoff (stops hoist when boom reaches a predetermined high angle).

(5) Boom length indicator (for telescoping booms).

(6) Device to prevent uncontrolled lowering of a telescoping hydraulic boom.

(7) Device to prevent uncontrolled retraction of a telescoping hydraulic boom.

b. The Contractor shall 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. The Contractor shall comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Erection shall be performed under the supervision of a designated person (as defined in ASME B30.5). All testing shall be performed in accordance with the manufacturer's

recommended procedures.

d. The Contractor shall 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. The presence of Government personnel does not relieve the Contractor of an obligation to comply with all applicable safety regulations. The Government will investigate all complaints of unsafe or unhealthful working conditions received in writing from contractor employees, federal civilian employees, or military personnel.

f. Each load shall be rigged/attached independently to the hook/master-link in such a fashion that the load cannot slide or otherwise become detached. Christmas-tree lifting (multiple rigged materials) is not allowed.

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

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

i. Crane suspended personnel work platforms (baskets) shall not be used unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Personnel shall not be lifted with a line hoist or friction crane.

j. A fire extinguisher having a minimum rating of 10BC and a minimum nominal capacity of 5lb of extinguishing agent shall be available at all operator stations or crane cabs. Portable fire extinguishers shall be inspected, maintained, and recharged as specified in NFPA 10, Standard for Portable Fire Extinguishers.

k. All employees shall be kept clear of loads about to be lifted and of suspended loads.

l. A weight handling equipment operator shall not leave his position at the controls while a load is suspended.

m. The Contractor shall use cribbing when performing lifts on outriggers.

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

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

p. A substantial and durable rating chart containing legible letters and figures shall be provided with each crane and securely mounted onto the crane cab in a location allowing easy reading by the operator while seated in the control station.

q. 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.

r. 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.

s. The Contractor shall certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

3.6.3 Equipment and Mechanized Equipment

a. Equipment shall be operated by designated qualified operators. Proof of qualifications 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. Such additional safety precautions or requirements shall be incorporated into the AHAs.

c. Equipment and mechanized equipment shall be inspected in accordance with manufacturer's recommendations for safe operation by a competent person prior to being placed into use.

d. Daily checks or tests shall be conducted and documented on equipment and mechanized equipment by designated competent persons.

3.7 EXCAVATIONS

The competent person for excavations performed as a result of contract work shall be on-site when excavation work is being performed, and shall inspect, and document the excavations daily prior to entry by workers. The competent person must evaluate all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly. The competent person shall perform soil classification in accordance with 29 CFR 1926.

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. Any markings made during the utility investigation must be maintained throughout the contract.

3.7.2 Utility Location Verification

The Contractor must 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. Digging within 2 feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 100 feet if parallel within 5 feet of the excavation.

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

Utilities located within concrete slabs or pier decks, 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.

3.7.4 Shoring Systems

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

3.7.5 Trenching Machinery

Trenching machines with digging chain drives shall be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers shall be provided training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Documentation of the training shall be kept on file at the project site.

3.8 ELECTRICAL

3.8.1 Conduct of Electrical Work

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

coveralls, face shields, and safety glasses. In addition, provide electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may be required, depending on the specific job and as delineated in the Contractor's AHA.

3.8.2 Arc Flash Risk/Hazard Analysis

Contractor shall provide an Arc Flash Risk/Hazsrd Analysis in accordance with NFPA 70E for all locations where workers may be exposed to arc flash hazard (work on energized electrical equipment). The Arc Flash Risk/Hazard Analysis shall be sealed and signed by a qualified professional engineer.

3.8.3 Arc Flash Risk/Hazard Analysis Qualifications

Contractor shall engage the services of a qualified organization to provide Arc Flash Risk/Hazard Analysis of the electrial distribution system. Organization shall be independent of th aupplier, manufacturer, and installer of ht equipment. The organization shall be a first tier subcontractor. This work shall not be performed by a second tier subcontractor.

a. Submit name and qualificaitons of organization. Organization shall have been regularaly engaged in providing Arc Flash Risk/Hazard Analysis for a minimum of 5 years.

b. Submit name and qualifications of the professional engineer performing the analysis. Include a list of three comparable jobs performed by the engineer with specific names nad telephone numbers for reference.

3.8.4 Special Permission Energized Electrical Work Permit

All work on energized electrical systems, including high voltage, must have an approved "Special Permission Energized Electrical Work Permit." The results of a Arc Flash Risk/Hazard Analysis, per NFPA 70E, shall be included in the "Special Permission Energized Electrical Work Permit" request. Flame-resistant (FR) clothing and personel protective equipment (PPE) shall be rated for a minimum of 8 calories per square centimeter even if the flash hazard analysis indicates a lower value. A blank copy of the permit request is attached. An editable version may be obtained from the Contracting Officer.

3.8.5 Portable Extension Cords

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

3.9 WORK IN CONFINED SPACES

The Contractor shall comply with the requirements in Section 06.I of USACE EM 385-1-1 and OSHA 29 CFR 1910.146. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or

enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 06.I.05 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. Ensure the use of rescue and retrieval devices in confined spaces greater than 1.5 m (5 feet) in depth. Conform to Sections 06.I.09, 06.I.10 and 06.I.11 of USACE EM 385-1-1.

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

e. Include training information for employees who will be involved as entrants and attendants for the work. Conform to Section 06.I.06 of USACE EM 385-1-1.

f. Daily Entry Permit. Post the permit in a conspicuous place close to the confined space entrance.

3.10 CRYSTALLINE SILICA

Grinding, abrasive blasting, and foundry operations of construction materials containing crystalline silica, shall comply with OSHA regulations, such as 29 CFR 1910.94, and USACE EM 385-1-1, Appendix C. The Contractor shall develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and personal protective equipment.

3.11 HOUSEKEEPING

3.11.1 Clean-Up

All debris in work areas shall be cleaned up daily or more frequently if necessary. Construction debris may be temporarily located in an approved location, however garbage accumulation must be removed each day.

3.11.2 Falling Object Protection

All areas must be barricaded to safeguard employees. When working overhead, barricade the area below to prevent entry by unauthorized employees. Construction warning tape and signs shall be posted so they are clearly visible from all possible access points. When employees are working overhead all tools and equipment shall be secured so that they will not fall. When using guardrail as falling object protection, all openings shall be small enough to prevent passage of potential falling objects.

-- End of Section --

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

08/10

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 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.

ACI INTERNATIONAL (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: http://www.concrete.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@aashto.org
Internet: http://www.aashto.org

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: http://www.ansi.org/

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018-2187
Ph: 847-699-2929

Fax: 847-768-3434
E-mail: customerservice@asse.org
Internet: http://www.asse.org

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy Avenue
Denver, CO 80235
Ph: 800-926-7337
Fax: 303-347-0804
E-mail: smorrison@awwa.org
Internet: http://www.awwa.org

AMERICAN WELDING SOCIETY (AWS)
550 N.W. LeJeune Road
Miami, FL 33126
Ph: 800-443-9353 - 305-443-9353
Fax: 305-443-7559
E-mail: info@aws.org or customerservice@awspubs.com
Internet: http://www.aws.org

ASME INTERNATIONAL (ASME)
Three Park Avenue, M/S 10E
New York, NY 10016-5990
Ph: 800-854-7179 or 800-843-2763
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: http://www.asme.org

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9585
Fax: 610-832-9555
E-mail: service@astm.org
Internet: http://www.astm.org

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Lane or 2001 L Street, NW. Suite 700
Piscataway, NJ 08855-1331 or Washington, DC 20036-4910 USA
Ph: 732-981-0060 or 800-701-4333
Fax: 732-562-6380
E-mail: onlinesupport@ieee.org or ieeeusa@ieee.org
Internet: http://www.ieee.org

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)
127 Park Street, NE
Vienna, VA 22180
Ph: 703-281-6613
Fax: 703-281-6671
E-mail: info@mss-hq.com
Internet: http://www.mss-hq.com

MAPLE FLOORING MANUFACTURERS ASSOCIATION (MFMA)
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

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-5900
Internet: http://www.nema.org/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000 or 800-344-3555
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: http://www.nfpa.org

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4656
Ph: 412-281-2331
Fax: 412-281-9992
E-mail: info@sspc.org
Internet: http://www.sspc.org

UNDERWRITERS LABORATORIES (UL)
2600 N.W. Lake Road
Camas, WA 98607-8542
Ph: 877-854-3577
Fax: 360-817-6278
E-mail: CEC.us@us.ul.com
Internet: http://www.ul.com/

U.S. ARMY CORPS OF ENGINEERS (USACE)
Order CRD-C DOCUMENTS from:
Headquarters Points of contact
441 G Street NW
Washington, DC 20314-1000
Ph: 202-761-0011
E-mail: hq-publicaffairs@.usace.army.mil
Internet: http://www.wes.army.mil/SL/MTC/handbook.htm
Order Other Documents from:
USACE Publications Depot
Attn: CEHEC-IM-PD
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: http://www.usace.army.mil/publications
or http://www.hnd.usace.army.mil/techinfo/engpubs.htm

U.S. DEPARTMENT OF AGRICULTURE (USDA)
Order AMS Publications from:
AGRICULTURAL MARKETING SERVICE (AMS)
Seed Regulatory and Testing Branch
801 Summit Crossing Place, Suite C
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 Service
14th and Independence Avenue, SW, Room 4028-S
Washington, DC 20250
Ph: 202-720-2791
Fax: 202-720-2166
Internet: http://www.usda.gov/rus

U.S. DEPARTMENT OF DEFENSE (DOD)
Order DOD Documents from:
Room 3A750-The Pentagon
1400 Defense Pentagon
Washington, DC 20301-1400
Ph: 703-571-3343
FAX: 215-697-1462
E-mail: pia@hq.afis.asd.mil
Internet: http://www.dod.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, CD 20005
Ph: 202-289-7800
Fax: 202-289-1092
Internet: http://www.wbdg.org/references/docs_refs.php

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
8601 Adelphi Road
College Park, MD 20740-6001
Ph: 866-272-6272
Fax: 301-837-0483
E-mail: contactcenter@gpo.gov
Internet: http://www.archives.gov
Order documents from:
Superintendent of Documents
U.S.Government Printing Office (GPO)
732 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: http://www.gpoaccess.gov

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION 01 45 10

QUALITY CONTROL

09/01

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 A 880	(1996) Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
ASTM C 1077	(2011) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 3666	(2009a) Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 3740	(2010) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2011) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
ASTM E 543	(2009) Standard Practice for Agencies Performing Non-Destructive Testing

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-11 Closeout Submittals

Quality Control Plan (QC PLAN)

Submit a QC plan within 15 calendar days after receipt of Notice of Award.

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Deliver the following to the Contracting Officer:

a. Combined Contractor Production Report/Contractor Quality Control Report (1 sheet): Original and 1 copy, by 10:00 AM the next work day after each day that work is performed;

b. QC Specialist Reports and Test Results: Originals and 1 copy, by 10:00 AM the next working day after each day that work is per formed;

c. Testing Plan and Log, 1 copy, at the end of each month;

d. QC Meeting Minutes: 1 copy, within 2 calendar days of the meeting;

e. Rework Items List: 1 copy, by the last working day of the month and;

f. 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. The QC program consists of a QC Organization, a QC Plan, attending a QC Plan meeting, attending a Coordination and Mutual Understanding Meeting, conducting QC meetings, performing three phases of control, performing submittal review, ensuring testing is performed, and preparing 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 shall cover construction operations on- site and off-site and shall be keyed to the proposed construction sequence.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to manage and implement the QC program. The QC Manager is required to attend the QC Plan meeting, attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review, ensure testing is performed and prepare 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 the QC specialists. In addition to managing and implementing the QC program, the QC Manager may perform the duties of project superintendent.

1.5.1.2 Qualifications

An individual with a minimum of five years experience as a Foreman, Superintendent, Inspector, QC Manager, Project Manager, or Construction Manager on similar size construction contracts which included the major trades that are part of this Contract.

1.5.1.3 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager shall have completed the course entitled "Construction Quality Management for Contractors." This course is periodically offered by the

Navy and the Corps of Engineers. However, it is sponsored by both the AGC and the ABC of Charlotte, North Carolina. Call one of the following to sign up for the next available class:

The Army Corps of Engineers, Baltimore District;
(Offered in Baltimore, MD)
Contact: Corps of Engineers, Baltimore District
10 South Howard Street
Baltimore, MD 21201
Phone: 410-962-2323

The Associated General Contractors (AGC), Virginia Chapter
in Cooperation with the Army Corps of Engineers, Norfolk District, and
the Naval Facilities Engineering Command, Atlantic Division.
(Offered at rotating locations in Norfolk, Williamsburg, and Richmond)
Contact: AGC of Virginia
8631 Maylan Drive, Parham Park
Richmond, VA 23294
Phone: 804-346-3383

Carolinas Associated General Contractors (CACG)
Contact: CACG
1100 Euclid Avenue
Charlotte, NC 28203
Phone: 704-372-1450 (ext. 5248)

Associated Builders and Contractors (ABC), Carolinas Chapter
Contact: ABC, Carolinas Chapter
3705 Latrobe Drive
Charlotte, NC 28211
Phone: 704-367-1331
or: 877-470-4819

1.5.2 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 shall be three years of experience in one of the specified positions.

1.6 QC PLAN

1.6.1 Requirements

Provide for approval by the Contracting Officer, a QC plan submitted in a 3-ring binder with pages numbered sequentially that covers, both on-site and off-site work and includes, the following:

a. A table of contents listing the major sections identified with tabs in the following order:

I. QC ORGANIZATION
II. NAMES AND QUALIFICATIONS
III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
IV. OUTSIDE ORGANIZATIONS
V. APPOINTMENT LETTERS
VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
VII. TESTING LABORATORY INFORMATION

VIII. TESTING PLAN AND LOG
IX. PROCEDURES TO COMPLETE REWORK ITEMS
X. DOCUMENTATION PROCEDURES
XI. LIST OF DEFINABLE FEATURES
XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL
XIII. PERSONNEL MATRIX
XIV. PROCEDURES FOR COMPLETION INSPECTION

b. A chart showing the QC organizational structure and its relationship to the production side of the organization.

c. Names and qualifications, in resume format, for each person in the QC organization.

d. Duties, responsibilities and authorities of each person in the QC organization.

e. 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.

f. A letter signed by an officer of the firm appointing the QC Manager and stating that he/she is responsible for managing and implementing the QC program as described in this contract. Include in this letter the QC Manager's authority to direct the removal and replacement of non-conforming work.

g. Procedures for reviewing, approving and managing submittals. Provide the names of the persons in the QC organization authorized to review and certify submittals prior to approval.

h. Testing laboratory information required by the paragraphs entitled "Accredited Laboratories" or "Testing Laboratory Requirements", as applicable.

i. 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.

j. Procedures to identify, record, track and complete rework items.

k. Documentation procedures, including proposed report formats.

l. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and requires separate control requirements. As a minimum, if approved by the Contracting Officer, consider each Section of the Specifications as a definable feature of work. However, at times, there may be more than one definable feature of work in each Section of the Specifications.

m. A personnel matrix showing, for each section of the specification, who will perform and document the three phases of control, and who will perform and document the testing.

o. Procedures for Identifying and Documenting the Completion Inspection process. Include in these procedures the responsible party for punch out inspection, prefinal inspection, and final

acceptance inspection.

1.6.2 Preliminary Work Authorized Prior to Approval

The only work that is authorized to proceed prior to the approval of the QC plan is mobilization of storage and office trailers and surveying.

1.6.3 Approval

Approval 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 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 his/her submitted qualifications.

1.6.4 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed change, including changes in the QC organization personnel, a minimum of seven calendar days prior to a proposed change. Proposed changes must be approved by the Contracting Officer.

1.7 QC PLAN MEETING

Prior to submission of the QC plan, 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.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, but prior to the start of construction, meet with the Contracting Officer to discuss the QC program required by this Contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used for documentation, administration for on-site and off-site work, and the coordination of the Contractor's management, production and QC personnel with the Contracting Officer. As a minimum, the Contractor's personnel required to attend shall include the project manager, project superintendent, and QC Manager. Minutes of the meeting shall be prepared by the QC Manager and signed by both the Contractor and the Contracting Officer.

1.9 QC MEETINGS

After the start of construction, the QC Manager shall conduct weekly QC meetings at the work site with the project superintendent and QC specialists. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer may attend these meetings. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. As a minimum, the following shall be accomplished at each meeting:

a. Review the minutes of the previous meeting;

b. Review the schedule and the status of work:

- Work or testing accomplished since last meeting
- Rework items identified since last meeting
- Rework items completed since last meeting;

c. Review the status of submittals:

- Submittals reviewed and approved since last meeting
- Submittals required in the near future;

d. Review the work to be accomplished in the next 2 weeks and documentation required. Schedule the three phases of control and testing:

- Establish completion dates for rework items
- Preparatory phases required
- Initial phases required
- Follow-up phases required
- Testing required
- Status of off-site work or testing
- Documentation required;

e. Resolve QC and production problems; and

f. Address items that may require revising the QC plan:

- Changes in QC organization personnel
- Changes in procedures.

1.9.1 THREE PHASES OF CONTROL

The QC Manager shall perform the three phases of control to ensure that work complies with Contract requirements. The Three Phases of Control shall adequately cover both on-site and off-site work and shall include the following for each definable features of work: A definable feature of work is a task which is separate and distinct from other tasks and requires separate control requirements.

1.9.2 Preparatory Phase

Notify the Contracting Officer at least 48 hours in advance of each preparatory phase. Conduct the preparatory phase with the superintendent, and the foreman responsible for the definable feature. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report. Perform the following prior to beginning work on each definable feature of work:

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

c. 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;

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

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

f. 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;

g. Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted; and

h. Discuss construction methods

1.9.3 Initial Phase

Notify the Contracting Officer at least 48 hours in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the QC Specialists, the Superintendent, and the Foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. 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 definable feature of work:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Review the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met; and

d. Ensure that testing is performed by an approved laboratory.

1.9.4 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Contractor Quality Control 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 an approved laboratory; and

d. Ensure that rework items are being corrected.

1.9.5 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.

1.10 SUBMITTAL REVIEW

Procedures for submittals are as described in Section entitled "Submittal Procedures."

1.11 TESTING

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

1.11.1 Testing Laboratory Requirements

Provide an independent testing laboratory or establish a laboratory qualified to perform sampling and tests required by this Contract. When the proposed testing laboratory is not accredited by an acceptable accreditation program as described by the paragraph entitled "Accredited Laboratories", submit to the Contracting Officer for approval, certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

a. Sampling and testing shall be under the technical direction of a Registered Professional Engineer (P.E) with at least 5 years of experience in construction material testing.

b. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.

c. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.

d. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.

e. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A 880. Laboratories shall meet the requirements of ASTM E 329.

f. Laboratories engaged in nondestructive testing (NDT) shall meet the requirements of ASTM E 543.

g. Laboratories engaged in hazardous materials testing shall meet the requirements of OSHA and EPA.

1.11.2 Accredited Laboratories

Acceptable accreditation programs are the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program and the American Association for Laboratory Accreditation (A2LA) program. Furnish to the Contracting Officer, a copy of the Certificate of Accreditation, Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required by the Contract.

1.11.3 Inspection of Testing Laboratories

Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records shall be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel

qualifications, test report forms, and the internal QC procedures.

1.11.4 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.

1.11.5 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. 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 shall 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. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.12 QC CERTIFICATIONS

1.12.1 Contractor Quality Control Report Certification

Each Contractor Quality Control Report shall contain the following statement: "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".

1.12.2 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 and attesting that the work for which payment is requested, including stored material, is in compliance with contract requirements.

1.12.3 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".

1.13 DOCUMENTATION

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

1.13.1 Contractor Production Report

Reports are required for each day that work is performed and shall be attached to the Contractor Quality Control Report prepared for the same day. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Production Reports are to be

prepared, signed and dated by the project superintendent and shall contain the following information:

a. Date of report, report number, name of contractor, contract number, title and location of Contract and superintendent present.

b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.

c. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed and hours worked.

e. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:

(1) Was a job safety meeting held this date? (If YES, attach a copy of the meeting minutes.)

(2) Were there any lost time accidents this date? (If YES, attach a copy of the completed OSHA report.)

(3) Was crane/manlift/trenching/scaffold/hv electrical/high work/hazmat work done? (If YES, attach a statement or checklist showing inspection performed.)

(4) Was hazardous material/waste released into the environment? (If YES, attach a description of incident and proposed action.)

f. A list of safety actions taken today and safety inspections conducted.

g. A list of equipment/material received each day that is incorporated into the job.

h. A list of construction and plant equipment on the work site including the number of hours used, idle and down for repair.

i. Include a "remarks" section in this report which will contain 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.

1.13.2 Contractor Quality Control Report

Reports are required for each day that work is performed and for every seven consecutive calendar days of no-work and on the last day of a no-work period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

a. Identify the control phase and the definable feature of work.

b. Results of the Preparatory Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedule have been discussed.

c. Results of the Initial Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the Contract, and the required testing has been performed and include a list of who performed the tests.

d. Results of the Follow-up Phase inspections held including the location of the definable feature of work. Indicate in the report for this definable feature of work that the work complies with the Contract as approved in the Initial Phase, and that required testing has been performed and include a list of who performed the tests.

e. Results of the three phases of control for off-site work, if applicable, including actions taken.

f. List the rework items identified, but not corrected by close of business.

g. List the rework items corrected from the rework items list along with the corrective action taken.

h. Include a "remarks" section in this report which will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Organization and corrective action taken by the Contractor.

i. Contractor Quality Control Report certification.

1.13.3 Testing Plan and Log

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" the date the test was conducted, the date the test results were forwarded to the Contracting Officer, remarks and acknowledgement that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated "Testing Plan and Log" to the last daily Contractor Quality Control Report of each month.

1.13.4 Rework Items List

The QC Manager shall 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, 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 "Contractor Rework Items List" to the

last daily Contractor Quality Control Report of each month. The Contractor shall be responsible for including on this list items needing rework including those identified by the Contracting Officer.

1.13.5 As-Built Drawings

The QC Manager is required to review the as-built drawings required by Section 01 11 00, "Summary of Work", to ensure that as-built drawings are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. The QC Manager shall initial each deviation and each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.13.6 Report Forms

The following forms, which are attached at the end of this section, are acceptable for providing the information required by the paragraph entitled "Documentation". While use of these specific formats are not required, any other format used shall contain the same information:

a. Combined Contractor Production Report and Contractor Quality Control Report (1 sheet), with separate continuation sheet

b. Testing Plan and Log

c. Rework Items List

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

01/07

PART 1 GENERAL

1.1 TEMPORARY UTILITIES

1.1.1 Availability of Utility Services

a. The Contract clause related to utilities applies. Reasonable amounts of water and electricity from the nearest outlet will be provided free of charge for pursuance of work within a facility under this contract. If the nearest available outlet cannot be utilized by the Contractor because of improper voltage, insufficient current, improper pressure, incompatible connectors, etc., it shall be the responsibility of the Contractor to provide temporary utilities as required.

b. Reasonable amounts of utilities for contractor trailers and storage buildings will be made available to the Contractor, when available. The Contractor shall be responsible for providing transformers, electrical service poles and drops for electrical services, and backflow preventer devices on connections to domestic water lines. Final taps and tie-ins to the Government utility grid will be made by the Contractor after approval by the Contracting Officer. Tap-in cost, if any, shall be the responsibility of the Contractor. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

1.1.2 Energy and Utilities Conservation

The Contractor shall carefully conserve utilities furnished without charge. The Contractor, at his own expense and in a manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines and remove the same prior to final acceptance of the construction.

1.2 WEATHER PROTECTION

1.2.1 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 shall 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.

1.2.1.1 Hurricane Conditions of Readiness

Unless directed otherwise, comply with:

a. Condition FIVE: Normal weather conditions are expected for the

foreseeable future. No action is required.

b. Condition FOUR (Sustained winds of 74 mph or greater expected within 72 hours): Contractors shall continue normal daily clean up and good house keeping 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. Stack lumber in neat piles less than 4 feet high. Prepare to remove or secure all debris, trash, or stored materials that could become missile hazards during high wind conditions. Meetings should be held on-site with all subcontractors to review the measures that are going to need to be taken should the base go to a higher readiness condition. Contact the ROICC for any additional updates and upon completion of all required actions.

c. Condition THREE (Sustained winds of 74 mph or greater expected within 48 hours): Once Condition 3 is set, contractors shall shift their focus from their normal activities to taking the actions that are required to prepare the job site for the potential of destructive weather. All debris and rubbish shall be removed form the site at the end of the workday. All stored materials shall either be removed from the job site or secured (metal straps or heavy lines/ropes). All tools, equipment and gear shall be secured at the end of the workday. Begin preparations to adequately secure the facility (windows boarded up, etc.). Meetings should be held on-site with all subcontractors to review the measures that are going to be taken should base go to a higher readiness condition. Contract the ROICC for any additional updates and upon completion of all required actions.

d. Condition TWO (Sustained winds of 74 mph or greater expected within 24 hours): Cease all normal activities until the job-site is completely prepared for the onslaught of destructive weather. The job site should be completely free of debris, rubbish and scrap materials. The facility being worked on should be made weather-tight. All scaffolding planking shall be removed. All formwork and free standing structural steel shall be braced. All machinery, tools, equipment and materials shall be properly secured or removed from the job-site. Expend every effort to clear all missiles hazards and loose equipment from the job site. When the contractor secures for the day the job site should be left in a condition that is ready for the storm and the contractor should assume that they will not be allowed to return to their job site until after the storm passes and the base is reopened. Contact ROICC for additional updates and upon completion of required actions.

e. Condition ONE (Sustained winds of 74 mph or greater expected within 12 hours): If still on the job site, the contractor will be required to immediately leave the base until the storm passes and the base is reopened.

1.3 STORAGE AREAS

The Contract Clause entitled "FAR 52.236-10, Operations and Storage Areas" and the following apply:

1.3.1 Storage Size and Location

The site available for storage shall be confined to the location as directed by the Contracting Officer.

1.3.2 Storage in Existing Buildings

The Contractor shall be working in and around a operational vehicle re-fueling station and existing building; the storage of material will not be allowed in the buildings unless approved by the Contracting Officer. Otherwise, Contractor shall provide a 8 foot high security fence with a lockable gate around his designation storage area. Remove fence at the completion of work.

1.4 TEMPORARY SANITARY FACILITIES

Provide adequate sanitary conveniences of a type approved for the use of persons employed on the work, properly secluded from public observation, and maintained in such a manner as required and approved by the Contracting Officer. Maintain these conveniences at all times without nuisance. Upon completion of the work, remove the conveniences from the premises, leaving the premises clean and free from nuisance. Dispose of sewage through connection to a municipal, district, or station sanitary sewage system. Where such systems are not available, use chemical toilets or comparably effective units, and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Include provisions for pest control and elimination of odors.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS

05/12

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.

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-S-16165	(Rev E) Shielding Harnesses, Shielding Items and Shielding Enclosures for Use in the Reduction of Interference from Engine Electrical Systems
MIL-STD-461	(Rev E) Control of Electromagnetic Interference Emissions and Susceptibility
MIL-STD-462	(Rev D; Notice 4) Electromagnetic Interference Characteristics

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

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Tables and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

1.2 Contractor Liabilities for Environmental Protection

Contractors shall complete and provide environmental training documentation for training required by Federal, State, and local regulations.

1.3 DEFINITIONS

1.3.1 Sediment

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

1.3.2 Solid Waste

Rubbish, debris, garbage, and other discarded solid materials, except recyclables and hazardous waste as defined in paragraph entitled "Hazardous Waste," resulting from industrial, commercial, and agricultural operations and from community activities.

1.3.3 Sanitary Wastes

Wastes characterized as domestic sanitary sewage.

1.3.4 Rubbish

Combustible and noncombustible wastes such as non-recyclable paper and cardboard, crockery, and bones.

Recyclables includes: clean paper, cardboard, glass, plastics (No. 1 & 2), metal, and cans.

Non-recyclable paper and cardboard are defined as material that has become wet or contaminated with food or other residue that render it un-acceptable for recycling.

Treated wood/lumber is defined as wood that has been stained or treated to prevent rot, or composite wood products such as OSB, pressboard furniture, etc.

Untreated wood is defined as lumber, trees, stumps, limbs, tops, and shrubs.

1.3.5 Debris

Combustible and noncombustible wastes such as ashes and waste materials resulting from construction or maintenance and repair work, (excluding organic matter) leaves, pine straw, grass and shrub clippings.

1.3.6 Chemical Wastes

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

1.3.7 Garbage

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

1.3.8 Hazardous Waste

Hazardous substances as defined in 40 CFR 261 or as defined by applicable State and local regulations.

1.3.9 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

1.3.10 Landscape Features

Trees, plants, shrubs, and ground cover.

1.3.11 Lead Acid Battery Electrolyte

The electrolyte substance (liquid medium) within a battery cell.

1.3.12 Oily Waste

Petroleum products and bituminous materials.

1.3.13 Class I Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Sections 602 (a and b) of The Clean Air Act.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-01 Preconstruction Submittals

Environmental protection plan

Preconstruction survey report

SD-11 Closeout Submittals

Solid waste disposal permit

Environmental training documentation

Environmental Plan Review

Annual Report of Products Containing Recovered Materials

1.4.1 Solid Waste Disposal Permit

Submit one copy of a State and local permit or license for the solid waste disposal facility. If the contract permists the use of the Base Landfill, request a letter from the Contracting Offcier authorizing permission to dump on base; submit the letter to the Base Landfill Office. In lieu of the letter a copy of the contract must be delivered to the Landfill Office for review.

1.5 ENVIRONMENTAL PROTECTION REGULATORY REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined in this Section. 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 but not limited to water, air, solid waste, and noise pollution.

1.6 ENVIRONMENTAL PROTECTION PLAN

1.6.1 Contents of Environmental Protection Plan

a. Include any hazardous materials (HM) planned for use on the station shall be included in the station HM Tracking Program maintained by the Safety Department. To assist this effort, submit a list (including quantities) of HM to be brought to the station and copies of the corresponding material safety data sheets (MSDS). Submit this list to the Contracting Officer. At project completion, remove any hazardous material brought onto the station. Account for the quantity of HM brought to the station, the quantity used or expended during the job, and the leftover quantity which (1) may have additional useful life as a HM and shall be removed by the Contractor, or (2) may be a hazardous waste, which shall then be removed as specified herein.

b. The Environmental Protection Plan shall list and quantify any Hazardous Waste (HW) to be generated during the project.

c. In accordance with station regulations, store HW near the point of generation up to a total quantity of one quart of hazardous waste or 55 gallons of hazardous waste. Move any volume exceeding these quantities to a HW permitted area within 3 days. Prior to generation of HW, contact Contracting Officer for labeling requirements for storage of hazardous wastes.

d. In accordance with station regulations, substitute materials as necessary to reduce the generation of HW and include a statement to that effect in the Environmental Plan.

e. Contact Contracting Officer for conditions in the area of the project which may be subject to special environmental procedures. Include this information in the Preconstruction Survey. Describe in the Environmental Protection Plan any permits required prior to working the area, and contingency plans in case an unexpected environmental condition is discovered.

f. Obtain permits for handling HW, and deliver completed documents to Contracting Officer for review. File the documents with the appropriate agency, and complete disposal with the approval of Contracting Officer. Deliver correspondence with the State concerning the environmental permits and completed permits to Contracting Officer.

1.6.2 Environmental Protection Plan Format

The Environmental Protection Plan shall follow the following format:

ENVIRONMENTAL PROTECTION PLAN

Contractor Organization
Address and Phone Numbers

1. Hazardous materials to be brought onto the station

ENVIRONMENTAL PROTECTION PLAN

Contractor Organization
Address and Phone Numbers

2. MSDS package
3. Employee training documentation
4. HW storage plan
5. HW to be generated
6. Preconstruction survey results
7. Permitting requirements identified

1.6.3 Environmental Plan Review

Fourteen days after the environmental protection meeting, submit the proposed environmental plan for further discussion, review, and approval.

1.6.4 Preconstruction Survey

Perform a preconstruction survey of the project site with the Contracting Officer, and take photographs showing document existing environmental conditions in and adjacent to the site.

1.7 GENERAL ENVIRONMENTAL MANAGEMENT SYSTEM AND ENVIRONMENTAL AWARENESS

The Contractor shall familiarize himself with requirements of the attached "Marine Corps Base (MCB), Camp Lejeune, Contractor Environmental Guide."

1.8 CAMP LEJEUNE SANITARY LANDFILL INFORMATION SHEET

See attached "Camp Lejeune Sanitary Landfill Information Sheet" for hours of operation and other important information pertaining Landfill.

PART 2 PRODUCTS

2.1 ANNUAL REPORT OF PRODUCTS CONTAINING RECOVERED MATERIALS

The Contractor shall submit data annually (by December 1) products used during the previous fiscal year (October 1 - September 30) as required by 6002 of the Solid Waste Disposal Act as amended by Resource Conservation and Recovery Act (RCRA). Report forms is attached to end of this section as "Appendix A."

PART 3 EXECUTION

3.1 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.

3.1.1 Land Resources

3.1.1.1 3.1.1.3 Temporary Construction

Remove traces of temporary construction facilities such as work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other signs of construction.

3.2 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 designated times.

3.3 RESTRICTIONS ON EQUIPMENT

3.3.1 3.4.1 Electromagnetic Interference Suppression

a. Electric motors must comply with MIL-STD-461 relative to radiated and conducted electromagnetic interference. A test for electromagnetic interference will not be required for motors that are identical physically and electrically to those that have previously met the requirements of MIL-STD-461. An electromagnetic interference suppression test will not be required for electric motors without commutation or sliprings having no more than one starting contact and operated at 3,600 revolutions per minute or less.

b. Equipment used by the Contractor shall comply with MIL-S-16165for internal combustion engines and MIL-STD-461 for other devices capable of producing radiated or conducted interference.

c. Conduct tests for electromagnetic interference on electric motors and Contractor's construction equipment in accordance with MIL-STD-461 and MIL-STD-462. Test location shall be reasonably free from radiated and conducted interference. Furnish testing equipment, instruments, and personnel for making the tests; a test location; and other necessary facilities.

3.3.2 Radio Transmitter Restrictions

Conform to the restrictions and procedures for the use of radio transmitting equipment, as directed. Do not use transmitters without prior approval.

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up and separate 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.

3.4.1 Disposal of Metal Paint Cans

All metal paint cans shall be taken to Building 962 for recycling. The cans shall be empty and completely dry. The cans shall be triple rinsed and stenciled "Triple Rinsed" prior to turn in. The Contractor shall give the Government 72 hours advance notice prior to turn-in. Contractor is responsible for rinsing, stenciling, crushing, and deposting in Government owned receptable, located at Building 962.

3.4.2 Disposal of Rubbish and Debris

Rubbish and debris shall be taken off-base for disposal, unless specifically directed otherwise below:

Metals shall be taken to the DRMO disposal area at Lot 203, as specified.

CATEGORY	CONSTRUCTION DEBRIS DISPOSAL - BASE SANITARY LANDFILL EXAMPLE/GENERAL INFORMATION FOR DEPOSIT IN THE LANDFILL
Recyclable Cardboard	Breakdown corrugated cardboard boxes and deliver to the Base Recycling Center located at Building 982. If base personnel rejects the cardboard, take cardboard for off-base disposal.
Recyclable Wood Pallets	Deliver usable pallets to the Base Recycling Center located at Building 982. If base personnel rejects the pellets, take pallets for off-base disposal.
Organic Matter	Organic matter will not be accepted at the landfill.
Asphalt Pavement	Remove pavement from Government property and deliver to an asphalt recycling establishment. Provide a record of the total tons of asphalt recycled and the corporate name and location of the recycling establishment receiving the removed asphalt.
*****	Weigh each and every vehicle delivering debris upon entrance and exit. Cover debris.
Metals	Metals will not be accepted at the landfill. Remove metals from each and every category before delivery to landfill. (Example: Remove hardware from doors and windows.) Dispose of metal construction debris at Defense Reutilization Maintenance Office (DRMO). Aluminum, brass, copper, lead, other metal, electrical wiring, cable (cut in 3 foot or less sections)
Treated & Untreated Wood/Lumber	Treated & untreated wood/lumber will not be accepted at the landfill.
Concrete	Concrete will not be accepted at the landfill.
Construction Material	Construction material should be managed and placed in a designated area. Area shall be kept clean of debris and all material removed at the end of the project.
Solid Waste	Separate each category of solid waste to enhance recycling.

CATEGORY	CONSTRUCTION DEBRIS DISPOSAL - BASE SANITARY LANDFILL EXAMPLE/GENERAL INFORMATION FOR DEPOSIT IN THE LANDFILL
Hazardous Material	This project involves demolition, renovation/repair and/or construction activities; therefore, hazardous material (such as paints, solvents, thinners, adhesives, etc) may be used during the execution of this project. The contractor will be required to appropriately manage the hazardous material and provide secondary containment.
Solid Waste Report	All solid waste generated and recycled will be weighed. Contractor will report the amount of solid wasted disposed and recycled at the end of the project to EMD's Solid Waste Manager or the Pollution Prevention Manager via the OICC. Tonnage information for all materials delivered to the Base Landfill is available at the Landfill Office. Submit a written request to the Landfill Manager, specifying the desired information.
Recycling of Construction Debris	Recyclable material (ex. Scrap metal/aluminum/brass/copper/lead, and other metal) may be recycled through Defense Utilization Maintenance Office) DRMO using a 1348-1a with the following information (Proceeds for the sale of recyclable material are to go to the Qualified Recycling financial account - 17F3875 27RM 00767001 0 000027 3c 000000 06700198004). For additional information contact the Base Recycling Coordinator 910-451-4214.
Electrical Equipment	Before demolition or removal of electrical equipment from the Base - Contractor shall contact Base High Voltage Shop Supervisor at (910) 451-2790, to allow for first right of refusal of electrical equipment such as: ATS, transformers, and generators. Electrical equipment will not be accepted at landfill.

3.4.3 Disposal Off-Base

a. Provide 24-hour advance written notice to the Contracting Office of Contractor's intention to dispose of off base.

b. Disposal at sites or landfills not holding a valid State of North Carolina permit is specifically prohibited. The prohibition also applies to sites where a permit may have been applied for but not yet obtained.

c. Off-base disposal of construction debris outside the parameters of

this paragraph at site without State permits and/or not in accordance with regulatory requirements shall require the Contractor at his own expense to remove, transport and relocate the debris to a State approved site. The Contractor shall also be required to pay any fines, penalties, or fees related to the illegal disposal of construction debris

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTE

3.5.1 Hazardous Waste Generation

Handle generated hazardous waste in accordance with 40 CFR 262.

3.5.2 Hazardous Waste Disposal

Dispose of hazardous waste in accordance with Federal, State, and local regulations, especially 40 CFR 263, 40 CFR 264, and 40 CFR 265. Removal of hazardous waste from Government property shall not occur without prior notification and coordination with the Contracting officer. Transport hazardous waste by a permitted, licensed, or registered hazardous waste transported to a TSD facility. Hazardous waste shall be properly identified, packaged, and labeled in accordance with 49 CFR 172. Provide completed manifest for hazardous waste disposed of off-site to the Contracting Officer within 7 days of disposal. Hazardous waste shall not be brought onto the station.

3.5.3 Hazardous Waste Storage

Store hazardous waste in containers in accordance with 49 CFR 178. Identify hazardous waste in accordance with 40 CFR 261 and 40 CFR 262. Identify hazardous waste generated within the confines of the station by the station's EPA generator identification number.

3.5.4 Spills of Oil and Hazardous Materials

Take precautions to prevent spills of oil and hazardous material. In the event of a spill, immediately notify the Contracting Officer. Spill response shall be in accordance with 40 CFR 300 and applicable State regulations.

3.5.5 Lead-Acid Batteries

Dispose of lead-acid batteries that are not damaged or leaking at a State-approved battery recycle or at a permitted or interim status hazardous waste TSD facility. For lead-acid batteries that are leaking or have cracked casings, dispose of the electrolyte solution using one of the following alternatives:

a. An industrial waste water treatment plant, if available and approved by the Contracting Officer for disposing of lead-acid battery electrolyte.

b. Dispose of the lead-acid battery electrolyte at a permitted or interim status hazardous waste TSD facility.

The management and disposal of waste lead-acid batteries and electrolyte shall comply with requirements for management and disposal of hazardous wastes.

3.5.6 Mercury Control

Prior to starting work, remove thermostats, switches, and other components that contain mercury. Upon removal, place items containing mercury in doubled polyethylene bags, label, and turn over to the Contracting Officer for disposal.

3.5.7 Petroleum Products

Protect against spills and evaporation during fueling and lubrication of equipment and motor vehicles. Dispose of lubricants to be discarded and excess oil.

3.6 DUST CONTROL

Keep dust down at all times, including 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 shake bags of cement, concrete mortar, or plaster unnecessarily.

3.7 QUARANTINE FOR IMPORTED FIRE ANT (4/82)

Onslow, Jones, and Cartaret Counties and portions of Duplin and Craven Counties have been declared a generally infested area by the United States Department of Agriculture (USDA) for the imported fire ant. Compliance with the quarantine regulations established by this authority as set forth in USDA Publication 301.81 of 31 December 1992, is required for operations hereunder. Pertinent requirements of the quarantine for materials originating on the Camp Lejeune reservation, the Marine Corps Air Station (Helicopter), New River and the Marine Corps Air Station, Cherry Point, which are to be transported outside Onslow County or adjacent suppression areas, include the following:

a. Certification is required for the following articles and they shall not be moved from the reservation to any point outside Onslow County and adjacent designated areas unless accompanied by a valid inspection certificate issued by an Officer of the Plant Protection and Quarantine Program (PPQ) of the U.S. Department of Agriculture.

(1) Bulk soil

(2) Used mechanized soil-moving equipment. (Used mechanized soil-moving equipment is exempt if cleaned of loose noncompacted soil).

(3) Other products, articles, or means of conveyances, if it is determined by an inspector that they present a hazard of transporting spread of the imported fire ant and the person in possession thereof has been so notified.

b. Authorization for movement of equipment outside the imported fire and regulated area shall be obtained from USDA, Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ), Box 28, Goldsboro, North Carolina, 27533-0028, Attn:

Mr. William Scroggins or Mr. Frank Best, telephone (919) 735-1941. If Mr. Scroggins or Mr. Best are not available, contact Mr. Jim Kelley at (910) 815-4667, the supervisor's office in Wilmington. Requests for inspection shall be made sufficiently in advance of the date of movement to permit arrangements for the services of authorized inspectors. The equipment shall be prepared and assembled so that it may be readily inspected. Soil on or attached to equipment, supplies, and materials shall be removed by washing with water or such other means as necessary to accomplish complete removal. Resulting spoil shall be wasted as necessary and as directed.

ANNUAL REPORT OF PRODUCTS CONTAINING RECOVERED MATERIALS

Contractor shall submit data annually (By 1 December) for the following products used during the previous fiscal year (1 October - 30 September) as required by 6002 of the Solid Waste Disposal Act as ammended by Resource Conservation and Recovery Act (RCRA):

Contract Number: _____ Fiscal Year: _____

MATERIAL	UNIT	QUANTITY (CRM)	TOTAL QUANTITY
A. Insulation			
1. Loose fill	Ft3		
2. Blanket or batt	Ft2		
3. Board	Ft2		
4. Spray-in-place	m3		
5. Other			
B. Cement and Concrete	yd3		
C. Paper and Paper Products			
1. Copy Paper	Box		
2. Printing/Writing Paper	Box		
3. Corrugated and fiberboard boxes	Box		
4. Folding boxboard and cartons	Box		
5. Stationary, office papers, envelopes, and computer paper	$Amt		
6. Toilet tissue, paper towels, fasial tissue, paper napkins, doilies and industrial wipes	$Amt		
7. Brown papers and coarse papers	Box		
8. Other			

APPENDIX A

MATERIAL	DEFINITION
1. Quantity (CRM)	Quantity used containing recovered materials.
2. Total Quantity	Quantity used containing recovered materials plus quantity used not containing recovered materials.
3. Unit	Ft3 (cubic feet), Ft2 (square feet), m3 (cubic meters), yd3 (cubic yards), box (number of boxes used), $ Amt (dollar value of material used)
4. Loose-Fill Insulation	Includes, but is not limited to..."cellulose fiber, mineral fibers (fiberglass and rock wool), vermiculite, and perlite.
5. Blanket or Batt Insulation	Includes, but is not limited to... "mineral fibers (fiberglass and rock wool)."
6. Board Insulation	This category refers to sheathing, roof decking, and wood panel insulation. It includes, but is not limited to... "cellulose fiber fiberboard, perlite composite board, polyurethane, polyisocyanurate, polystyrene, phenolics, and composites."
7. Spray-in-place Insulation	Includes, but is not limited to... "foam-in-place polyurethane and polyisocyanurate, and spray-on cellulose."
8. Cement or Concrete Containing Recovered Materials, Cement, or Concrete Containing Fly Ash	
9. Copy Paper	This item refers to... "any grade of paper suitable for copying by the xerographic method."
10. Printing & Writing Paper	This item refers to... "paper designed for printing, other than newsprint, such as offset or book paper," and... "paper suitable for pen and ink, pencil, typewriter or printing."

APPENDIX A

MATERIAL	DEFINITION
11. Corrugated & Fiberboard Boxes	Corrugated boxes refer to... "boxes made of corrugated paperboard, which, in turn, is made from a fluted corrugating medium pasted to two flat sheets of paperboard (linerboard)." Fiber or fiberboard boxes refer to... "boxes made from containerboard, either solid fiber or corrugated paperboard (general term); or boxes made from solid paperboard of the same material throughout."
12. Folding Boxes and Cartons	This item refers to... "a paperboard suitable for the manufacture of folding cartons."
13. Stationery, Office Papers, Envelopes, and Manifold Business Forms	This item is considered self-explanatory, however, if questions arise refer to 40 CFR 250.4 for definitions of any of these items.
14. Toilet Tissue, Paper Towels, Facial Tissue, Paper Napkins, Doilies, and Industrial Wipes	This item is considered self-explanatory, however, if questions arise refer to 40 CFR 250.4 for definitions of any of these items.
15. Brown Papers, and Coarse Papers	Brown papers refer to... "papers usually made from unbleached kraft pulp and used for bags, sacks, wrapping paper, and so forth." Coarse papers refer to... "papers used for industrial purposes, as distinguished from those used for cultural or sanitary purposes."
16. Other	Any other type of paper not included in any of the above categories.

APPENDIX A

-- End of Section --

SECTION 01 78 00

CLOSEOUT PROCEDURES

12/10

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-10, Operation and Maintenance Data

Equipment/product warranty list

Submit Data Package 1 in accordance with Section 01 78 23, "Operation and Maintenance Data."

SD-11 Closeout Submittals

As-built drawings

GIS Deliverables

Record of materials

Maximo requirements

Complete Submittal Package - 1 copy

Equipment/product warranty tag

1.2 PROJECT RECORD DOCUMENTS

As-Built Drawings will be submitted as specified in 1.2.1 along with GIS Deliverables which will be created and submitted within specification in section 1.2.2.

1.2.1 As-Built Drawings

"FAC 5252.236-9310, Record Drawings." In addition to the requirements of FAC 5252.236-9310, the Contractor shall survey the horizontal and vertical location of all new utilities and structures to within 0.1 feet relative to the station datum. Drawing files shall be drawn according to, and in scale with NAD-1983-UTM-Zone-18N, GCS-North-America 1983, Datum: D-North-America-1983. All utilities shall be surveyed at each fitting and every 100 LF of run length and at each change of direction. All structures shall be surveyed at corners of buildings. Locations and elevations shall be recorded on the Record Drawings. Submit drawings with QC certification. Submit drawings in AutoCAD format versions 2000 or 2002.

1.3 SPECIFICATION FOR DIGITAL DATA - GIS DELIVERABLES

Objective: The primary objective of this section is to provide detailed specifications for the collection and creation of Geographic Information

System (GIS) data to ensure that all GIS data delivered is compatible and will add value to Camp Lejeune's Installation Geospatial Information and Services (IGI&S) repository.

1.3.1 **Section 1** - Collection and Creation of Geospatial data

Prior to data collection and creation the contractor shall provide the Government Project Manager a Technical Approach Plan for approval which describes the contractor's plan to collect and create GIS Data as specified in this section.

The Technical Approach Plan will contain the following:

a. How features will be collected utilizing Global Positioning System (GPS) technology

b. Which features, as specified in Section 2, will be located, GPS and created

c. Source of attribute data

d. Steps taken to create file personal Geodatabase

e. What GIS data will be delivered

All questions regarding the Specification For Digital Data - GIS Deliverables shall be directed to MCB Camp Lejeune I&E, PWD GIS Section, via the Government Project Manager.

Specific Tasks are as follows:

a. Contractor is responsible for the collection and creation of geospatial data for newly constructed or replaced utilities and infrastructure features that fall within the realm of this specification.

b. Utilize GPS technology to locate and create GIS data and deliver only features that are relevant to this contract as specified in Section 2.

c. Follow instructions in Section 2 which defines the following:

(1) GIS feature requirements
(2) The manner in which the data will be collected in GPS
(3) The manner in which GIS data will be created
(4) Required Attribute data
(5) Other instructions pertaining to GIS data

Survey Grade and Sub-Foot GPS Geospatial Data Collection requirements:

a. GPS data shall be completed in accordance with the "Statewide Global Positioning System (GPS) Data Collection and Documentation Standards, Version 3" (or higher version if available at the time of this project) as prepared by the Statewide Mapping Advisory Committee and adopted by the North Carolina Geographic Coordinating Council in May 2006. Copies of these standards can be found on the Internet at: www.ncgicc.org.

b. Only bench marks included in the North Carolina Geodetic Survey

Base Station Network shall be used for mapping grade GPS data collection.

c. Mission planning is essential and contractor should utilize lowest possible PDOP values.

d. Geographic data shall be collected and created into the Universal Transverse Mercator (UTM) coordinate system.

(1) UTM Zone 18N, the GRS 1980 spheroid and the North American Datum 1983.

e. Spatial accuracy requirements for Survey and Sub-Foot grade data collection are as follows:

Sub-Foot requirements

(1) All points shall be within + 12 inches
(2) 95 % accuracy rate for all points.

Survey Grade requirements

(1) All points shall be within + 1 centimeter
(2) 98 % accuracy rate for all points

f. Every effort shall be made to capture feature locations without using offsets.

(1) Offsets will be noted in final report and user_flag field for which each feature it applies, unless otherwise specified

1.3.1.1 Geospatial Data Standards

The IGI&S repository model is based on the Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) with modifications.

a. Copies of the SDSFIE may be obtained from the Solutions and Technology for the Advancement and Refinement of SDSFIE (STARS) Team Internet homepage at http://www.sdsfie.org/.

b. Due to on-going government modifications to Camp Lejeune's IGI&S repository the contract shall ensure the schema of the final product is in compliance and all data will been created and delivered utilizing Camp Lejeune's most current IGI&S repository schema.

(1) The contractor shall request an additional template prior to delivery to be used for the final delivery of data

(2) Final report will include date of last data request for IGI&S schema and geospatial data

Camp Lejeune's IGI&S repository's schema and geospatial data shall be obtained via the Government Project Manager before any data is collected or created. The Project Manager, upon request, shall furnish the contractor with a Geospatial data request package. The contractor shall:

a. Request only GIS data that is pertinent to the contract

b. Request shall include the following information:

(1) Contract Number and Title
(2) Contractor's Name, Address, Phone Number, Email and Point of Contact
(3) Summary of Project
(4) Contract Specification
(5) Expected Delivery date and features

When developing a new feature class, the Contractor shall develop the initial structure consistent with the most current version of SDSFIE.

a. If further modifications to the database structure are required, the Contractor will consult with the Government Project Manager for direction and final approval.

b. All new feature data class shall be noted on the final report.

1.3.1.2 Collection of Geospatial data

a. Utility data, as identified in Section 2 will be collected utilizing Survey Grade GPS data collection methods.

b. Prior to GPS efforts, buried underground utilities shall be located in order to GPS accurate location.

c. Other infrastructure data, as identified in Section 2 shall be collected utilizing Sub-Foot GPS data collection methods.

d. GPS data and collection data files shall be included with every phase of delivery.

1.3.1.3 Creation of Geospatial Data

Data will be created in a File Personal Geodatabase using ArcGIS 9.3 or higher if a higher version is being used by the government at the time of this project.

Contractor shall verify the ArcGIS version, via the Government Project Manager, at the commencement of this contract.

Geodatabase Spatial Reference Properties shall include the following:

a. Coordinate System of UTM Zone 18N, the GRS 1980 spheroid and the North American Datum 1983

b. x,y domain precision of 1000

To ensure that all Geospatial data created can be loaded and add value to Camp Lejeune's IGI&S repository; data will be created in such a way that the delivered file personal geodatabase mirrors the IGI&S repository. This includes, but is not limited to the following:

a. Geospatial database table structure

b. Domain(s) configuration

(1) SDSFIE domains have been modified by Camp Lejeune for operational purposes, it is the contractor's responsibility to

request and utilize associated domain structure to ensure deliverable will load into the geodatabase

c. Required attribute data as specified in Section 2 shall be obtained via contract specifications, plans and on as-built drawings

(1) Actual field data always supersedes drawings

d. The contractor may have to research and verifying existing as-built data in the Technical Records Section located at the Public Works Building, MCB Camp Lejeune

All data must be created using GIS topology rules for polygons, points and lines, such as, but not limited to the following examples:

a. Polygons, Polylines and points rules, please reference illustrating topology rules in ArcGIS at www.esri.com

b. Polygons must not have slivers

c. All utility or infrastructure system data, which is, but not limited to, transportation system and electrical, water, steam distribution, and wastewater collection etc., will be created using GIS spatially connectivity rules which specifies that vertex, edge and endpoints be snapped to features within the system.

(1) Features will be snapped to the appropriate item

(2) Data will be created to represent the real world, for example, direction of flow, i.e., water, sewer and transportation systems will be drawn and created in the direction of flow

(3) Utility systems will be created from source to sink, etc

(4) Abandoned In Place (AIP) utility lines will be located and updated in the current utility line feature data set and identified as AIP in the attribute table

(4) Demolished Lines are to be delivered in a feature data set, which appropriately reflects the utility

1.3.1.4 Creation of Geographic Data Documentation (METADATA)

For each digital file delivered containing geographic information the Contractor shall provide documentation consistent with the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM). Both 'Mandatory' and 'Mandatory-if- Applicable' fields shall be completed for each geographic data set.

Metadata generation tools included in the ArcGIS suite of software shall be used in the production of the required metadata in XML format. If neither of these tools is used, the Contractor must insure that the metadata is delivered in a format that can be easily translated to the XML format. Copies of the FGDC metadata standard can be obtained on the Internet at http://www.fgdc.gov.

The documentation shall include, but not be limited to, the following:

a. The name and description of the data set/data layer

b. The source of the data and any related data quality information such as positional accuracy and time period of content

c. Descriptions of the receiver and other equipment used during collection and processing, base stations used for differential corrections, software used for performing differential corrections, estimated horizontal and vertical accuracies obtained, and conversion routines used to translate the data into final geographic data delivery format

d. Type of data layer (point, line, polygon, etc.)

e. Field names of all attribute data and a description of each field name

f. Definition of all codes used in the data fields

g. Ranges of numeric fields and the meaning of these numeric ranges

h. The creation date of the data layer and the name of the person or company who created it

i. A point of contact shall be provided to answer technical questions

Final report will also be required with the following supplement information:

a. Specific procedures and list of equipment, software and versions that was utilized for the GPS data collection and creation of geospatial data

b. Any offsets

c. Modifications to the geodatabase to include any new feature data class

d. Source that was utilized for all required attributes

e. Miscellaneous information that the contractor deems significant

f. A Technical Point of Contact

g. GPS data controller files

1.3.1.5 GIS Submittals

a. Reports will be submitted in the following formats and or versions. Contractor shall verify version(s) of software, via the Government Project Manager, at the commencement of this contract

(1) Microsoft Office 2003
(2) Adobe Portable Document Format (PDF)
(3) Spreadsheet files shall be provided in Microsoft Excel format

b. All GIS data will be provided in a ArcGIS file personal geodatabase as specified

c. Media for Geospatial Data Deliverables: Geographic data shall be delivered on a compact disk read-only memory (CD-ROM) -or- digital versatile disk read-only memory (DVD-ROM)

d. Map submittals shall accompany each geospatial deliverable

(1) Include ANSI C map for each project / area

Data should be labeled and attributed per specification

1.3.1.6 Ownership

All digital files, final hard-copy products, source data acquired for this project, and related materials, including that furnished by the Government, shall become the property of Marine Corps Base, Camp Lejeune and will not be issued, distributed, or published by the Contractor.

1.3.1.7 Geographic Data Review

a. The digital geographic maps, GPS collection files and related data, all working text and documents and file personal geodatabase shall be included for review in the draft and final contract submittals

b. The contract shall submit a preliminary review of data between 15-25 percent to ensure specifications are being met

c. The data will be analyzed for discrepancies in subject content, correct format in accordance with these specifications, and compatibility with Camp Lejeune's IGI&S repository schema

d. Failure for non-compliance of the specifications outlined in this document will result in non-acceptance of data deliverables

1.3.2 **Section 2** - Instructions to GPS and Attribute Requirements

Contract shall deliver all GIS data required in this section that applies to this contract

a. Attribute data requirements for Infrastructure: The following attributes shall be collected for each infrastructure data class: Collect GPS data for all features listed with Sub-Foot accuracy and enter attribute data in compliance with the IGI&S repository

b. Structures: CLJN.structure_existing_area

GPS Structure and collect the following attributes:

(1) Subtype ID:
(2) Building ID:
(3) Structure Status
(4) Number of Levels
(5) Structure Use 2: Populate "Residential" if structure is a residential unit
(6) Material:
(7) Drawing Number
(8) Contract Number
(9) Date Acquired

(10) Source

c. Floor Outline: CLJN.building.floor_outline (Polyline) All new and renovated buildings will be required to have a "clean floor plan" for each floor level that will be delivered in GIS format. Each level will represent one feature and provide the following: walls, doors, windows, closet, crawlspace, head facility, stairwells, etc.

Create feature and update the following attributes:

(1) Building ID: Facility number
(2) Floor Name
(3) Subtype ID:
(4) Drawing Number
(5) Drawing Type
(6) Contract Number

d. Slabs: CLJN.slab_area

GPS and collect the following attributes:

(1) Structure ID: (Facility Number, if applicable)
(2) Feature Description:
(3) Structure Material
(4) Structure Condition
(5) Built Date
(6) Drawing Number
(7) Drawing Type
(8) Contract Number
(9) Data Source:

1.3.2.1 Attribute data requirements for Transportation

The following attributes shall be collected for each infrastructure data class: Collect GPS data for all features listed with Sub-Foot accuracy.

a. Road Centerline: CLJN.road_centerline

GPS and collect the following attributes:

(1) Category:
(2) Road Name
(3) Paved: PAVED / UNPAVED
(4) Date Acquired:
(5) Surface Type:
(6) Drawing Number
(7) Contract Number
(8) Data Source:
(9) Use:
(10) Ramp:

b. Road Area: CLJN.road_area

GPS and collect the following attributes:

(1) Road Segment
(2) Paved
(3) Divided: yes / no

(4) Number of Lanes
(5) Installation Date
(6) Surface Type: Drawing Number
(7) Contract Number
(8) Data Source:
(9) Road_Name
(10) Ramp:

c. Curb line: CLJN.curb_line

GPS and collect the following attributes:

(1) Curb Material
(2) Description
(3) Drawing Number
(4) Contract Number
(5) Data Source:

d. Driveways: CLJN.vehicle_driveway_area

GPS and collect the following attributes:

(1) Driveway ID: Building that is associated with this feature
(2) Paved or Unpaved:
(3) Surface Material
(4) Installation Date
(5) Drawing Number
(6) Contract Number
(7) Data Source:

e. Parking Lots: CLJN.vehicle_parking_area

GPS and collect the following attributes:

(1) Parking ID: Building that is associated with this feature
(2) Paved or Unpaved
(3) Total Spaces
(4) Lighting:
(5) Drawing Number
(6) Contract Number
(7) Data Source:
(8) Surface_Type:
(9) Vehicle_Day:
(10) Park_use:
(11) Feature Name:
(12) Striping:
(13) Vehicle_Type:

f. Bridge: CLJN.road_bridge_area

GPS and collect the following attributes:

(1) Bridge ID: Facility Number
(2) Number of Lanes
(3) Bridge Material Type
(4) Bridge Type
(5) Capacity:
(6) Drawing Number
(7) Drawing Type

(8) Contract Number
(9) Data Source:
(10) Feature Name:

g. Pedestrian Sidewalks: CLJN.pedestrian_sidewalk_area

GPS and collect the following attributes:

(1) Material
(2) Use:
(3) Status
(4) Drawing Number
(5) Contract Number
(6) Data Source:

1.3.2.2 Attribute data requirements for Improvement

The following attributes shall be collected for each infrastructure data class: Collect GPS data for all features listed with Sub-Foot accuracy.

a. Fence: CLJN.fence_line

GPS and collect the following attributes:

(1) Material: CHAIN LINK, WOOD, etc
(2) Drawing Number
(3) Contract Number
(4) Data Source:
(5) Length:

b. Gates: CLJN.gate_line

GPS and collect the following attributes:

(1) Material:
(2) Feature Height
(3) Drawing Number
(4) Contract Number
(5) Data Source:
(6) Length:

c. Walls: CLJN.wall_line

GPS and collect the following attributes:

(1) Material:
(2) Feature Height
(3) Drawing Number
(4) Contract Number
(5) Data Source:
(6) Length:

d. Recreation Trails: CLJN.recreation_trail_centerline

GPS and collect the following attributes:

(1) Subtype:
(2) Trail Description:
(3) Paved:

(4) Date Acquired:
(5) Drawing Number
(6) Contract Number
(7) Data Source:
(8) trail_id:
(9) Trail_Name:

e. Playground: CLJN.playground_area

GPS and collect the following attributes:

(1) Pool ID: Facility Number
(2) Feature Description:
(3) Drawing Number
(4) Contract Number
(5) Data Source:

f. Swimming Pool: CLJN.swimming_pool_area

GPS and collect the following attributes:

(1) Swimming Pool ID:
(2) Feature Description:
(3) Drawing Number
(4) Contract Number
(5) Data Source:

g. Athletic Court: CLJN.athletic_court_area

GPS and collect the following attributes:

(1) Court ID:
(2) Court Type:
(3) Court Name
(4) Date Acquired
(5) Drawing Number
(6) Contract Number
(7) Court Desc:

h. Athletic Field: CLJN.athletic_field_area

GPS Structures and collect the following attributes:

(1) Field ID: Facility Number
(2) Field Description:
(3) Date Acquired:
(4) Field Type
(5) Contract Number
(6) Drawing Number
(7) Data Source:
(8) Field Name

1.3.2.3 Environmental Storage Tanks

The following attributes shall be collected for each infrastructure data class: Collect GPS data for all features listed with survey grade accuracy.

a. Underground Storage Tanks: CLJN.underground_storage_tank_point

GPS and collect the following attributes:

(1) ENVUST-ID for Under Ground Storage Tank
(2) Hazsite_ID
(3) EH_Tank: Fuel Type
(4) Facility Number
(5) X Coordinates
(6) Y Coordinates
(7) Installation Date:
(8) Product_D:
(9) Narrative
(10) Serial Number
(11) Tank_Sys_D:
(12) Status:
(13) regulated:
(14) Volume
(15) Volume_U_D:

b. Aboveground Storage Tanks: CLJN.aboveground_storage_tank_site

GPS and collect the following attributes:

(1) ENVAST_ID for Above Ground Storage Tank
(2) Hazsite_ID
(3) EH_Tank:
(4) Facility Number
(5) X Coordinates
(6) Y Coordinates
(7) Product_D:
(8) Narrative
(9) Serial Number
(10) Tank_Sys_D:
(11) Status:
(12) Regulated:
(13) Volume
(14) Volume_U_D:

1.3.2.4 Other Features

a. Other Infrastructure Features:

All newly constructed features require GIS deliverables. If a particular utility is being installed and has been omitted from this specification, the feature shall be deliverable under these guidelines. At a minimum the following will be required:

(1) Subtype Id
(2) Facility ID
(3) Installation Date
(4) Type/Description
(5) Material
(6) Drawing Number
(7) Contract Number
(8) Data Source:

1.3.2.5 Utilities

Locate as specified in The Collections of Geospatial Data and Collect GPS

data for each feature listed with survey grade accuracy and enter Domain data in compliance with the IGI&S database

Please note: All utility lines that can be currently located in MCB, Camp Lejeune GIS geodatabase that are to be demolished/removed within the specifications of this contract will be used to update the demolished line feature data set for that class. The existing spatial and non-spatial data will be copied into the demolished feature class. This information does not include Abandoned in Place (AIP) lines. Abandoned lines shall remain the in the existing data feature class and be attributed AIP.

1.3.2.6 Electrical Distribution

Please Note: MCB, Camp Lejeune's Complete Circuit ID list is available, please contract Government Project Manager for list which is provided by our Electrical Distribution shop in Public Works, MCB Camp Lejeune.

The following attributes shall be collected for each utility data class:

a. Collect GPS data for all features listed with survey grade accuracy.

b. Demolished Electrical Lines: CLJN.demolished_cable_line

Existing attribute information will be copied into the demolished feature class: Please add the following attribute data once updated.

(1) Date
(2) Drawing Number
(3) Drawing Type
(4) Contract Number
(5) Data Source:

c. Electrical Lines: CLJN.electrical_cable_line

Locate all Electrical Line data and collect the following attributes:

(1) Subtype Identifier:
(2) Disposition:
(3) Subtype:
(4) Date Acquired:
(5) Conduit Size
(6) Number of Phases
(7) Insulation Material
(8) Voltage
(9) Size of Units
(10) Substation ID
(11) Circuit ID:
(12) Contract Number
(13) Drawing Number
(14) Data Source:

d. Electrical Meter: CLJN.electrical_meter_point

Locate, GPS and collect the following attributes:

(1) Meter ID

(2) Voltage
(3) KW Rate
(4) Number of Phases
(5) Model Number
(6) Date Acquired
(7) Facility ID
(8) Substation ID
(9) Circuit ID:
(10) X Coordinates
(11) Y Coordinates
(12) Contract Number
(13) Drawing Number
(14) Data Source:

e. Electrical Transformer: CLJN.elect_transformr_bank_point

Locate, GPS and collect the following attributes:

(1) Subtype:
(2) Date Installed
(3) Primary Voltage
(4) Secondary Voltage
(5) Number of Transformers
(6) Total KVA
(7) Substation ID
(8) Circuit ID:
(9) KVA Information
(10) X Coordinates
(11) Y Coordinates
(12) Contract Number
(13) Drawing Number
(14) Data Source:

f. Electrical Poles: CLJN.utility_pole_tower_point

Locate, GPS and collect the following attributes:

(1) Pole No
(2) Date Acquired:
(3) Condition
(4) Type:
(5) Material
(6) Pole Height
(7) Units of Measure
(8) Circuit ID
(9) X Coordinates
(10) Y Coordinates
(11) Contract Number
(12) Drawing Number
(13) Data Source:

g. Exterior Lighting: CLJN. exterior_lighting_point

Locate, GPS and collect the following attributes:

(1) Light Type
(2) X Coordinates
(3) Y Coordinates
(4) Sensor:

(5) Watts
(6) Voltage
(7) Circuit ID
(8) Contract Number
(9) Drawing Number
(10) Date Acquired:
(11) Data Source:

h. Electrical Switch: CLJN.electrical_switch_point

Locate, GPS and collect the following attributes:

(1) Subtype ID:
(2) Switch ID:
(3) Disposition
(4) Installation Type:
(5) Switch Status:
(6) Voltage
(7) Circuit ID:
(8) X Coordinates
(9) Y Coordinates
(10) Contract Number
(11) Drawing Number
(12) Data Source:

i. Electrical Regulator: CLJN.electrical_regulator_point

Locate, GPS and collect the following attributes:

(1) Electrical Regulator ID:
(2) Disposition
(3) Regulator Type
(4) Regulator Use
(5) Primary Volts
(6) Secondary Volts
(7) Number of Taps
(8) KV Rate
(9) Fuse Type
(10) Manufacture
(11) Model Number
(12) Circuit ID:
(13) X Coordinates
(14) Y Coordinates
(15) Contract Number
(16) Drawing Number
(17) Data Source:

j. Electrical Manholes: CLJN.electrical_junction_point

Locate, GPS and collect the following attributes:

(1) Subtype ID:
(2) Type:
(3) Number of Cables
(4) Rim Elevation
(5) Units of Elevation
(6) Diameter
(7) Diameter Units
(8) X Coordinates

(9) Y Coordinates
(10) Sub Station ID
(11) Contract Number
(12) Drawing Number
(13) Data Source:

k. Electrical Generators: CLJN.electrical_generator_point

Locate, GPS and collect the following attributes:

(1) Generator ID
(2) Disposition
(3) KVA
(4) KW Rate
(5) Voltage
(6) Fuel Type
(7) Manufacture
(8) Model
(9) Serial Number
(10) Circuit ID:
(11) X Coordinates
(12) Y Coordinates
(13) Facility ID
(14) Contract Number
(15) Drawing Number
(16) Data Source:

1.3.2.7 Substation

a. Substation: CLJN.CLJN.electrical_substation_point

Locate, GPS and collect the following attributes:

(1) Disposition
(2) Capacity Rate
(3) Capacity Measure
(4) Voltage In
(5) Voltage Out
(6) Number of transformer
(7) Number of Spares
(8) Number of Circuits
(9) X Coordinates
(10) Y Coordinates
(11) Contract Number
(12) Drawing Number
(13) Data Source
(14) Date Acquired

1.3.2.8 Steam Distribution

The following attributes shall be collected for each utility data class: Collect GPS data for all features listed with survey grade accuracy.

a. Boiler: CLJN.heat_cool_boiler_site - If Required

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Disposition

(3) Type
(4) Capacity Heat
(5) Capacity Units
(6) Building ID: Facility Number where Boiler Resides
(7) X Coordinates
(8) Y Coordinates
(9) Contract Number
(10) Drawing Number
(11) Data Source

b. Fitting: CLJN.heat_cool_fitting_point

Georeference fitting data and collect the following attributes:

(1) Subtype ID:
(2) Date Acquired:
(3) Material
(4) Size
(5) Units
(6) Line Diameter
(7) Diameter in Units
(8) X Coordinates
(9) Y Coordinates
(10) Contract Number
(11) Drawing Number
(12) Data Source:

c. Valves: CLJN.heat_cool_valve_point

Locate, GPS and collect the following attributes:

(1) Data Acquired
(2) Size
(3) Size Units
(4) Elevation
(5) Elevation Units
(6) Project ID
(7) X Coordinates
(8) Y Coordinates
(9) Contract Number
(10) Drawing Number
(11) Data Source:

d. Manholes: CLJN.heat_cool_junction_point

Locate, GPS and collect the following attributes:

(1) Sub Type ID:
(2) Number of Valves
(3) Number of Pipes
(4) Width
(5) Length
(6) Diameter
(7) Units for Measurements
(8) Rim Elevations
(9) Ground Elevation
(10) Contract Number
(11) Drawing Number
(12) X Coordinates

(13) Y Coordinates
(14) Data Source:

e. Steam Line: CLJN.heat_cool_line

Locate, GPS and collect the following attributes:

(1) Subtype ID: Condensate, Steam
(2) Date Acquired:
(3) Disposition
(4) Use Underground, Overhead, Abandoned
(5) Material
(6) Size
(7) Length
(8) Size Units
(9) Ground Elevation
(10) Invert Elevation
(11) Units for Elevation
(12) Taped: Yes/No
(13) Building ID - If service line indicate Building
(14) Insulation Material
(15) Size of Insulation
(16) Size Units
(17) Contract Number
(18) Drawing Number
(19) Data Source:

f. Demolished Steam Line: CLJN.demolished_heat_cool_line

Existing attribute information will be copied into the demolished feature class: Please add the following attribute data once updated.

(1) Date
(2) Drawing Number
(3) Drawing Type
(4) Contract Number
(5) Data Source:

1.3.2.9 Storm Sewer

a. Storm Sewer Lines: CLJN.storm_sewer_line

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Use
(3) Type
(4) Material
(5) Size
(6) Diameters Units
(7) Elevation
(8) Elevation Units
(9) Contract Number
(10) Drawing Type
(11) Drawing Number

b. Storm Sewer Drainage Line: CLJN.storm_sewer_open drainage_line

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Disposition
(3) Contract Number
(4) Drawing Type
(5) Drawing Number

c. Manhole: CLJN.storm_sewer_junction_point

Locate, GPS and collect the following attributes:

(1) Subtype
(2) X Coordinate
(3) Y Coordinates
(4) Contract Number
(5) Drawing Type
(6) Drawing Number

d. Inlet: CLJN.storm_sewer_inlet_point -

Locate, GPS and collect the following attributes: Contract shall verify SWPPP GPS inlet and add to this feature.

(1) Subtype
(2) Date Acquired
(3) X Coordinates
(4) Y Coordinates
(5) Contract Number
(6) Drawing Type
(7) Drawing Number

e. Outfall: CLJN.storm_sewer_outfall_point

Locate, GPS and collect the following attributes:

(1) Subtype Domain
(2) Date Acquired:
(3) Basin ID - contractor shall utilized existing data and coordinate Basin_ID with data manager
(4) User_Flag
(5) X Coordinates
(6) Y Coordinates
(7) Contract Number
(8) Drawing Type
(9) Drawing Number

f. Ponds, Basins, & Treatment Measures: CLJN.storm_sewer_reservoir_areas

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Project ID:
(3) Permit ID: SW8 XXXXXX
(4) Size:
(5) Facility ID:
(6) Installation ID:
(7) Drawing Type:

(8) Drawing Number:

1.3.2.10 Wastewater Collection

The following attributes shall be collected for each utility data class: Collect GPS data for all features listed with survey grade accuracy.

a. Wastewater Lines: CLJN.wastewater_line

Locate, GPS and collect the following attributes:

(1) Pipe ID: by Manhole number
(2) Date Acquired
(3) Use
(4) Material
(5) Size of Diameter
(6) Units
(7) Invert Elevation 1
(8) Invert Elevation 2
(9) Elevation Units
(10) Slope
(11) Slope Units:
(12) Building ID: If building/facility service line indicate Building number that the line services
(13) Contract Number
(14) Drawing Number
(15) Data Source:
(16) Subtype:

b. Demolished Lines: CLJN.demolished_wastewater_line

Existing attribute information will be copied into the demolished feature class: Please add the following attribute data once updated.

(1) Date
(2) Drawing Number
(3) Drawing Type
(4) Contract Number
(5) Data Source:

c. Fitting: CLJN.wastewater_fitting_point

Georeference Fitting data and collect the following attributes:

(1) Subtype ID:
(2) Date Acquired:
(3) Type
(4) Material
(5) Size of Diameter
(6) Units
(7) User Flag: Named Area
(8) Contract Number
(9) Drawing Number
(10) X Coordinates
(11) Y Coordinates
(12) Data Source:

d. Valves: CLJN.wastewater_valve_point

Locate, GPS and collect the following attributes:

(1) Valves ID: Manhole Number associate with valve
(2) Date Acquired:
(3) Valve Style/Group:
(4) Valve Use
(5) Size in Diameter
(6) Valve Elevation
(7) Units of Elevation
(8) X Coordinates
(9) Y Coordinates
(10) Manhole ID
(11) Contract Number
(12) Drawing Number
(13) Data Source:

e. Manholes: CLJN.wastewater_junction_point

Locate, GPS and collect the following attributes:

(1) Subtype ID: Manhole
(2) Manhole ID: Each section of the base has a unique numbering system for manholes; please see Public Work, GIS office for details.
(3) Use:
(4) Type
(5) Material
(6) Number of Pipes in manhole
(7) Rim Elevation
(8) Invert Elevation
(9) Elevations Units
(10) Manhole Diameter
(11) Diameter Units
(12) X Coordinates
(13) Y Coordinates
(14) Date Acquired:
(15) Contract Number
(16) Drawing Number
(17) Data Source:

f. Vent: CLJN.wastewater_vent_point

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Valve Style/Type:
(3) Use:
(4) Size in Diameters
(5) Units in Diameters
(6) X Coordinates
(7) Y Coordinates
(8) Subtype ID: AIR
(9) Containment Type
(10) Contract Number
(11) Drawing Number
(12) Data Source:

g. Pump Stations: CLJN.wastewater_pump_point

Locate, GPS and collect the following attributes:

(1) Pump Station ID: Facility Number
(2) Date Acquired
(3) Use
(4) Type
(5) Cooling Method
(6) Rated Outflow Volume
(7) Flow Unit Measure Code
(8) X Coordinates
(9) Y Coordinates
(10) Number of Pumps
(11) Contract Number
(12) Drawing Number
(13) Data Source

h. Oil Water Separators: CLJN.wstewat_oil_wat_separatr_point

Locate, GPS and collect the following attributes:

(1) Oil Water Separator ID: Facility Number
(2) Date Acquired
(3) Type
(4) Separator Process
(5) Separator Volume
(6) Volume Units of Measure
(7) Grit Chamber:
(8) Flow Capacity
(9) Flow Units
(10) X Coordinates
(11) Y Coordinates
(12) Contract Number
(13) Drawing Number
(14) Data Source

i. Grease Trap: CLJN.wastewater_grease_trap_point

Locate, GPS and collect the following attributes:

(1) Trap Identification: Nearest Facility use Number
(2) Type of Trap
(3) Material
(4) Capacity Units
(5) Manhole
(6) Total Number of Laterals
(7) Flow Rate
(8) Flow Units
(9) Building ID: Facility Number on associated Building
(10) X Coordinates
(11) Y Coordinates
(12) Contract Number
(13) Drawing Number
(14) Data Source:

j. Septic Tank: CLJN.CLJN.wastewater_septic_tank_point

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Disposition
(3) Tank Capacity
(4) Contract Number
(5) Drawing Number
(6) Data Source:

1.3.2.11 Water Distribution

The following attributes shall be collected for each utility data class: Collect GPS data for all features listed with survey grade accuracy.

a. Water Lines: CLJN.water_line

Locate, GPS and collect the following attributes:

(1) Date Acquired
(2) Use of Line
(3) Disposition
(4) Material
(5) Size
(6) Size Units
(7) Pipe Length
(8) Unit for Length Dimension
(9) Taped
(10) Source
(11) All Invert Elevation information
(12) Units of Measures
(13) Contract Number
(14) Drawing Number
(15) Data Source
(16) Subtype

b. Demolished Line: CLJN.demolished_water_line

Existing attribute information will be copied into the demolished feature class: Please add the following attribute data once updated.

(1) Date
(2) Drawing Number
(3) Drawing Type
(4) Contract Number
(5) Data Source: Existing GIS Data

c. Water Meter: CLJN.water_meter_point

Locate, GPS and collect the following attributes:

(1) Meter ID
(2) Date Acquired:
(3) Type
(4) Installation Type
(5) Building ID: Facility Number - If attached to Building
(6) X Coordinates
(7) Y Coordinates
(8) Contract Number
(9) Drawing Number
(10) Data Source

d. Water Tank: CLJN.water_tank_point

Locate, GPS and collect the following attributes:

(1) Tank ID: Facility Number
(2) Date Acquired
(3) Disposition
(4) Tank Use
(5) Tank Status
(6) Tank Width
(7) Tank Length
(8) Tank Diameter
(9) Ground Elevation
(10) Tank Volume
(11) Unit of measure in Gallons
(12) Top Elevation
(13) Overflow Elevation
(14) Pressure High
(15) Pressure Low
(16) X Coordinates
(17) Y Coordinates
(18) Contract Number
(19) Drawing Number
(20) Data Source:

e. Water Valve: CLJN.water_valve_point

Locate, GPS and collect the following attributes:

(1) Date Acquired:
(2) Disposition
(3) Use: Valve
(4) Valve Status
(5) Size
(6) Size Units
(7) Valve Elevation
(8) Ground Elevation
(9) Size Unit
(10) Manhole ID
(11) X Coordinates
(12) Y Coordinates
(13) Contract Number
(14) Drawing Number
(15) Data Source
(16) subtype

f. Water Fitting: CLJN.water_fitting_point

Georeference and collect the following attributes:

(1) Date Acquired
(2) Disposition
(3) Type
(4) Material
(5) Size
(6) Size Units
(7) Contract Number
(8) Drawing Number

(9) Data Source

g. Water Well: CLJN.potable_water_well_point

Locate, GPS and collect the following attributes:

(1) Well ID: Facility Number
(2) Use: potable
(3) Well Status
(4) Station ID: Building Number
(5) Date Acquired:
(6) X Coordinates
(7) Y Coordinates
(8) Tank ID: Water Tank Facility Number
(9) Contract Number
(10) Drawing Number
(11) Data Source:

h. Water Manhole: CLJN.water_junction_point

Locate, GPS and collect the following attributes:

(1) Subtype
(2) Use
(3) Type
(4) Material
(5) Number Valves
(6) Number Pipes
(7) Installation Date
(8) Size Diameter
(9) Unit Diameter
(10) X Coordinates
(11) Y Coordinates
(12) Contract Number
(13) Drawing Number
(14) Data Source:

i. Fire Hydrant: CLJN.water_fire_connection_point

Locate, GPS and collect the following attributes:

(1) Hydrant ID: TBD by Fire Department
(2) Date Acquired:
(3) Disposition
(4) Valve Connector Type
(5) Valve Size:
(6) Inlet Diameter
(7) Units of measure
(8) X Coordinates
(9) Y Coordinates
(10) Contract Number
(11) Drawing Number
(12) Data Source:

j. NON Potable Water Well: CLJN.non-potable_water_well_point

Locate, GPS and collect the following attributes:

(1) Well ID: Facility Number

(2) Use:
(3) Well Status
(4) Station ID: Building Number
(5) Date Acquired:
(6) X Coordinates
(7) Y Coordinates
(8) Tank ID: Water Tank Facility Number
(9) Contract Number
(10) Drawing Number
(11) Data Source:

k. Other Utility Features:Failure to follow the specification outlined in this document will result in non-acceptance of data deliverable.

Geospatial data delivery does not replace as-built requirements

All newly constructed features require GIS deliverables.

(1) Facility ID
(2) Installation Date
(3) Type/Description
(4) Material
(5) Size
(6) Drawing Number
(7) Contract Number
(8) Data Source

1.3.2.12 Non-Compliance

Failure to follow the specification outlined in this document will result in non-acceptance of data deliverable.

Geospatial data delivery does not replace as-built requirements.

1.3.3 As-Built Record of Materials

Furnish a record of materials.

Where several manufacturers' brands, types, or classes of the item listed have been used in the project, designate specific areas where each item was used. Designations shall be keyed to the areas and spaces depicted on the contract drawing. Furnish the record of materials used in the following format:

MATERIALS DESIGNATION	SPECIFICATION	MANUFACTURER	MATERIALS USED (MANUFACTURER'S DESIGNATION)	WHERE USED
_____	_____	_____	_____	_____

1.3.4 Maximo Requirements

Submit maximo requirements as specified in Section 23 03 00 and 26 00 00.

1.4 EQUIPMENT/PRODUCT WARRANTIES

1.4.1 Equipment/Product Warranty List

Furnish to the Contracting Officer a bound and indexed notebook containing written warranties for equipment/products that have extended warranties (warranty periods exceeding the standard one-year warranty) furnished under the contract, and prepare a complete listing of such equipment/products. The equipment/products list shall state the specification section applicable to the equipment/product, duration of the warranty therefor, start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty. The warranty period shall begin on the same date as project acceptance and shall continue for the full product warranty period. Execute the full list and deliver to the Contracting Officer prior to final acceptance of the facility.

1.4.2 Equipment Warranty Tags and Guarantor's Local Representative

Furnish with each warranty the name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and appliances are installed. The guarantor's representative, upon request of the station representative, shall honor the warranty during the warranty period, and shall provide the services prescribed by the terms of the warranty. At the time of installation, tag each item of warranted equipment with a durable, oil- and water-resistant tag approved by the Contracting Officer. Attach tag with copper wire and spray with a clear silicone waterproof coating. Leave the date of acceptance and QC's signature blank until project is accepted for beneficial occupancy. Tag shall show the following information:

EQUIPMENT/PRODUCT WARRANTY TAG

Type of Equipment/Product _____
Warranty Period _____ From _____ To _____
Contract No. _____
Inspector's Signature _____ Date Accepted _____

Construction Contractor:
Name: _____
Address: _____
Telephone: _____

Warranty Contact: _____
Name: _____
Address: _____
Telephone: _____

STATION PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE

1.5 COMPLETE SUBMITTAL PACKAGE

Contractor shall make electronic copies of all submittals, including the transmittal sheet, and provide a CD/DVD containing all submittals for project close out.

The CD/DVD shall be marked "Complete Submittal Package - Contract #N40085-11-B-0185."

1.6 CLEANUP

Leave premises "broom clean." 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. Clean filters of operating equipment. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E 1971	(2005) Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of Government personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.2.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.2.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 5. Commissioned items with a Data Package 1 or 2 requirement shall use instead Data Package 5.

1.2.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the

notification of this change requirement.

1.2.4 Review and Approval

The Government's Commissioning Authority (CA) shall review the commissioned systems and equipment submittals for completeness and applicability. The Government CA shall verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CA shall communicate deficiencies to the Contracting Officer. Upon a successful review of the corrections, the CA shall recommend approval and acceptance of these O&M manuals to the Contracting Officer. This work shall be in addition to the normal review procedures for O&M data.

1.2.5 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.3.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.3.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.3.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.3.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.3.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.3.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.3.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.3.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.3.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.3.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E 1971.

1.3.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.3.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.3.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.3.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.3.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.3.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.3.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.3.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.3.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required

in the applicable technical sections.

1.3.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.3.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.3.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.3.5.6 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.3.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.3.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product,

equipment, and system manufacturers.

1.4 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES

Include Data Package 5 and the following for control systems:

a. Narrative description on how to perform and apply all functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.

b. Full as-built sequence of operations.

c. Copies of all checkout tests and calibrations performed by the Contractor (not Cx tests).

1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.5.1 Data Package 1

a. Safety precautions

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Contractor information

f. Spare parts and supply list

1.5.2 Data Package 2

a. Safety precautions

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan and schedule

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Contractor information

1.5.3 Data Package 3

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Lubrication data

h. Preventive maintenance plan and schedule

i. Cleaning recommendations

j. Troubleshooting guides and diagnostic techniques

k. Wiring diagrams and control diagrams

l. Maintenance and repair procedures

m. Removal and replacement instructions

n. Spare parts and supply list

o. Product submittal data

p. O&M submittal data

q. Parts identification

r. Warranty information

s. Testing equipment and special tool information

t. Testing and performance data

u. Contractor information

1.5.4 Data Package 4

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Lubrication data

i. Preventive maintenance plan and schedule

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Corrective maintenance man-hours

q. Product submittal data

r. O&M submittal data

s. Parts identification

t. Warranty information

u. Personnel training requirements

v. Testing equipment and special tool information

w. Testing and performance data

x. Contractor information

1.5.5 Data Package 5

a. Safety precautions

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan and schedule

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Testing and performance data

s. Contractor information

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 02 41 00

DEMOLITION

10/06

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.

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) Safety and Health Requirements Manual

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

40 CFR 61	National Emission Standards for Hazardous Air Pollutants

1.2 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 inside or outside the buildings. The work includes demolition, 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 SUBMITTALS

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

SD-07 Certificates

Demolition Plan

Proposed demolition, and removal procedures for approval before work is started.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and 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.

1.4.1 Notifications

1.4.1.1 General Requirements

Furnish timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M.

1.5 PROTECTION

1.5.1 Traffic Control Signs

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

1.5.2 Existing Conditions Documentation

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. 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.

1.5.3 Items to Remain in Place

Contractor will be working in a occupied fuel storage and refueling facility. Contractor shall take all 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 pavements to remain. 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.

1.5.4 Existing Construction Limits and Protection

Do not disturb existing areas beyond the extent indicated or necessary for installation of new construction. Provide temporary support of components to prevent movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas as necessary to maintain a clean working environment.

1.5.5 Weather Protection

For portions of the fuel storage tanks and adjacent building where exterior work is performed, protect building and materials and equipment from the weather at all times.

1.5.6 Utility Service

Maintain existing utilities 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.

1.5.7 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities concrete and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

1.6 ENVIRONMENTAL PROTECTION

Comply with the Environmental Protection Agency requirements specified.

1.7 DEMOLITION PLAN

Prepare and submit to the COTR for approval a scheduled/phased demolition plan covering all site work and demolition activities.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing power distribution equipment and associated mechanical equipment on site for reuse. Existing equipment 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 on site whenever possible.

3.1.1 Utilities and Related Equipment

3.1.1.1 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.

3.1.1.2 Disconnecting Existing Utilities

Remove existing utilities, as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

3.1.2 Paving and Slabs

Sawcut concrete and asphaltic concrete paving and concrete slabs and walkways including aggregate base to a depth of 10 inches below existing adjacent grade. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs not to be used in this project shall be expediously removed from the Installation.

3.1.3 Concrete

Saw concrete along straight lines to a depth necessary for the demolition required. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the surrounding concrete is sound.

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 Brick and Masonry: Completely fill holes and depressions, left as a result of removals, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

3.1.5 Equipment and Fixtures

Disconnect electrical hardware at the nearest connection to existing services to remain, unless otherwise noted. Electrical equipment and fixtures must be disconnected at fittings. Remove service attached to the unit. Salvage each item of equipment as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal operating auxiliary equipment. Transport salvaged equipment to a designated storage area as directed by the Contracting Officer. Do not remove equipment until approved.

3.1.5.1 Preparation for Storage

Remove water, dirt, dust, and foreign matter from units. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit.

3.1.5.2 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 avgas 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.

3.1.5.3 Fixtures, Motors and Machines

Remove and salvage fixtures, motors and machines associated with plumbing, fuel systems, domestic water, and other mechanical system installations. Salvage, box and store auxiliary units and accessories with the main motor and machines. Tag salvaged items for identification, storage, and protection from damage.

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 expediously 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. 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.

3.3 CLEANUP

Remove debris and rubbish from site and excavations. Remove and transport the materials 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 federal, state and local regulations as contractually specified in the Waste Management Plan. Storage of removed materials on the project site is prohibited.

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.

-- End of Section --

SECTION 03 30 50

CAST-IN-PLACE CONCRETE

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 in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 301	(2010) Specifications for Structural Concrete
ACI 305R	(2010) Specification for Hot Weather Concreting
ACI 306R	(2010) Cold Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM C 33/C 33M	(2011) Standard Specification for Concrete Aggregates
ASTM C 94/C 94M	(2011) Standard Specification for Ready-Mixed Concrete
ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A615/A615M	(2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C 143/C 143M	(2010) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 156	(2009a) Standard Test Method for Water Retention by Concrete Curing Materials
ASTM D 1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve

PART 2 PRODUCTS

2.1 CONCRETE

ASTM C 94/C 94M, a minimum strength of 4000 psi at 28 days and slump between 2 and 4 inches ASTM C 143/C 143M.

2.2 CURING MATERIALS

ACI 301.

2.3 CONCRETE AGGREGATE

ASTM C 33/C 33M, fine aggregate grading with a maximum of 3 percent by weight passing ASTM D 1140, No. 200 sieve, or coarse aggregate Size 57, 67, or 7.

2.4 REINFORCING STEEL

ASTM A615/A615M, Grade 60.

2.5 WELDED-WIRE FABRIC FOR CONCRETE REINFORCEMENT

ASTM A185/A185M.

2.6 VAPOR BARRIER

Shall be polyethylene sheeting of natural color with a nominal thickness of 0.004-inch. The loss of moisture when determined in accordance with ASTM C 156 shall not exceed 0.055 gram per square centimeter of surface.

PART 3 EXECUTION

3.1 FILL

Under the areas to receive concrete shall be compacted to 95% density.

3.2 WORKMANSHIP

The surface immediately under concrete installed on grade shall be wetted as directed immediately before the concrete is placed.

3.3 CURING

Curing concrete shall conform to ACI 301.

3.4 CONCRETE FINISHES

Concrete shall be given a floated finish.

3.5 HOT WEATHER CONCRETE WORK

ACI 305R.

3.6 COLD WEATHER CONCRETE WORK

ACI 306R.

-- End of Section --

SECTION 23 03 00

BASIC MECHANICAL MATERIALS AND METHODS

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 in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/AWWA C219	(2006) Standard for Bolted, Sleeve-Type Couplings for Plain-End Pipe

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A53/A53M	(2010) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM B117	(2009) Standing Practice for Operating Salt Spray (Fog) Apparatus
ASTM C 1107/C 1107M	(2011) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D 1785	(2006) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2007; Errata 06-1; TIA 07-1; TIA 07-2; TIA 07-3; Errata 07-2; TIA 08-4; TIA 08-5; TIA 08-6; TIA 08-7; TIA 08-8; TIA 08-9; TIA 08-10; TIA 08-11; TIA 09-12; TIA 09-13; TIA 09-14; Errata 09-3; TIA 09-15; TIA 09-16; TIA 10-17) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(2009) Motors and Generators
NEMA MG 10	(2001; R 2007) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors

NEMA MG 11 (1977; R 2007) Energy Management Guide for Selection and Use of Single Phase Motors

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2011) National Electrical Code

1.2 RELATED REQUIREMENTS

This Section applies to all systems of this Contract.

This Section includes piping materials and installation instructions common to most piping systems, transition fittings, dielectric fittings, mechanical sleeve seals, sleeves, grout, mechanical demolition, equipment installation requirements common to equipment sections, painting and finishing, concrete bases, supports and anchorages.

1.3 QUALITY ASSURANCE

1.3.1 Material and Equipment Qualifications

Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.3.2 Alternative Qualifications

Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, can be shown.

1.3.3 Service Support

The equipment items shall be supported by service organizations. Submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These service organizations shall be reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.3.4 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.

1.3.5 Modification of References

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.

1.3.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall." Reference to the "code official" shall be interpreted to mean the "Contracting Officer." For Navy owned property, references to the "Owner" shall be interpreted to mean the "Contracting Officer." For leased facilities, references to the "Owner" shall be interpreted to mean the "lessor." References to the "permit holder" shall be interpreted to mean the "Contractor."

1.3.5.2 Administrative Interpretations

For ICC Codes referenced in the contract documents, the provisions of Chapter 1, "Administrator," do not apply. These administrative requirements are covered by the applicable Federal Acquisition Regulations (FAR) included in this contract and by the authority granted to the Officer in Charge of Construction to administer the construction of this project. References in the ICC Codes to sections of Chapter 1, shall be applied appropriately by the Contracting Officer as authorized by his administrative cognizance and the FAR.

1.3.6 Electrical Characteristics for Mechanical Equipment & Motors

Electrical equipment raceways, boxes fittings, wire and cable shall comply with the requirements of Division 26. Motors 1/2 horsepower and larger shall comply with Section ELECTRIC MOTORS.

1.3.6.1 Equipment Selection

Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished at no additional cost to the Contract provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased and included at no additional cost to the Government. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.3.7 General Contractor Responsibility

Certain portions of the mechanical specifications assign responsibility for specific work to manufacturers, suppliers, and subcontractors for quality assurance. However the mechanical specifications are indivisible with respect to the contract. The Contractor shall be responsible for compliance with the Contract Documents for all work.

1.3.8 Additional Detail

The Contract Drawings accompanying these Specifications are in some instances general and do not show all details of equipment design and construction. The Contractor shall in every case supply every detail necessary to accomplish a finished installation in a manner satisfactory to the Contracting Officer, and where applicable, the equipment manufacturer, even though all details may not be fully described in these specifications and the accompanying contract drawings.

1.3.9 Interferences

Planning and checking have been done by the Engineer to minimize as far as possible, interference or conflicts between new piping and new or existing obstructions. However, prior to beginning the erection of each line the Contractor shall ascertain that no interference will be encountered, thereby precluding the necessity of disassembling of partially or completely erected systems for rerouting to clear obstructions which may exist. Where any interference is encountered, the Contractor shall obtain the approval of the COTR for a routing to clear the interference. After such approval has been obtained, the Contractor shall proceed with erection. In no case shall the Contractor be entitled to extra compensation for taking down or dismantling work which has been erected or pre-fabricated except such pre-fabrication that has been called for in the specification or on the drawings, or unless specifically authorized in writing by the COTR.

1.3.10 Coordination

The contract documents are based on prototypical design where identified vendors and products are used to prepare the system layout and to identify all utility connections. These drawings, even when dimensioned, are schematic in nature and are subject to field coordination to reflect actual conditions and final equipment shop drawings which may vary from the documents which were furnished at the time of design. It shall be the Contractor's responsibility to coordinate the final installation of all equipment and systems. Where alternate manufacturers or substitutions are incorporated into the work, any architectural or engineering design required to incorporate that work shall be the responsibility of the contractor, as is any cost resulting from changes in layout, increased sizes or lengths of run of services or for any additional utilities that may be required by the use of alternates or substitutions. Any changes in the project required to support alternates or substitutions shall be fully identified and submitted as an adjunct to the shop drawing for the alternate or substituted product. In addition, such changes shall be reflected in the coordination drawings and shall be approved by all affected trades.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Transition Fittings

Dielectric Fittings

Mechanical Sleeve Seals

Sleeves

Grout

1.5 COORDINATION

1.5.1 Pipe Spaces, Chases, Slots, and Openings

Arrange for pipe spaces, chases, slots, and openings during progress of construction, to allow for mechanical installations.

1.5.2 Support Devices

Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete and other structural components as they are constructed.

1.6 DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

1.7 ELECTRICAL INSTALLATION REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, (2005,TIA 2005) and requirements specified herein.

1.7.1 New Work

Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 480 volts or less, to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be provided under Division 26, except internal wiring for components of package equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide all required changes to the electrical service as necessary and related work as a part of the work for the section specifying that motor or equipment.

1.7.2 Modifications to Existing Systems

Where existing mechanical systems and motor-operated equipment require modifications, provide electrical components under Division 26.

1.7.3 High Efficiency Motors

1.7.3.1 High Efficiency Single-Phase Motors

Unless otherwise specified, single-phase fractional-horsepower alternating-current motors shall be high efficiency types corresponding to the applications listed in NEMA MG 11.

1.7.3.2 High Efficiency Polyphase Motors

Unless otherwise specified, polyphase motors, except motors integral to equipment with a total efficiency rating, shall be selected based on

premium efficiency characteristics relative to the applications as listed in NEMA MG 10. Additionally, polyphase squirrel-cage medium induction motors with continuous ratings shall meet or exceed energy efficient ratings in accordance with Table 12-6C of NEMA MG 1.

1.7.4 Three-Phase Motor Protection

Provide controllers for 3 phase motors rated one horsepower (.75 kilowatts) and larger with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage. Provide protection for motors from immediate restart by a time adjustable restart relay.

1.8 INSTRUCTION TO GOVERNMENT PERSONNEL

When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Government personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. 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 the equipment or system.

When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.9 ACCESSIBILITY

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, expansion joints, controls, dampers, and equipment requiring access, in locations freely accessible through access doors.

1.10 EQUIPMENT INVENTORY UPDATE

Submit information for each piece of equipment removed and supplied for use of Camp Lejeune to update the Maximo equipment inventory. For the purposes of this paragraph, inventoried equipment is defined as equipment listed on the Maximo Equipment Inventory Update form.

1.10.1 Requirements

The contractor shall prepare and submit one Maximo Equipment Inventory Update form for each individual item of inventoried equipment that is demolished, removed, replaced, or installed. (ex: three new condensing units would require the submission of three Equipment Inventory Update forms.

1.10.1.1 Standards

The contractor shall provide accurate, complete, and legible information on all required forms. All required forms shall be completed and delivered to

the Contracting Officer on or before the Beneficial Occupancy Date. All information on Equipment Inventory Update forms shall be obtained by visual inspection of equipment data plate(s).

1.10.1.2 Form Preparation

Each required Maximo Equipment Inventory Update form shall contain the following information:

(1) The name and telephone number of an individual who can be contacted for clarification or additional information pertaining to the data on the form.

(2) The date of data collection

PART 2 PRODUCTS

2.1 GENERAL MATERIALS

Refer to individual Division 23 piping Sections for further information pertaining to pipe, tube, and fitting materials and joining methods.

2.2 TRANSITION FITTINGS

2.2.1 AWWA Transition Couplings

Same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

2.2.1.1 Underground Piping NPS 1-1/2 and Smaller

Manufactured fitting or coupling.

2.2.1.2 Underground Piping NPS 2 and Larger

ANSI/AWWA C219, metal sleeve-type coupling.

2.2.1.3 Aboveground Pressure Piping

Pipe fitting.

2.3 DIELECTRIC FITTINGS

2.3.1 Description

Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

2.3.2 Insulating Material

Suitable for system fluid, pressure, and temperature.

2.3.3 Dielectric Unions

Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

2.3.4 Dielectric Flanges

Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

2.3.5 Dielectric-Flange Kits

Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

a. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

2.3.6 Dielectric Couplings

Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

2.3.7 Dielectric Nipples

Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.4 MECHANICAL SLEEVE SEALS

2.4.1 Description

Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

2.4.1.1 Sealing Elements

EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2.4.1.2 Pressure Plates

Carbon steel. Include two for each sealing element.

2.4.1.3 Connecting Bolts and Nuts

Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

2.5.1 Galvanized-Steel Sheet

0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.5.2 Steel Pipe

ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.5.3 Cast Iron

Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.5.4 Stack Sleeve Fittings

Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

2.5.5 Underdeck Clamp

Clamping ring with set screws.

2.5.6 Molded PVC

Permanent, with nailing flange for attaching to wooden forms.

2.5.7 PVC Pipe

ASTM D 1785, Schedule 40.

2.5.8 Molded PE

Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.6 GROUT

2.6.1 Description

ASTM C 1107/C 1107M, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

2.6.1.1 Characteristics

Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2.6.1.2 Design Mix

5000-psi, 28-day compressive strength.

2.6.1.3 Packaging

Premixed and factory packaged.

PART 3 EXECUTION

3.1 PAINTING OF NEW EQUIPMENT

New equipment painting shall be factory applied or shop applied, and shall be as specified herein, and provided under each individual section.

3.1.1 Factory Painting Systems

Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors

shall withstand 500 hours in a salt-spray fog test. Salt-spray fog test shall be in accordance with ASTM B117, and for that test the acceptance criteria shall be as follows: immediately after completion of the test, the paint shall show no signs of blistering, wrinkling, or cracking, and no loss of adhesion; and the specimen shall show no signs of rust creepage beyond 0.125 inch on either side of the scratch mark.

The film thickness of the factory painting system applied on the equipment shall not be less than the film thickness used on the test specimen. If manufacturer's standard factory painting system is being proposed for use on surfaces subject to temperatures above 120 degrees F, the factory painting system shall be designed for the temperature service.

3.1.2 Shop Painting Systems for Metal Surfaces

Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees F shall be cleaned to bare metal.

Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Color of finish coat shall be aluminum or light gray.

a. Temperatures Less Than 120 Degrees F: Immediately after cleaning, the metal surfaces subject to temperatures less than 120 degrees F shall receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat.

b. Temperatures Between 120 and 400 Degrees F: Metal surfaces subject to temperatures between 120 and 400 degrees F shall receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.

c. Temperatures Greater Than 400 Degrees F: Metal surfaces subject to temperatures greater than 400 degrees F shall receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.

3.2 MECHANICAL DEMOLITION

3.2.1 Demolition

Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

3.2.1.1 Piping to Be Removed

Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

3.2.1.2 Equipment to Be Removed

Disconnect and cap services and remove equipment.

3.2.1.3 Equipment to Be Removed and Salvaged

Disconnect and cap services and remove equipment and deliver to the Government.

3.2.2 Damage

If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.3 PIPING SYSTEMS - COMMON REQUIREMENTS

3.3.1 Sleeves

Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

a. Cut sleeves to length for mounting flush with both surfaces.

1. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

b. Install sleeves in new walls and slabs as new walls and slabs are constructed.

c. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

1. Steel Pipe Sleeves: For pipes smaller than NPS 6.

2. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

3. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.

a) Seal space outside of sleeve fittings with grout.

3.3.2 Mechanical Sleeve Seal Installation

Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3.3 Roughing-In

Verify final equipment locations for roughing-in.

3.3.4 Piping Installation

a. Piping cuts for piping connections to be used in the final installation shall preferably be made by sawing or machining. If arc and torch cutting are used, the cut shall be smooth and true and shall be cleaned of all slag. Wherever piping cuts are made at the location of existing welds, the existing weld shall be removed completely as part of the new weld preparation. In the layout of modifications to existing piping, butt welds shall be spaced a minimum of 6 inches apart. Any deviation from this shall be approved by the Engineer.

b. Piping shall be erected in accordance with the plans and sections, as shown on the Drawings. Piping elevations and locations of existing lines may not reflect as-built conditions and shall be verified before erecting new piping. The Contractor shall take extra care to assure correctness of all cut lines when connecting to existing piping. The Contractor shall also verify dimensions of all shop-fabricated piping assemblies prior to fabrication.

c. Piping shall be installed straight without kinks or pockets and shall be parallel or perpendicular to building walls, beams, and girders. Vertical piping shall be installed straight and plumb. Full lengths of pipe shall be used, where possible; couplings and short lengths of pipe shall not be used where a single length can be used.

d. The Contractor shall endeavor to erect prefabricated pipe lines before the erection of field-fabricated piping in the same area. Final piping system closure welds shall be made at the equipment nozzle connections and shall not be made until final equipment alignment has been completed.

e. Piping shall be installed so as to allow expansion and contraction without placing excessive stresses in piping, anchors, or equipment.

f. Authorization by the Government shall be obtained prior to welding or attaching temporary pipe supports, scaffolding, lugs, and structural shapes to the building steel or equipment in questionable locations. These items shall be removed when installation is complete. Temporary welds shall be removed by cutting. Breaking of welds is prohibited. Weld metal remaining on the steel surfaces shall be removed by grinding to produce a surface equal to the original surface in the immediate area. The ground surface shall be visually examined to insure that the area is free of cracks and undercuts. Undercutting of structural steel shall be repaired by welding and grinding smooth. Temporary welds shall not be permitted on the surface of previously erected adjacent piping, pipe supports, or vessels. The surface of adjacent piping shall be protected from strikes and weld spatter.

g. The use of pliers or pipe wrenches for tightening nuts or tubing connectors is prohibited. Proper cutting, forming, and assembling tools shall be used in the erection of all tubing. Tubing shall not be cut with a hacksaw.

h. Drains shall be piped to the nearest floor drain or contaminated water return; no drain shall spill on the floor.

i. Horizontal drainage lines shall be laid to a uniform pitch of 1/4 inch per foot, if practical, but in no case less than 1/8 inch per foot, except when the Drawings specifically show otherwise.

j. Bending of pipe shall not be permitted, unless specifically shown on the Drawings or permitted by the Piping Specifications.

k. The Contractor shall be responsible for the repair of all leaks detected during the pressure tests specified herein.

l. Insulation shall not be applied over piping prior to completion of testing. Welds or other type joints shall not be painted prior to completion of testing.

m. Cold pulling or jacking of pipe to bring weld ends into alignment or to obtain clearances for equipment removal shall be held to a minimum. Pulls resulting in pipe movements greater than 3/8 inch shall be approved by the Engineer before proceeding.

n. Throughout the entire system there shall be as few joints as possible.

o. Where interferences are found in the field, such as between piping, conduit, air and cable ducts, and electrical boxes, it shall be the responsibility of the Contractor to resolve the problem with the Engineer before proceeding with the work.

p. The Contractor shall be responsible for checking and confirming size, location, and flange drilling of all piping, valves, and material furnished to him by the Government for installation in pipe lines herein specified.

q. All bolts in flanged construction shall be uniformly tightened with proper wrenches. Hammering and bumping shall be prohibited. Care shall be taken to obtain uniform pressure on the gasket and to avoid overstressing to the bolts, dishing of the flanges, and compression of the gasket beyond its proper limits.

r. Piping shall be checked inside and outside before installation to see that it is clean. Loose material, including rust, mill scale, and foreign matter, shall be removed.

s. Particular care shall be used in assembling the piping to prevent loose materials from getting into the piping system or equipment during erection of the piping. Every precaution shall be taken to keep the piping clean and free from internal dirt and debris.

t. All openings for pipe connections, all equipment access openings, and all open-ended pipes not being worked on during installation or in use otherwise shall be covered with temporary covers made of plywood, sheet metal, or plastic.

u. Proper cutting, forming, and assembling tools shall be used in the erection of tubing. Tubing shall not be cut with a hacksaw. Terminals:

1) Where the piping connects to equipment or piping furnished in place by Others, such connections shall be made by the Contractor,

who shall properly complete the connections in each case.

2) All material, accessories, and fabrication for such piping shall conform to the requirements specified herein. Extreme care and judgment shall be used in routing small pipe, tubing, and conduit which is shown only diagrammatically on the Contract Drawings. Sufficient clearance shall be provided under and/or around hatchways, galleries, monorails, removable slabs, temporary end walls, and clearance required for access to equipment and valves, for maintenance, operation, inspection, and the like. Routing of small pipe and tubing shall be subject to review and acceptance by the COTR. The Contractor shall relocate, at his own expense and without cost to the Government, any such small piping and tubing which does not conform to these requirements.

3.3.5 Field-Routed Piping

a. Piping size 2" NPS and smaller shall be routed in the field according to this Specification and the Schematics or P & ID Contract Drawings. Connections to larger piping and equipment are shown on the Piping Drawings. Materials shall conform to the Piping Specifications.

b. Pipe shall be routed in the most direct manner without interfering with other piping, equipment, electrical cable trays, or the like. Piping should follow the general physical routing of larger piping to give a neat appearance, minimize interference with future piping.

c. Piping shall be located so as not to interfere with operation or maintenance of the equipment. Valves requiring frequent operation shall be readily accessible.

d. If vapor pockets are unavoidable, high point vents shall be installed equipped with a valve so that the line may be filled and tested. Low points shall have a valve drain. Vent and drain size shall be minimum 3/4 inch NPS.

e. Care shall be taken to locate lines so that there is clearance for any required insulation.

f. Pipe shall be adequately supported so that thermal growth is not restricted and deflection of the pipe due to the weight of the contents and insulation is minimized.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

3.4.1 Clearances

Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

3.4.2 General

Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

3.4.3 Maintenance Access

Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

3.4.4 Right-of-Way

Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

3.5.1 General

Painting of mechanical systems, equipment, and components to match existing adjacent areas. Division 23 Sections may state additional locations where paint is required or additional requirements for the paint.

3.5.2 Damage and Touchup

Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

3.6.1 General

Refer to Section STRUCTURAL STEEL for structural steel.

3.6.2 Location

Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

3.6.3 Field Welding

Comply with AWS D1.1/D1.1M.

3.7 GROUTING

3.7.1 General

Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

3.7.2 Cleaning

Clean surfaces that will come into contact with grout.

3.7.3 Forms

Provide forms as required for placement of grout.

3.7.4 Air Entrapment

Avoid air entrapment during placement of grout.

3.7.5 Fill

Place grout, completely filling equipment bases.

3.7.6 Bases

Place grout on concrete bases and provide smooth bearing surface for equipment.

3.7.7 Anchors

Place grout around anchors.

3.7.8 Curing

Cure placed grout.

MAXIMO EQUIPMENT INVENTORY UPDATE

Employee: _____ Phone: _____ Date: ____/____/____

Bldg: _____ Specific Location: _____

__ AC, Computer Room
__ AC, Package
__ AC, Package Terminal
__ Assembly, Trap line
__ Backflow Preventer
__ Boiler
__ Chiller, Air Cooled Recip
__ Chiller, Air Cooled Screw
__ Chiller, Air Cooled Scroll
__ Chiller, Water Cooled Recip
__ Chiller, Water Cooled Screw
__ Compressor, Control Air
__ Compressor, Industrial Air
__ Dryer, Refrigerated Air
__ Exchanger, Heat
__ Evaporator, Freezer
__ Evaporator, Refrigerator
__ Fan, Exhaust
__ Generator
__ Heater, Space
__ Heater, Unit
__ Heat Pump, Geo-Thermal
__ Heat Pump, Indoor Unit
__ Heat Pump, Outdoor Unit
__ Heat Pump, Package
__ Heat Pump, Package Terminal
__ Pump, Circulating, Chilled Water
__ Pump, Circulating, Domestic Water
__ Pump, Circulating, Dual Temp Water
__ Pump, Circulating, Heating Water
__ Pump, Condensate
__ Pump, Sump
__ Regulator, Temperature
__ Tank, Hot Water Storage
__ Tower, Cooling
__ Unit, Air Handling
__ Unit, AC Condensing
__ Unit, Freezer Condensing
__ Unit, Refrigerator Condensing
__ Unit, Fan Coil
__ Unit, TAB (Attach Room No. List)
__ Unit, VAV (Attach Room No. List)
__ Valve, Pressure Reducing
__ Valve, Steam Pilot
__ Water Heater

Demolished/Removed Equipment

Maximo no: _____ or Ser no: _____

New Equipment

Manufacturer: _____

Model no: _____

Ser no: _____

Type: __Elec __Oil __LP Gas __Nat Gas __Steam __Water __Air

Motor Data: HP____ Volts____ Phase____ RLA_____ RPM____ Frame____

Tons____ No. of Motors____ no. of Belts____ Belt size(s)____ CFM____

KW____ Refrig type_____ Refrig Qty_____ Filter Size(s)_____

INSERT EXCEL FORM - VAV/TAB ROOM NUMBER LIST

-- End of Section --

SECTION 23 05 00

BASIC PIPING MATERIALS AND METHODS

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.3	(1998) Malleable Iron Threaded Fittings Classes 150 and 300
ANSI B18.2.1	(1996; Errata 2003) Square and Hex Bolts and Screws Inch Series

ASME INTERNATIONAL (ASME)

ASME B16.5	(2009) Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard
ASME B16.9	(2007) Standard for Factory-Made Wrought Steel Buttwelding Fittings
ASME B16.25	(2007) Standard for Buttwelding Ends
ASME B18.2.2	(2010) Standard for Square and Hex Nuts
ASME B31.1	(2010) Power Piping
ASME B31.9	(2011) Building Services Piping
ASME B1.20.1	(1983; R 2006) Pipe Threads, General Purpose (Inch)
ASME BPVC SEC I	(2010) BPVC Section I-Rules for Construction of Power Boilers
ASME BPVC SEC IX	(2010) BPVC Section IX-Welding and Brazing Qualifications

ASTM INTERNATIONAL (ASTM)

ASTM A 700	(2002) Standard Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment
ASTM A105/A105M	(2010a) Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A106/A106M	(2010) Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

ASTM A193/A193M	(2010a) Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service and Other Special Purpose Applications
ASTM A197/A197M	(2000; R 2006) Standard Specification for Cupola Malleable Iron
ASTM A234/A234M	(2011) Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

AMERICAN WELDING SOCIETY (AWS)

AWS Z49.1	(2005) Safety in Welding and Cutting and Allied Processes

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

1.2 RELATED REQUIREMENTS

1.2.1 Sections

The following Sections apply to this Section with additions and modifications specified herein:

Section 23 05 50 - GASKETS

Section 23 06 00 - HANGERS AND SUPPORTS

Section 23 10 00 - VALVES

1.3 DESCRIPTION OF WORK

This Section specifies piping materials and installation methods common to more than one section of Division 23 and includes basic piping installation instructions. This Section covers piping that falls under ASME B31.1. Pipes and pipe fittings furnished as part of factory-fabricated equipment specified as part of the equipment assembly in other Division 23 Sections shall comply with the requirements of this Section except where noted in those Sections.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-03 Product Data

Piping Systems

SD-06 Test Reports

Hydrostatic Testing Records

Visual Inspection Reports

SD-07 Certificates

Welding Procedure Submittals

Welder Qualifications

Weld Records

Independent Testing Agency Qualifications

Independent Testing Agency Non-Affiliation

Visual Examiner's Qualifications

1.4.1 Piping Systems

For the piping system submittal, submit the following:

a. Manufacturer's technical product data, installation instructions, and dimensioned drawings for each type of pipe and pipe fitting.

b. Copy of mill certificates, laboratory test and manufacturing reports relating to chemical and physical properties of pipe, fittings, and related materials.

c. Piping schedule showing manufacturer, ASTM number, ASTM type, ASTM grade, pipe or tube weight, fitting type, and joint type for each piping system.

d. The piping and accessories submittal shall clearly describe what components are going to be used for each piping group.

e. Records and reports required for certain pipe groups as specified in individual piping group specifications.

f. Indicate country of fabrication. Provide ISO 9001 and Independent Test Reports if applicable per Quality Assurance paragraph.

g. "Fire Watch" safety procedures.

1.5 QUALITY ASSURANCE

1.5.1 Codes and Standards

a. All building piping systems including potable city water, sanitary, and other plumbing systems shall be designed, fabricated, erected, and tested in accordance with ASME B31.9.

b. All piping that is not designated as building piping systems shall be designed, fabricated, erected, and tested in accordance with ASME B31.1.

c. All welders performing welding to this procedure shall be qualified to this procedure in accordance with ASME BPVC SEC IX.

d. Conform to ASME BPVC SEC I and ASME B31.1 for administrative and technical requirements for Boiler External Piping and Nonboiler

External Piping.

e. Comply with the latest editions of the publications of the following Agencies to the extent referenced in this Section:

(1) ANSI - American National Standards Institute.

(2) API - American Petroleum Institute.

(3) ASME - American Society of Mechanical Engineers.

(4) ASTM - American Society for Testing and Materials.

(5) AWS - American Welding Society.

(6) AWWA - American Water Works Association.

(7) CISPI - Cast Iron Soil Pipe Institute Association.

(8) FM - Factory Mutual.

(9) NFPA - National Fire Protection Association.

(10) PFI - Pipe Fabrication Institute.

(11) UL - Underwriter's Laboratories, Inc.

1.5.2 Special Precautions

a. Torch cutting will be permitted only with the specific written approval of the Government.

b. Any cutting method, which may create sparks, must include "Fire Watch". Submit "Fire Watch" procedure for approval.

c. Draining operations must not damage building components or endanger human health.

d. Comply with AWS Z49.1.

1.5.3 Country of Fabrication

a. All piping, fittings, and piping accessories not manufactured, fabricated, and/or assembled in the United States of America or Canada must be manufactured, fabricated, and/or assembled by an ISO 9001 registered corporation.

b. Submit ISO 9001 registration certificates for all corporations where the piping, fittings, and piping accessories are not manufactured, fabricated, and/or assembled in the United States or Canada.

c. For all piping, fittings, and piping accessories not fabricated in the United States or Canada, submit an independent test report for all materials to be provided.

d. No piping, fittings, and piping accessories manufactured, fabricated, and/or assembled in China including Taiwan are permitted to be provided in this Contract.

1.5.4 Independent Testing Agency Non-Affiliation

The Contractor and the independent testing agency shall provide a signed statement that the testing agency has no affiliation with the Contractor and can serve as an independent agency to provide the testing as specified.

1.6 WELDING QUALITY ASSURANCE

1.6.1 Welding Procedures

In the form of a submittal, the Contractor shall record in detail and shall qualify the Welding Procedure Specifications for every welding procedure that he proposes. Procedures shall be developed for all metals included in the work. The procedures for making transition welds between different materials or between plates or pipes of different wall thickness shall be qualified. Qualification for each welding procedure shall conform to the requirements of ASME B31.1 and to this specification. The method for each system shall be fully described including the number of beads, the volts, the amperes, and the welding rod for various pipe thicknesses and materials. The welding procedures shall specify end preparation for butt welds including cleaning, alignment, and root openings. Preheat, interpass temperature control, and postheat treatment of welds shall be as required by approved welding procedures, unless otherwise indicated or specified. Approval of any procedure does not relieve the Contractor of the sole responsibility for producing acceptable welds. Welding procedures shall be identified individually and shall be clearly referenced to the type of welding required for this project. These procedures shall be the same as those used for all pipe welder qualification tests, all shop welds, and all field welds. The Contractor shall provide Procedure Qualification Records for all proposed Welding Procedure Specifications (WPS).

1.6.2 Welding Procedure Submittals

Submit the following:

1.6.2.1 Welding Procedure Specifications

Provide for each weld type. It is highly recommended that the Contractor use ASME Form E00006, QW-482 "Suggested Format for Welding Procedure Specification (WPS)".

1.6.2.2 Procedure Qualification Records

Provide for each weld type. It is highly recommended that the Contractor use ASME Form E00007, QW-483 "Suggested Format for Procedure Qualification Record (PQR)".

1.6.3 Welder Qualifications

1.6.3.1 WPQs

Provide welder qualifications for each welder for each weld type. It is highly recommended that the Contractor use ASME Form E00008, QW-484 "Suggested Format for Manufacturer's Record of Welder or Welding Operation Qualification Tests (WPQ)." The WPQs shall be performed under the witness of an independent agency. The witness shall be a representative of an independent testing agency, Authorized Inspector, or consultant, any of which must be approved by the National Certified Pipe Welding Bureau. The

qualifying test segment must be a 2 inch nominal pipe size with wall thickness within range of the WPS. Tests position shall be "6G" per ASME BPVC SEC IX.

1.6.3.2 Evidence of Continuity

Welder qualifications must be current. If the qualification test is more than 6 months old, provide record of welding continuity for each welder. Record of welding continuity shall show that the welder in question has performed welding to the procedure in question without a 6 month continuous span of inactivity since the date that the welder qualification test was passed for the submitted welding procedure. Record of welding continuity shall include, at a minimum, the welder's employer name and address, the date the welder qualification test was passed, and the dates indicating welding continuity including welding procedure for each date.

1.6.4 Weld Records

1.6.4.1 Quality Control Document

For all welding within the scope of ASME B31.1, the Contractor shall submit for approval an administrative procedure for recording, locating, monitoring, and maintaining the quality of all welds to be performed on the project. This quality control document record shall include but not be limited to drawings and schedules identifying location of each weld by individual number, identification of welder who performed each weld by individual welder's name, stamp number, date and WPS used.

1.6.4.2 Welder Identification Numbers

After achieving qualification, but before being assigned work, each qualified person shall be assigned an identifying number by the Contractor that shall be used to identify all of his welds. A list of qualified persons with their respective numbers shall be submitted by the Contractor and shall be maintained accurately with deletions and additions reported promptly.

1.6.4.3 Welder Identification

Upon completing a joint, the welder shall mark the pipe not more than 6 inches from the weld with the identifying number and the last two digits of the year in which the work was performed. Identification marks shall be made by using a rubber stamp or felt-tipped marker with permanent, weatherproof ink or other methods approved by the Engineer that do not deform the metal. For seam welds, identification marks shall be placed adjacent to the welds at 3-foot intervals. Identification by die stamps or electric etchers will not be allowed. The markers are to be provided by the Contractor. Substituting a map of welds with welders' names shall not be acceptable.

1.7 DELIVERY, STORAGE, AND HANDLING

Piping material shall be packaged in accordance with ASTM A 700 and as specified herein.

1.7.1 Pipe Identification

Upon the receipt of each shipment of pipe on the job, the Contractor is responsible for maintaining the marking and for the storage of all pipe in

such a manner that the ASTM material specifications and method of manufacture (seamless, etc.) of each piece of pipe will be clearly discernible at the time of its installation in the system. If at the time of its installation any piece of pipe is not readily identifiable, it will be subject to rejection, or arbitrary downgrading by the Engineer or COTR to the lowest grade which has been received on the job to that date.

1.7.2 End Caps

Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, and clay pipe. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

1.7.3 Storage

Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.

Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

1.7.4 Protective Coatings

External machined surfaces, flange facings, and bolt holes shall be protected against corrosion during shipment, storage, and installation with the application of one coat of water-soluble, rust-inhibiting coating. All edges prepared for field welding shall be protected against corrosion during shipment, storage, and installation with one coat of rust-inhibiting coating (deoxaluminate or Government-approved equivalent) applied after inspection and cleaning.

PART 2 PRODUCTS

2.1 GENERAL

All materials shall be submitted for review prior to being incorporated in the Work. Material for pipes, fittings, and accessories shall be new and in accordance with ASTM specifications. Welded attachments shall be made of material compatible with the piping. Where the material for a specific component is not specified, it shall be selected by the Contractor for review by the Engineer. Material and equipment specified by brand or manufacturer are typical and designate the type, quality, and purpose of the items. Similar and equivalent items of equal standards may be accepted if, in the opinion of the Engineer, they are equivalent in all important respects and are equally suitable for the purpose intended. The Contractor shall submit descriptive literature and secure the Engineer's written approval for any substitutions before orders are placed.

2.1.1 Code

The fabrication and erection of all applicable piping shall conform to the latest edition and all current revisions of ASME B31.1. In addition, the fabrication and erection of all piping shall conform to all applicable Federal, State, and Local laws.

2.1.2 Piping Materials

Provide all pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by the intended service use, comply with governing regulations and industry standards, and obtain approval from the Engineer prior to any work.

2.1.3 Pipe/Tube Fittings

Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections as determined by the intended service use and install in accordance with pipe manufacturer's recommendations. In addition, obtain approval from the Engineer or COTR before performing any work.

2.1.4 Plastic Pipe

All PVC and fiberglass reinforced pipe (FRP) materials shall contain an ultra-violet inhibitor.

2.2 PIPE IDENTIFICATION SYSTEM

2.2.1 General

A system has been established which identifies the specific piping materials and insulation, gaskets, and other components for each type of pipe identified in the Contract Drawings. The specific pipe specification is linked by the service number as listed in the "Piping, Gasket, Insulation, and Service Group Index," which appears in this Section.

2.2.2 Pipe Identification System Description

The system used on the Contract Drawings to indicate the specific materials and construction required for each pipe line is illustrated by the following example.

a. A typical pipe line may be called out as:

4 inches 100S, where:

(1) 4 inches: Indicates nominal pipe size of line.

(2) "100S": Is the abbreviation for the piping system contents and is the service group as depicted in the "Piping, Gasket, Insulation and Service Group Index". In this example the abbreviation is for STEAM, 100 PSIG. In this example, the service group "100S" requires Pipe Group 3, Gasket Group "HPB", and Insulation Group "C".

b. Gasket groups are specified in detail in Section 23 05 50 - GASKETS.

c. Pipe material and erection specification groups appear as subsections of this Section. For example in the above example the service group is "100S" which according to the index corresponds

to Pipe Group No. 3; refer to PIPING GROUP 3 of this Section.

d. Valve groups are identified and specified in Section 23 10 00 - VALVES.

2.3 PIPING, GASKET, INSULATION, AND SERVICE GROUP INDEX

The following pages contain the "Piping, Gasket, Insulation, and Service Group Index".

PIPING, GASKET, INSULATION AND SERVICE GROUP INDEX

SERVICE	LINE DESCRIPTION	PIPE GROUP	GASKET GROUP	INSUL GROUP	SERV GROUP ON DWGS
OIL, FUEL	Jet Fuel 175 PSIG at 120 Degrees F Max, From Pump Discharge to Points of Use	6	A	-	FOS

Notes:

1. Insulate vent and drain systems per Insulation Group "A" with Insulation Finish "AA" only for continuous venting systems such as the deaerator vent and condensate receiver vent and continuous hot draining systems.

2.4 PIPING GROUP 6 - STEEL PIPE

2.4.1 Design Basis

a. Working pressure, 150 psig at 366 degrees F.

b. Corrosion allowance, .025 inch.

2.4.2 Pipe

a. All pipe shall be seamless carbon steel conforming to ASTM A106/A106M, Grade B. Pipe wall thickness shall be as follows:

1/8 through 24 Inches Schedule "XSTG"

2.4.3 Joints

a. Joints 2 inches and smaller shall be screwed.

b. Joints 2-1/2 inches and larger shall be butt welded.

c. All sizes shall be flanged where shown on the Contract Drawings or where required to connect to flanged valves, fittings, or equipment.

2.4.4 Stress Relieving

Stress relieving is not required.

2.4.5 Fabrication and Erection

Fabrication and erection shall be in accordance ASME B31.1.

2.4.6 Testing

Testing shall be in accordance with ASME B31.1.

2.4.7 Flanges

Flanges 24 inches and smaller shall be Class 150 steel welding neck type, raised face, and drilled in accordance with ASME B16.5. Material shall conform to ASTM A105/A105M.

2.4.8 Fittings

a. Fittings 2 inches and smaller shall be Class 150 screwed banded malleable iron in accordance with ANSI B16.3. Material shall conform to ASTM A197/A197M.

b. Fittings 2-1/2 inches and larger shall be steel, butt welded type in accordance with ASME B16.9 and with the same wall thickness as the attached pipe. Material shall conform to ASTM A234/A234M, Grade WPB, seamless carbon steel.

c. Mitered branches are not allowed.

2.4.9 Bolting Materials

Bolting materials shall be continuous threaded alloy steel studs threaded in accordance with ANSI B18.2.1. Material shall conform to ASTM A193/A193M, Grade B7. Nuts shall be heat-treated, heavy hexagonal, semi finished and in accordance with ASME B18.2.2. Material shall conform to ASTM A105/A105M, Grade 2H.

2.4.10 Unions

a. Unions 2 inches and smaller shall be 150 pounds malleable iron, brass seat, nut type. Material shall conform to ASTM A197/A197M.

b. Unions 2-1/2 inches and larger shall be made with flanges.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Inspection by the Engineer and Government

Material, equipment, design, and workmanship shall at all times be subject to the inspection of the Engineer and Government and, upon being notified in writing by the Engineer, any material, equipment, or workmanship not meeting the specified requirements shall be replaced or reworked immediately without additional cost to the Government. Inspection by the Engineer and/or Government shall not relieve the Contractor from the responsibility for full compliance with the specified requirements.

3.1.2 Government-Furnished Drawings

The Drawings supplied by the Government including the Contract Drawings are

not intended to be fabrication drawings. Dimensions for pipe fabrication shall be field checked prior to fabrication.

3.2 PREPARATION

Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

3.2.1 Measurement Verification by the Contractor

Before fabrication, the Contractor shall verify all measurements at the site and obtain all necessary additional information for completion of the Work, including the following:

a. Actual location of weld nozzles, flanges, or other type of terminal connections and verification of weld nozzle ends and flange facings that are existing, to which the Contractor's Work must connect.

b. Exact location of existing piping with supports and hangers in place.

c. Exact location of new and existing structures and equipment.

d. Interferences and difficulties that may exist.

e. The Contractor shall take such field measurements and allow for such makeup lengths or closures necessary for accurate alignment and assembly.

3.3 INSTALLATIONS

3.3.1 General

Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leak-proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 0.05 inches misalignment tolerance.

3.3.2 Piping Locations and Arrangements

Drawings (plans, schematics, and diagrams) indicate the general location arrangement and restrictions of the piping systems. Location and arrangement of piping layout shall take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated on Contract Drawings, including the following guidelines:

a. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

b. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated on the Contract Drawings.

c. Locate groups of pipes parallel to each other, spaced to permit applying full insulation, servicing of valves, and thermal

expansion of piping systems.

d. Provide vents and drains at high and low points in mains, risers, and branch lines with minimum 3/4 inch valve with cap to facilitate hydrostatic testing.

3.3.3 Electrical Equipment Spaces

Do not run piping through transformer vaults and other electrical rooms or electronic equipment spaces and enclosures. In no instance shall piping be routed above electrical equipment. Do not run piping through or over control rooms.

3.3.4 Interferences

Do not run piping or conduits through ducts or equipment cabinets.

3.3.5 Shop Prefabrication

a. Where shop prefabrication is not specified but is done as the Contractor's choice, any adjustments necessary due to inaccuracies in equipment setting and dimensions or location of existing obstructions shall be done at no additional cost. No shop fabrication sketches will be checked by the Engineer, but Contractor shall submit drawings to the Engineer for information.

b. All shop fabrication shall be fabricated to dimensional tolerances in accordance with Pipe Fabrication Institute (PFI) Standard ES-3. Accumulated tolerances between fixed points shall not exceed plus or minus 3/8 inch.

3.3.6 Connections To Pumps, Tanks, and Equipment

a. The Contractor shall erect and support piping in manner that shall not put undue strain on pumps, tanks, or equipment.

b. The procedure for connection of piping to equipment shall be as follows:

(1) After the equipment has been set and grouted, the Contractor shall run the pipe to the equipment without making any tight connections to flanges.

(2) Flat faced flanges and full face gaskets shall be used on piping connecting to equipment with flat faced flanges. Raised faces of standard flanges may be machined off flat to accomplish this. Bolting for these joints shall be per ASME B31.1.

(3) Before connecting flanges to equipment, the contractor shall notify the Engineer of the intent. At the Government's and Engineer's request, the flange position may be inspected to assure that no strain is placed on the equipment. If pipe is not in correct alignment, the Contractor shall remove piping and correct. The correction in alignment shall not be made while the pipe is connected to the equipment.

c. After alignment is found correct by the Engineer, the Contractor shall bolt up the flanges.

d. When required by the COTR after the equipment has been in service, tested at operating temperatures, and with the lines and equipment still hot, the Contractor shall loosen flange connections to pumps, tanks, and equipment, and check for alignment, position, expansion, and strain applied to the equipment; make any adjustments necessary, and obtain approval of the Engineer before reconnecting.

3.3.7 Thermal Cutting

When thermal cutting is required, the material shall be in accordance with ASME B31.1 welding preheat requirements. Thermal cut surfaces shall be ground to remove all slag, oxide, and surface irregularities to 1/16 inch. Austenitic stainless steel pipe shall be cut by mechanical means only.

3.3.8 Welded Attachments

a. Welded attachments shall include lugs, brackets, and similar devices welded to pipe for hangers, supports, and guides. Weld procedures used to attach such devices shall be compatible with the base material. Preheating shall be in accordance with ASME B31.1 requirements for piping material.

b. All areas where lugs or attachments are removed or repaired shall be tested hydrostatically to meet accepted standards stated in ASME B31.1. Any linear indications shall be removed and the area retested. The procedure shall be repeated until no indications are noted.

3.4 FITTINGS AND SPECIALTIES

3.4.1 General

Use fittings for all changes in direction and all branch connections.

3.4.2 Pipe Elbows

Provide pipe elbows where depicted on the Contract Drawings. Use long radius elbows except where specifically designated on the Contract Drawings.

3.4.3 Branches

Wherever branch pipe is indicated, install type of fitting shown on Contract Drawings, i.e. forged branch connection fitting, regular "T" fitting, or reducing "T" fitting.

a. If the type of fitting is not shown on the Contract Drawings or specified in the piping specifications, the Contractor may choose between the above mentioned fittings, within the limits of the following:

(1) Forged branch connection fittings may only be used if the smaller branch pipe is at least two standard nominal pipe sizes smaller than the larger main pipe.

(2) All fittings and procedures conform to the specific piping group specification as scheduled in this Section.

(3) The Contractor shall provide taps into existing mains that

will remain energized at up to piping system design pressure where a hot tap is specifically indicated on the Contract Drawings. This procedure is also known as wet tapping. Hot or wet tapping shall be performed by experienced personnel with special hot tap fabrication equipment. All hot tapping shall be coordinated with the Government. Hot tapping is only allowed where indicated on the Contract Drawings or by written approval from the Owner.

b. Blowoff Piping: All branch connections in blowoff piping systems shall be made using "Y" style fitting with branch-flow angled towards the direction of flow.

3.4.4 Reducers

Unless explicitly stated on Contract Drawings, use forged fittings. Use concentric fittings except as specified below:

3.4.4.1 Steam Systems

For reducers in horizontal in direction of flow, use eccentric flat on bottom to allow condensate to continue flowing in direction of steam travel.

3.4.5 Dielectric Unions

Install dielectric unions to connect piping materials of dissimilar metals in dry piping systems (gas, compressed air). Unions shall be rated for the design basis working pressure and temperature of the piping system per this specification.

3.4.6 Dielectric Fittings

Install dielectric fittings to connect piping materials of dissimilar metals in wet piping systems (water, steam). Fittings shall be rated for the design basis working pressure and temperature of the piping system per this specification.

3.5 JOINTS

3.5.1 Threaded Joints

a. Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Immediately before erecting the piping, all threads on pipe and all fittings shall be thoroughly cleaned of cuttings, dirt, oil, or other foreign matter.

b. Ordinary or special-type screwed joints shall be kept to a minimum to reduce any possibility of leakage. Continuous runs of piping shall be used, wherever possible. All screwed connections shall have full threads of true taper and shall be accurate to gage. Only Teflon shall be used on threaded joints that have a design temperature less than 500 degrees F. Pipe compound shall be used on threaded joints that have a design temperature greater than 500 degrees F. Care shall be taken to prevent obstruction of pipe or tubing when using Teflon tape.

c. When screwed connections are specified to be seal welded, the pipe shall be threaded so that not more than one thread remains outside

the joint. The pipe to be welded shall be cleaned to bare metal and free of oil, scale, and dirt. The joint shall be made up handtight, without tape, and shall be welded with not less than two light beads with the weld cleaned between successive passes. The seal weld shall completely cover the thread with no undercut on the pipe. Plugs to be installed in seal weld fitting shall be installed, using Teflon tape, after all welding is complete.

3.5.2 Welded Joints

3.5.2.1 General

a. Weld pipe joints only when ambient temperature is above 0 degree F where possible.

b. Bevel pipe ends at a 37.5 degree angle where possible, smooth rough cuts, and clean to remove slag, metal particles, and dirt.

c. Use pipe clamps or tack-weld joints with 1 inch long welds; 4 welds for pipe sizes to 10 inches, 8 welds for pipe sizes 12 inches to 20 inches.

d. Build up welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes, and non-metallic inclusions.

e. Do not weld-out piping system imperfections by tack-welding procedures; prefabricate to comply with requirements.

f. If piping component ends are bored, such boring shall not result in the finished wall thickness after welding less than the minimum design thickness.

g. The inside diameters of piping components to be butt-welded shall be aligned as accurately as is practicable within existing commercial tolerances on diameters, wall thickness and out of roundness. Alignment shall be preserved during welding. The internal misalignment of the ends to be joined shall not exceed 0.05 inch.

3.5.2.2 Welding Processes

a. All welding on metal piping systems shall be done using qualified welding and qualified welders and welding operators in accordance with ASME BPVC SEC IX.

b. All welding shall be done by a process that is compatible with the work being welded and the working conditions. Shielded metal-arc welding (SMAW) shall not be used on work less than 3/16 inch thick.

c. Welding shall be performed by using only one of the following processes:

(1) Shielded Metal Arc Welding (SMAW), also know as "Stick" Welding

(2) Gas Tungsten Arc Welding (GTAW), also known as TIG and Heliarc Welding

(3) Submerged Arc Welding (SAW)

(4) Metal Inert Gas Welding (MIG)

c. Where a specific welding process is called for in the piping group, it shall govern.

d. All stainless steel work less than 3/16 inch thick shall be welded by the gas tungsten-arc (GTAW) process with the back side purged. Work thicker than 3/16 inch shall have a root pass by the GTAW Process with the back purged and the balance of the weld may be completed by SMAW Process or any other suitable process.

3.5.2.3 Welding Grooves

a. The ends of steel pipe and fittings to be erected with butt welded joints shall be beveled to form welding grooves in accordance with ASME B16.25, except where otherwise noted in these Specifications, or on the Contract Drawings.

b. Welding grooves for butt welded joints in pipe of unequal wall thickness shall be beveled in accordance with ASME B31.1.

3.5.2.4 Backing Rings

Backing rings shall not be used.

3.5.2.5 Cleaning of Welding

All slag or flux remaining on the bead of welding shall be completely removed before laying down the next successive bead and at the completion of the weld.

3.5.2.6 Preheating of Welded Joints

Pipe adjacent to joints before and during welding shall be preheated by any suitable method in accordance with the qualified welding procedure and in all cases shall be in accordance with ASME B31.1, Paragraph 131.

3.5.2.7 Weld Quality

a. All welds shall have full penetration and complete fusion with a minimum of weld metal protruding on the inside of the pipe.

b. The finished weld contour shall be uniform, with the toe or edge of the weld merging smoothly into the base material. Butt welds shall have a slight reinforcement build-up gradually from the toe or edge toward the center of the weld. The limitation on butt weld reinforcement shall be in accordance with ASME B31.1, Table 127.4.2 and shall apply separately to both inside and outside surfaces of the joint. Fillet welds may be slightly concave on the furnished surface.

3.5.2.8 Identification of Welders

Refer to Quality Assurance paragraph of Part 1 of this Section.

3.5.3 Socket Welding Joints

Where socket welding valves or fittings are used, the pipe shall be spaced with a minimum of 1/16 inch clearance between the end of the pipe and the socket so that no stresses will be imparted to the weld due to "bottoming" of the pipe in the socket. The fit between the socket and the pipe shall conform to applicable standards for socket weld fittings and in no case shall the inside diameter of the socket exceed the outside diameter of the pipe by more than 0.075 inches.

3.5.4 Flanged Joints

a. Match flanges within piping system and at connections with valves and equipment where specified. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

b. All slip-on flanges are to be welded on front and back. Welding neck flanges shall be bored to match the attached pipe.

c. Flange faces shall be in perfect alignment, with holes straddling the principal centerlines. Ordinary or special-type flanged joints shall be kept to a minimum to reduce any possibility of leakage. Continuous runs of piping shall be used, wherever possible. All bolts in flanged construction shall be uniformly tightened with proper wrenches only. Hammering and bumping are prohibited. Care shall be taken to secure uniform pressure on the gasket and to avoid overstressing of the bolts, dishing of flanges, and compression of the gasket beyond limits. All bolts shall be well lubricated over the entire thread with a heavy graphite-and-oil mixture prior to tightening operation.

d. Bolting with Spiral-Wound Gaskets: All steel bolts shall be tightened to obtain a cold stress between 30,000 and 45,000 psi. Torque, if used, shall be correlated to bolt stress by onsite strain testing.

e. Bolting with Rubber Gaskets: Bolts shall be uniformly tightened to compress gaskets approximately one-half of their original thickness. Care shall be taken to avoid damaging the gasket by overtightening.

3.6 CLEANING, FLUSHING, INSPECTING

3.6.1 General

Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water, air, or steam unless otherwise specified in the pipe group specifications or directed by the Engineer before proceeding with required tests. Inspect each run of each system for completion of joints, supports, and accessory items.

3.7 PIPING TESTS - HYDROSTATIC

3.7.1 ASME B31.1 (Nonboiler External Piping)

All ASME B31.1 nonboiler external piping shall be hydrostatically tested in accordance with Paragraph 137 of the ASME B31.1 Power Piping Code.

3.7.2 General

Provide temporary equipment for testing, including pump and gages. The gage shall be accurate to within 3 psig and shall be calibrated within six months of the test as recorded on a sticker on the gage. Test piping system before insulation is installed or piping is painted. Pressure testing shall be performed following the completion of postweld heat treatment, nondestructive examinations, and all other fabrication, assembly, and erection activities required to provide the system or portions thereof subjected to the pressure test with pressure retaining capability. Remove control devices before testing. Ensure that all expansion joints, anchors, and guides are installed and completed. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time. The Contractor shall provide air vent valves at all high points in the system to purge air pockets while the system is filling and drain valves at all low points to drain system.

a. The Contractor shall consider that testing may be performed against existing valves and equipment having unknown sealing capability. It is the Contractor's responsibility to provide adequate pumping and test medium to accommodate any leakage through the existing equipment and valves.

b. Testing shall be performed with calibrated test gages (Contractor furnished) in the presence of the Government or Engineer.

c. The Contractor shall furnish all temporary pipe, fittings, and pumps required to perform the tests.

d. Pipe hangers, snubbers, or restraints shall be blocked, disconnected, or pinned, as required, prior to pressure testing or cleaning and shall be restored to operating condition following such test.

e. Equipment and instruments shall be isolated and openings shall be plugged, as required, to accomplish the required testing and cleaning and to prevent over pressurizing connecting piping or equipment. Relief and safety valves shall be "gagged" or the valves removed and the respective nozzle blanked for testing of the associated equipment.

f. The equipment to which any piping system is attached shall not be subjected to any line tests. The test pressures apply to the piping materials as specified but shall not be assumed to apply to piping specialties, accessories, or equipment, including safety heads, rupture disks, relief valves, expansion joints, instruments, or filters. Items that may be damaged by the test pressure shall either be removed or blanked off.

g. Lines containing check valves shall have the source of test pressure located on the upstream side.

h. The system shall be filled with water, care being taken that air is completely vented from the top of system so that there are no air pockets remaining.

i. The test water for hydrostatic tests shall be clean and of such

quality as to minimize corrosion of the materials in the piping system. The temperature of the test medium shall be a minimum of 60 degrees F, unless the Engineer specifies otherwise. The test pressure shall not be applied until the system and the pressurizing medium are approximately at the same temperature.

j. The leak test shall be considered satisfactory if no leakage is discovered on the piping or at any joints and if no sweating due to porosity is discovered on piping or at joints. Lines requiring repairing shall be retested to the pressure originally specified. The piping system, exclusive of possible localized instances at pumps or packing, shall show no evidence of leaking.

k. Refer to "Piping System Special Requirements" for natural gas piping system requirements.

3.7.3 Test Pressure

3.7.3.1 ASME B31.1

a. The hydrostatic test pressure shall be as defined in Paragraph 137.4.5 of the ASME B31.1 Power Piping Code. The design pressure is listed under the line service description in the "Piping, Gasket, Insulation, and Service Group Index" listed in this Section. For example, a "HPS" pipe service has a design pressure of 130 PSIG. This is not to be confused with design basis working pressure for the piping group, which for this example would be 150 PSIG for Pipe Group 3.

b. The test pressure shall be continuously maintained for a minimum time of 10 minutes and may then be reduced to design pressure and held for such time as may be necessary to conduct the examinations for leakage. Examinations for leakage shall be made of all joints and connections. The piping system shall show no visual evidence of weeping or leaking.

c. Vent and drain piping shall be leak tested by using 6.5 PSIG pressure or by maintaining a 15 foot water column, either applied to the highest point of the line being tested. The extent of the test shall be an initial service leak test in accordance with Paragraph 137.7 of ASME B31.1.

3.7.4 Test Blinds

a. If during the field testing of piping it becomes necessary to insert test blinds in any part of this piping, the Contractor shall provide test blinds.

b. Test blinds shall be equipped with a long handle.

c. The Contractor shall submit a written description of the location of test blinds before testing.

d. The Contractor shall remove all test blinds after testing.

3.7.5 Repairing Failed Sections

Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to

overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

3.7.6 Draining

Drain test water from piping systems after testing and repair work has been completed.

3.7.7 Hydrostatic Testing Records

a. It is the responsibility of the Contractor to keep accurate, updated records of all hydrostatic testing. The Contractor shall submit a final log of all hydrostatic testing for the Owner's records.

b. The Contractor shall maintain a constantly updated list of the following for all hydrostatic tests:

(1) Date and time of test.

(2) Hydrostatic test pressure.

(3) Piping system tested.

(4) Extent of piping system tested so that it can be clearly identified up to what point a piping system has been tested.

(5) Test results. All failures shall be indicated with the cause explicitly stated and the corrective action taken.

(6) Signed witnesses of each test which shall be one employee of the Contractor and by the Owner or Engineer.

3.8 PIPING EXAMINATIONS - VISUAL

3.8.1 General

Visually examine all pipe welds per ASME B31.1. As described below, visual examination of welds shall be performed by the Contractor. FRP pipe bonds shall be visually examined for surface conditions, alignment, poor bonding, and the like.

3.8.2 Acceptance Standards

3.8.2.1 ASME B31.1

a. The acceptance standards for visual examination shall be as defined in ASME B31.1, Paragraph 136.4.2.A, and are repeated here for convenience. The following indications are unacceptable:

(1) Cracks-external surface.

(2) Undercut on surface which is greater than 1/32 inch deep.

(3) Weld reinforcement greater than that specified in Table 127.4.2. of ASME B31.1.

(4) Lack of fusion on surface.

(5) Incomplete penetration (applies only when inside surface is readily accessible).

(6) Any other linear indications greater than 3/16 inch long.

(7) Surface porosity with rounded indications having dimensions greater than 3/16 inch or four or more rounded indications separated by 1/16 inch or less edge to edge in any direction. Rounded indications are indications which are circular or elliptical with their length less than three times their width.

b. In addition, acceptance will also be based on the proper lay-out, materials, and methods, as specified.

3.8.3 Failed Welds

a. All welds not passing visual examination shall be repaired or replaced at no expense to the Government.

b. Do not begin to repair or replace the weld until the weld report has been submitted to the Engineer and the Engineer gives approval for repairing the weld with the method that the Contractor proposes. Repair shall be performed using the qualified welding procedures applicable to the original weld.

3.8.4 Visual Inspection Reports

a. Reports for visual examinations of welds shall be required for all piping larger than 3 inch NPS except for vent and drain services. Reports preformed for visual examinations by the Contractor are not required to be submitted, but shall be kept available for review at any time by the Government or Engineer.

b. Each weld report shall include the following:

(1) Date of weld examination.

(2) Type of examination.

(3) Examiner's name.

(4) Welders' names including all persons who worked on the weld and their work involved.

(5) Piping system.

(6) Weld location.

(7) Weld procedure and materials.

(8) Materials and dimensions of items that were welded.

(9) Examination results.

3.8.5 Visual Examiner's Qualifications

a. All persons performing visual examinations and evaluating examinations shall be certified according to AWS QC1.

3.8.6 Visual Examination Requirements

3.8.6.1 ASME B31.1

a. Visual examination requirements shall be as defined in ASME B31.1, Table 136.4

b. Welds designated for visual examination shall be examined as follows:

(1) Before welding - for compliance with requirements for joint preparation, alignment and fit-up, cleanliness, condition of welding equipment, quality and condition of base and filler materials to be used, and preheat, when required.

(2) During welding - for cracks, conformance to the qualified welding procedure, quality of individual weld passes, interpass temperature, placement and sequencing of individual weld passes, and backgouged surfaces.

(3) After welding - for cracks, contour and finish, bead reinforcement, undercutting, overlap, size of fillet welds, finished weld appearance, weld size, weld length, dimensional accuracy of weldment, and monitor post weld heat treatment.

c. Records of visual examinations must be kept as described in this Section.

d. Shop fabricated welds may be examined in the shop prior to arrival at the project site provided all other conditions of this Section are satisfied.

3.8.7 Examiner's Scope

a. Visual examinations to be performed by the Contractor may be performed and interpreted by an employee or employees of the Contractor, provided that each individual is certified as specified. As an option, the Contractor may obtain the services of an independent testing agency to perform these examinations.

b. If the Contractor elects to utilize the services of an independent testing agency to perform any visual examinations, the following applies:

(1) The qualifications for the personnel of the independent testing agency performing the examinations shall be submitted.

(2) The Contractor shall provide all required access and lighting for the independent testing agency.

(3) The Contractor shall be responsible for all of the independent testing agencies activities, including handling submittals, performing evaluations at the required times, etc.

c. A welder who has performed any work with regard to a specific weld shall not perform the visual examination of the same weld.

3.9 OPERATING TEST AND FINAL INSPECTION

After cleaning, testing, insulation, painting, and identification, the completed Work shall be tested by an operating test performed by the Government under normal service conditions. Upon completion of each operating test, the Contractor shall correct loose or faulty hangers and shall provide required devices to eliminate sway or vibration of piping.

3.10 INSULATION, PAINTING, AND IDENTIFICATION

3.10.1 Painting

Paint piping systems in accordance with existing Steam Plant color designations. Coordinate with COTR. Do not paint piping with aluminum jacket.

3.10.2 Cleaning and Painting Carbon Steel Piping

a. External surfaces of Contractor-furnished carbon steel pipe shall be thoroughly cleaned of dirt, rust, and mill scale in accordance with SSPC SP 6/NACE No.3, Commercial Blast Cleaning.

b. Previously painted surfaces which have blistered, loose, peeling, and scaling paint, dirt, dust, oil, grease, and other contaminants shall be removed in accordance with the surface preparation methods specified in SSPC SP 6/NACE No.3.

c. The following methods may be used to apply paint coatings to the steel surfaces:

(1) Paints and protective coatings may be spray applied by either conventional, airless, or air-assisted airless spray, unless otherwise specified. Spraying is normally the preferred method or application.

(2) Paints and protective coatings may be brushed or rolled when spray or brush application is unsuitable. The brush or roller shall be clean and of the best suited for the surface being coated is applied.

d. All external surfaces of carbons steel piping shall be given one coat of zinc primer. The coating shall be applied on the same day the surface is cleaned. The surface must be dry before the coating is applied.

e. Internal surfaces shall be thoroughly cleaned of all sandblast material. No coatings shall be applied to the inside.

3.10.3 TOUCH-UP

Following installation of piping which will not be insulated, the Contractor shall field touch-up primed paint damaged during installation and areas at field welds not previously painted. Before painting, surfaces shall be solvent cleaned, followed by hand or power tool cleaning.

-- End of Section --

SECTION 23 05 50

GASKETS

PART 1 GENERAL

1.1 REFERENCES

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

ASME INTERNATIONAL (ASME)

ASME B31.1	(2010) Power Piping
ASME B31.3	(2010) Process Piping

1.2 RELATED REQUIREMENTS

This Section specifies gaskets for piping systems that fall under ASME B31.1 and ASME B31.3 as specified in Section 23 05 00, BASIC PIPING MATERIALS AND METHODS.

1.3 DESCRIPTION OF WORK

The extent and type of gaskets required by this Section shall be as indicated on the Contract Drawings and/or specified in other Division 15 sections.

1.4 SUBMITTALS

In accordance with Section 01 33 00 - SUBMITTAL PROCEDURES, submit the following:

SD-03 Product Data

Gaskets

1.4.1 Gaskets

Submittals for gaskets shall include the following:

a. Materials of construction, thickness, pressure and temperature rating, manufacturer's model number, and storage requirements.

1.5 QUALITY ASSURANCE

1.5.1 Codes and Standards

a. All gaskets fall under the scope of ASME B31.1.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 General

a. Keep gaskets in dry area protected from weather.

b. Do not prepare gaskets until ready for installation.

c. Do not reuse gaskets.

PART 2 PRODUCTS

2.1 GASKET IDENTIFICATION SYSTEM

A system has been established which identifies the specific gasket for each service identified in the Contract Drawings. The specific gasket group is linked by the service number as listed in the "Piping, Gasket, Insulation, and Service Group Index", which appears in Section 23 05 00 - BASIC PIPING MATERIALS AND METHODS. An example is also presented in that Section.

2.2 GASKET GROUPS

2.2.1 Gasket Group A

Gaskets shall be non-asbestos, compressed sheet, nitrile binder with a rated maximum operating temperature and pressure of 700 degrees F and 1200 psi, respectively. Gaskets shall be 1/16 inch thick and conform to the flange face on which they are used. Acceptable products from acceptable manufacturers include: Sepco Style No. 6234, manufactured by Sepco Corporation; 1599-TR, Hwy. 31, Pelham, AL 35124, Phone Number (800) 242-6514; Sur-Seal Style No. NA 700, manufactured by Sur-Seal Gasket and Packing, Inc.; 6156 Wesselman Road, Cincinnati, OH 45248; Phone Number (800) 345-8966; or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

Match flanges within piping system and at connections with valves and equipment where specified.

Clean flange faces and install gaskets.

Tighten bolts to provide uniform compression of gaskets.

Replace gaskets after hydrostatic testing.

Replace leaking gaskets, and also check flange alignment and bolt torque in the hot alignment.

-- End of Section --

SECTION 23 06 00

HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. At the discretion of the Government, the manufacturer of any material supplied will be required to furnish test reports pertaining to any of the tests necessary to assure compliance with the standard or standards referenced in this specification.

ASME INTERNATIONAL (ASME)

ASME B31.1	(2010) Power Piping
ASME B31.9	(2011) Building Services Piping

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C 1107/C 1107M	(2011) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C 533	(2009) Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation
ASTM C 552	(2007) Standard Specification for Cellular Glass Thermal Insulation

MAPLE FLOORING MANUFACTURERS ASSOCIATION (MFMA)

MFMA-4	(2004) Metal Framing Standards Publication

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(2009) Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation
MSS SP-69	(2003) Pipe Hangers and Supports - Selection and Application (ANSI Approved American National Standard)
MSS SP-89	(2003) Pipe Hangers and Supports - Fabrication and Installation Practices

MSS SP-90 (2000) Guidelines for Terminology for Pipe Hangers and Supports

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2010) Structural Welding Code - Steel

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PA 1 (2000; E 2004) Shop, Field, and Maintenance Painting of Steel

1.2 RELATED REQUIREMENTS

1.2.1 Sections

The following Sections apply to this Section with additions and modifications specified herein:

Section 23 03 00 - BASIC MECHANICAL MATERIALS AND METHODS

1.3 SYSTEM DESCRIPTION

This Section includes hangers and supports for mechanical system piping and equipment.

1.4 DEFINITIONS

1.4.1 MSS

Manufacturers Standardization Society for the Valve and Fittings Industry.

1.4.2 Terminology

As defined in MSS SP-90.

1.5 GENERAL QUALITY CONTROL

1.5.1 Channel Support Systems

Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.5.2 Steel Trapezes

Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

1.5.3 Seismic Restraint Hangers

Design and obtain approval from authorities having jurisdiction for seismic restraint hangers and supports for piping and equipment.

1.5.4 Welding

Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1.5.5 Engineering Responsibility

Design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, and seismic restraint by a qualified professional engineer.

1.5.5.1 Professional Engineer Qualifications

A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

1.6 SUBMITTALS

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

SD-02 Shop Drawings

Pipe Hangers, Supports, and Components

Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.

SD-03 Product Data

Pipe Hangers, Supports, and Components

For each type of pipe hanger, channel support system component, and thermal hangers shield insert indicated.

SD-06 Test Reports

Hanger Adjustment

Acceptance testing of the system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.1.1 Available Manufacturers

Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1 Pipe Hangers

1. AAA Technology and Specialties Co., Inc.

2. Anvil International, Inc.

3. B-Line Systems, Inc.

4. Lisega

5. National Pipe Hanger Corp.

2.1.1.2 Channel Support Systems

1. Anvil International, Inc.

2. B-Line Systems, Inc.

3. Lisega

5. Unistrut Corp.

2.1.1.3 Thermal-Hanger Shield Inserts

1. Anvil

2. Lisega

3. Pipe Shields, Inc.

4. Rilco Manufacturing Co., Inc.

2.2 MANUFACTURED UNITS

2.2.1 Pipe Hangers, Supports, and Components

MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

2.2.1.1 Galvanized, Metallic Coatings

For piping and equipment that will not have field-applied finish.

2.2.2 Nonmetallic Coatings

On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

2.2.2 Channel Support Systems

MFMA-4, factory-fabricated components for field assembly.

2.2.2.1 Coatings

Manufacturer's standard finish, unless bare metal surfaces are indicated.

2.2.2.2 Nonmetallic Coatings

On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

2.2.3 Thermal-Hanger Shield Inserts

600-psi minimum compressive-strength insulation, encased in sheet metal shield.

2.2.3.1 Material for Cold Piping

ASTM C 552, Type I cellular glass or water-repellent-treated, ASTM C 533, Type I high density (min. 15 lb/cu. ft) calcium silicate with vapor barrier.

2.2.3.2 Material for Hot Piping

Water-repellent-treated, ASTM C 533, Type I (min. 15 lb/cu. ft) calcium silicate.

2.2.3.3 For Trapeze or Clamped System

Insert and shield cover entire circumference of pipe.

2.2.3.4 For Clevis or Band Hanger

Insert and shield cover lower 180 degrees of pipe.

2.2.3.5 Insert Length

Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Mechanical-Anchor Fasteners

Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

2.3.2 Structural Steel

ASTM A36/A36M, steel plates, shapes, and bars, black and galvanized.

2.3.3 Grout

ASTM C 1107/C 1107M, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.

2.3.3.1 Characteristics

Post hardening and volume adjusting; recommended for both interior and exterior applications.

2.3.3.2 Properties

Nonstaining, noncorrosive, and nongaseous.

2.3.3.3 Design Mix

5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

3.1.1 Specific Requirements

Specific hanger requirements are specified in Sections specifying equipment and systems.

3.1.2 Compliance

Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

3.1.3 Horizontal-Piping Hangers and Supports

Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

3.1.3.1 Adjustable Steel Clevis Hangers (MSS Type 1)

For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 10.

3.1.3.2 Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3)

For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.

3.1.3.3 Steel Pipe Clamps (MSS Type 4)

For suspension of cold and hot pipes, NPS 1/2 to NPS 24 (DN15 to DN600), if little or no insulation is required.

3.1.3.4 Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12)

For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.

3.1.3.5 U-Bolts (MSS Type 24)

For support of heavy pipe, NPS 1/2 to NPS 30.

3.1.3.6 Pipe slide and slide plate (MSS Type 35)

For use where axial movement is present. Provide lateral restraints where necessary.

3.1.3.7 Single Pipe Rolls (MSS Type 41)

For suspension of pipes, NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.

3.1.3.8 Adjustable Pipe Roll and Base Units (MSS Type 46)

For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

3.1.4 Vertical-Piping Clamps

Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

3.1.4.1 Extension Pipe or Riser Clamps (MSS Type 8)

For support of pipe risers, NPS 3/4 to NPS 20.

3.1.4.2 Carbon- or Alloy-Steel Riser Clamps (MSS Type 42)

For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

3.1.5 Hanger-Rod Attachments

Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

3.1.5.1 Steel Turnbuckles (MSS Type 13)

For adjustment up to 6 inches for heavy loads.

3.1.5.2 Steel Clevises (MSS Type 14)

For 120 to 450 degrees F piping installations.

3.1.5.3 Steel Weldless Eye Nuts (MSS Type 17)

For 120 to 450 degrees F piping installations.

3.1.6 Building Attachments

Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

3.1.6.1 Steel or Malleable Concrete Inserts (MSS Type 18)

For upper attachment to suspend pipe hangers from concrete ceiling.

3.1.6.2 Top-Beam C-Clamps (MSS Type 19)

For use under roof installations with bar-joist construction to attach to top flange of structural shape.

3.1.6.3 Side-Beam or Channel Clamps (MSS Type 20)

For attaching to bottom flange of beams, channels, or angles.

3.1.6.4 Center-Beam Clamps (MSS Type 21)

For attaching to center of bottom flange of beams.

3.1.6.5 Welded Beam Attachments (MSS Type 22)

For attaching to bottom of beams if loads are considerable and rod sizes are large.

3.1.6.6 Top-Beam Clamps (MSS Type 25)

For top of beams if hanger rod is required tangent to flange edge.

3.1.6.7 Linked-Steel Clamps with Eye Nuts (MSS Type 29)

For attaching to bottom of steel I-beams for heavy loads, with link extensions.

3.1.6.8 Welded-Steel Brackets

For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

a. Light (MSS Type 31): 750 lb.

b. Medium (MSS Type 32): 1500 lb.

c. Heavy (MSS Type 33): 3000 lb.

3.1.6.9 Side-Beam Brackets (MSS Type 34)

For sides of steel or wooden beams.

3.1.6.10 Plate Lugs (MSS Type 57)

For attaching to steel beams if flexibility at beam is required.

3.1.7 Saddles and Shields

Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

3.1.7.1 Steel Pipe-Covering Protection Saddles (MSS Type 39)

To fill interior voids with insulation that matches adjoining insulation.

3.1.7.2 Protection Shields (MSS Type 40)

Of length recommended by manufacturer to prevent crushing insulation.

3.1.7.3 Thermal-Hanger Shield Inserts

For supporting insulated pipe, 360-degree insert of high-density, 600-psi minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

3.2 HANGER AND SUPPORT INSTALLATION

3.2.1 Pipe Hanger and Support Installation

Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

3.2.2 Channel Support System Installation

Arrange for grouping of parallel runs of piping and support together on

field-assembled channel systems.

3.2.2.1 Field assemble and install

Field assemble and install according to manufacturer's written instructions.

3.2.3 Heavy-Duty Steel Trapeze Installation

Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated, heavy-duty trapezes.

3.2.3.1 Pipes of Various Sizes

Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

3.2.3.2 Field Fabricate

Field fabricate from ASTM A36/A36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

3.2.4 Attachments

Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

3.2.5 Fasteners

Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

3.2.6 Accessories

Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

3.2.7 Expansion

Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

3.2.8 Load Distribution

Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

3.2.9 Pipe Slopes

Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 are not exceeded.

3.2.10 Insulated Piping

Comply with the following:

1. Hot or cold piping with or without vapor barrier:

   a. Use thermal-hanger shield insert with clamp sized to match OD of insert.

   b. Do not exceed pipe stress limits according to ASME B31.9 and ASME B31.1 Power Piping.

2. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.

3. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

   b. NPS 4 : 12 inches long and 0.06 inch thick.

   c. NPS 5 and NPS 6 : 18 inches long and 0.06 inch thick.

   d. NPS 8 to NPS 14 : 24 inches long and 0.075 inch thick.

   e. NPS 16 to NPS 24 : 24 inches long and 0.105 inch thick.

4. Insert Material: Length at least as long as protective shield.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

3.3.1 Stands

Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

3.3.2 Grouting

Place grout under supports for equipment and make smooth bearing surface.

3.4 METAL FABRICATION

3.4.1 Cutting and Drilling

Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

3.4.2 Fitting

Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

3.4.3 Field Welding

Comply with AWS D1.1/D1.1M procedures for shielded metal arc welding,

appearance and quality of welds, and methods used in correcting welding work, and with the following:

3.4.3.1 Use materials and methods that minimize distortion and develop

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

3.4.3.2 Obtain fusion without undercut or overlap.

3.4.3.3 Remove welding flux immediately.

3.4.3.4 Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

3.5.1 Hanger Adjustment

Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

3.6.1 Finish

All pipe supports, hangers, attachments, and components shall be of hot dipped galvanized construction.

3.6.2 Touching Up

Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC PA 1 requirements for touching up field-painted surfaces.

3.6.2.1 Apply paint by brush or spray to provide a minimum dry film

Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

3.6.3 Galvanized Surfaces

Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

-- End of Section --

SECTION 23 10 00

VALVES

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 B31.1	(2010) Power Piping
ASME B16.10	(2009) Face-to-Face and End-to-End Dimensions of Valves
ASME B16.34	(2009) Valves - Flanged, Threaded and Welding End
ASME B16.5	(2009) Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard

ASTM INTERNATIONAL (ASTM)

ASTM A 105	(2005) Carbon Steel Forgings for Piping Applications
ASTM A 216	(2004) Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service
ASTM B 61	(2008) Standard Specification for Steam or Valve Bronze Castings
ASTM B 62	(2009) Standard Specification for Composition Bronze or Ounce Metal Castings

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-45	(1998) Bypass and Drain Connections
MSS SP-80	(2008) Bronze Gate, Globe, Angle and Check Valves

1.2 RELATED REQUIREMENTS

Contract Drawings and General Provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2.1 Sections

The following Sections apply to this Section with additions and

modifications specified herein:

Section 23 05 00 - BASIC PIPING MATERIALS AND METHODS

1.3 DESCRIPTION OF WORK

This Section specifies valves that fall under ASME B31.1 piping systems.

The extent and type of valves required by this Section shall be as indicated on the Contract Drawings and/or specified in other Division 15 sections. Valves furnished as part of factory-fabricated equipment shall conform to the requirements of this Section unless otherwise stated. Relief valves are specified in individual equipment Sections and Section 23 10 00 - RELIEF VALVES.

1.4 SUBMITTALS

Shop Drawings and Product Data: In accordance with Section 01 33 00 - SUBMITTAL PROCEDURES, submit the following:

SD-03 Product Data

Valve Data

Manufacturer's technical product data, including installation instructions, for each type of valve. Include pressure drop curve or chart for each type and size of valve.

Submit valve schedule showing manufacturer's figure number for corresponding valve symbol used to specify valves on this specification. List all valve sizes to be supplied for each valve symbol.

Manufacturer's assembly-type (exploded view) shop drawings for each type of valve and valve actuator indicating dimensions, weights, materials, and methods of assembly of components.

Technical data for electric valve actuators that indicate all features specified.

Manufacturer's technical product data indicating the service rating of each valve type. In addition, this information shall indicate the maximum hydrostatic test pressure that the valve can take when only one side of the valve is being pressurized. The indicated hydrostatic pressure shall be good for not only the structural integrity of the valve, but should also take into consideration its continued effectiveness for providing tight shut-off service as a valve without requiring any modifications or maintenance.

List country of manufacturer, fabrication, and assembly for all valves and valve components.

SD-07 Certificates

Country of Fabrication

Submit ISO 9001 and Independent Test reports if applicable per Quality Assurance paragraph below.

1.5 QUALITY ASSURANCE

1.5.1 Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance

Comply with the various MSS Standard Practices referenced.

1.5.2 Country of Fabrication

a. All valves and valve components not manufactured, fabricated, and/or assembled in the United States of America or Canada must be manufactured, fabricated, and/or assembled by an ISO 9001 registered corporation. No valves or valve components manufactured, fabricated, and/or assembled in China including Taiwan are permitted to be provided in this Contract.

b. Submit ISO 9001 registration certificates for all corporations where valves and valve components are not manufactured, fabricated, and/or assembled in the United States or Canada.

c. For all valves and valve components not fabricated in the United States or Canada, submit an independent test report for all materials to be provided.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Preparation For Transport

Prepare valves for shipping as follows:

a. Ensure valves are dry and internally protected against rust and corrosion.

b. Protect valve ends against damage to threads, flange faces, and weld-end preps.

c. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball and plug valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open; and block swing check valves in either closed or open position.

1.6.2 Storage

Use the following precautions during storage:

a. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.

b. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. Outdoor storage of valves shall not be permitted.

1.6.3 Handling

Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 PRODUCTS

2.1 VALVE FEATURES

2.1.1 Valve Data

Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by the manufacturer for installation requirements. Valves are identified on the Contract Drawings by Symbol.

2.1.2 Valve Design

Provide valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.

2.1.3 Pressure and Temperature Ratings

As specified according to the individual valve specifications.

2.1.4 Sizes

Same size as upstream pipe, unless otherwise indicated.

2.1.5 Operators

Provide the following special operator features:

a. Handwheels, fastened to valve stem, for valves other than quarter turn.

b. Lever handles, on quarter-turn valves 6 inch and smaller, except for plug valves. Provide plug valves with square heads.

c. Chain-wheel operators, for all valves installed 6 feet or higher above finished floor. Extend chains to an elevation of 5 feet above finished floor.

2.1.6 Extended Stems

Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

2.1.7 By-pass and Drain Connections

Provide valved by-pass where indicated on the Contract Drawings. Comply with MSS SP-45 bypass and drain connections.

2.1.8 Neck Extensions

Neck extensions and right angle drives where indicated and where required for access to the operator.

2.1.9 Hot Tap Valves

The Contractor shall provide hot taps into existing mains that will remain energized at up to the piping system design pressure where a hot tap is

specifically indicated in the Contract Drawings. This procedure is also know as wet tapping. For these instances, the valve shall be a full port valve to satisfy the requirements of the hot tap machine and provide a true area pipe tap, and shall satisfy the requirements of the specification of the valve group.

2.2 VALVE IDENTIFICATION SYSTEM DESCRIPTION

A system has been established which identifies the specific valves for each piping system identified in the Contract Drawings. The specific valve specification is linked by the service number as depicted in the "Valve Index" listed in this Section.

2.2.1 Valve Index

Valves are specified in this Section according to the "Valve Index". In general, the following is a description of the format:

a. The first symbol, consisting of one or more numerals, indicates the valve group specification that applies to this valve.

b. The second symbol, consisting of two letters, indicates the type of valve in accordance with the following listing:

1. GB = Globe Valve

2. BF = Butterfly Valve

3. BL = Ball Valve

4. CK = Check Valve

5. GT = Gate Valve

6. PG = Plug Valve

c. The third symbol consists of two numerals. The first numeral indicates the size group; the second numeral, when it is zero, indicates that the valve is standard type. Where the second numeral is greater than zero, it indicates modifications as described in the valve specifications herein.

d. The fifth symbol, consisting of a letter, indicates the type of connection to the valve as follows:

1. F = Flanged Ends

2. S = Screwed Ends

3. W = Weld Ends, Butt, or Socket

4. C = Solvent Cemented

e. For example: For a 4 inch 125S shutoff valve, refer to 2GT20F which indicates a valve of Valve Group 2, Gate Type, Standard, and with flanged ends.

2.2.2 Substitutions

There may be some instances where it is desirable to substitute an item, such as a valve or gasket at a particular location, in place of the one specified in the groups listed in the Index. In that event, the item will be clearly indicated and specified on the Contract Drawings, and such an indication is to take precedence over the item specified in the valve group specifications. All other terms of that group specification are to be observed.

2.3 VALVE INDEX

The following pages contain the "Valve Index"

SERVICE	LINE DESCRIPTION	SHUTOFF	THROTTLING	CHECK	SERV GROUP ON DWGS
OIL, FUEL	Jet Fuel 175 PSIG at 120 Degrees F Max, From Pump Discharge to Points of Use				
	2 Inches and Smaller	2BL14S	2BL14S	2CK20S	FOS
	2-1/2 Inches and Larger	2GT20F	2GB20F	2CK20F	FOS

2.3.1 Valve Group 2

2.3.1.1 Gate Valves

a. Symbol: 2GT10S - 2 Inches and Smaller: Class 250 gate valve, cast bronze body and bonnet, screwed ends; bronze seats, disc, and stem; screwed or union bonnet, solid wedge disc, integral seat rings, inside screw, rising stem, body and bonnet material to conform to ASTM B 61 or ASTM B 62. The valve shall conform to MSS-SP-80, Class 250-B62, Type 2.

b. Symbol: 2GT20F - 2-1/2 Inches and Larger: Class 150 steel gate valve, flanged ends, bolted flanged bonnet, outside screw and yoke, rising stem, flexible or solid wedge disc, renewable seat rings and disc. Materials shall be: Body and bonnet, ASTM A 216, Grade WCB or A105; stem, 13 percent chromium stainless steel; disc face and seat rings 13 percent chromium stainless steel or a combination of 13 percent chromium stainless steel and nickel-copper, stellite or a combination of stellite and 13 percent chromium stainless steel as recommended by its manufacturer for steam service. Face to face dimension shall conform to ASME B16.10. Flanges shall be faced and drilled to ASME B16.5. Working pressure and temperature ratings shall comply with ASME B16.34 (Standard Class). Where noted on the Contract Drawings provide an enclosed gear operator.

c. Symbol: 2GT10S - 2 Inches and Smaller: Class 600 gate valve, forged or cast carbon steel body and bonnet, screwded ends; 13 percent chromium stainless steel disc and stem; bolted or union bonnet, solid wedge disc, renewable or integral stellite or cobalt based alloy hard faced seat rings, outside screw and yoke, rising stem, body and bonnet materials to conform to ASTM A 105 or ASTM A 216, Grade WCB. Working pressure and temperature ratings shall comply with ASME B16.34 (Standard Class).

2.3.1.2 Globe Valves

a. Symbol: 2GB10S - 2 Inches and Smaller: Class 250 globe valve, cast bronze body and bonnet, screwed ends; bronze seat, disc and stem, union bonnet, plug or semi-plug type disc, inside screw, rising stem, body and bonnet material to conform to ASTM B 61 or ASTM B 62. The valve shall conform to MSS SP-80, Class 250-B62, Type 1.

b. Symbol: 2GB20F - 2-1/2 Inches and Larger: Class 150 steel globe valve, flanged ends, bolted flanged bonnet, outside screw and yoke, rising stem, plug or semi-plug type disc, renewable seat rings and disc. Materials shall be: Body and bonnet, ASTM A 216, Grade WCB or A105; stem, 13 percent chromium stainless steel; seat ring, 13 percent chromium stainless steel; disc, 13 percent chromium stainless steel or 13 percent chromium stainless steel faced. Face to face dimension shall conform to ASME B16.10. Flanges shall be faced and drilled to ASME B16.5. Working pressure and temperature ratings shall comply with ASME B16.34 (Standard Class).

c. Symbol: 2GB10W - 2 Inches and Smaller: Class 600 globe valve, forged or cast carbon steel body and bonnet, socket weld ends, 12 percent chromium stainless steel disc and stem; stellite seat ring; bolted bonnet, plug or semi-plug type disc, renewable or integral hard faced seat ring, outside screw and yoke, rising stem, body and bonnet material to conform to ASTM A 105 or ASTM A 216, Grade WCB. Working pressure and temperature ratings shall comply with ASME B16.34 (Standard Class).

2.3.1.3 Check Valves

a. Symbol: 2CK20S - 2 Inches and Smaller: Class 150 spring loaded horizontal or vertical lift check valve; forged carbon steel body and cover; screwed ends; 13 percent chrome stainless steel disc; renewable or integral stellite seat ring; bolted cover; body and cover material. Working pressure and temperature rating shall comply with ASME B16.34 (Standard Class).

b. Symbol: 2CK20F - 2-1/2 Inches and Larger: Class 150 steel horizontal swing check valve, flanged ends, bolted flanged cover and renewable seat ring. Body material shall conform to ASTM A 216, Grade WCB or A 105. Disc or disc seating face and the seat ring shall be 13 percent chromium stainless steel. Face to face dimension shall conform to ASME B16.10. Flange shall be faced and drilled to ASME B16.5. Working pressure and temperature ratings shall comply with ASME B16.34 (Standard Class).

c. Symbol: 2CK10W - 2 Inches and Smaller: Class 600 horizontal or vertical swing check valve; forged carbon steel body; socket weld ends; 13 percent chrome stainless steel disc; renewable or integral stellite seat ring; body material to conform to ASTM A 105. Working pressure and temperature ratings shall comply with ASME B16.34 (Standard Class).

2.3.1.4 Ball Valves

a. Symbol: 2BL10S - 2 Inches and Smaller: Rated for 1500 pound WOG,

rated for natural gas service, carbon steel body with hard chrome plate ball, Teflon seats, threaded ends, full port, and two piece body. Valve shall have blow-out proof stem design and shall have zinc plated carbon steel lever with vinyl grip. Valve lever shall have design so that lock-out can easily occur.

b. Symbol: 2BL14S - 2 Inches and Smaller: Rated for 1500 pound WOG, rated for No. 2 fuel oil service, carbon steel body and hard chrome plate ball, teflon seats which are rated for 150 PSIG service at 200 degrees F. Valve shall have threaded ends. Valve shall have full port. Valve shall have one or two piece body. Valve shall have blow-out proof steam design and shall have zinc plate carbon steel lever with vinyl grip. Valve lever shall have design so that lock-out tag-out can easily occur. Valve shall be listed by Underwriter's Laboratory for manual liquid fuel shut-off service.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Interior

Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

3.1.2 Actuator

Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

3.1.3 Threads

Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

3.1.4 Flanges

Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage. In cases where higher rated raised face steel flanges are mated to lower rated flat face cast iron flanges, remove raised face from steel flange before bolting together.

3.1.5 Piping

Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

3.1.6 Defects

Replace defective valves with new valves.

3.2 VALVE INSTALLATIONS

3.2.1 General Application

Refer to the Contract Drawings and piping system specification sections for specific valve applications and arrangements.

a. Locate valves for easy access and provide separate support where necessary.

b. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

c. Install by-pass and drain valves per MSS SP-45 or as indicated on the Contract Drawings.

d. Install three-valve bypass around each control valve and throttling valve as indicated on the Contract Drawings.

3.2.2 Valve Orientation

Unless otherwise indicated on the Drawings, stems of valves in horizontal lines shall be pointed up, if possible. If this is not practical, the stem may be pointed in a horizontal position. Valves shall not be installed with stems pointed down. All valves shall have a readily accessible location. The Contractor shall be responsible to determine valve stem locations on field-routed piping prior to fabrication of the piping. When welding valves to piping, the Contractor shall insure that the valves are in the open position and shall take extreme care not to overheat and damage the seat area. All valves shall be installed in accordance with the manufacturer's instruction manual. Any valves damaged during installation shall be replaced with new, identical valves at the Contractor's expense. Install valves in a position to allow full stem movement.

3.2.3 Installation of Swing Check Valves

Install for proper direction of flow and in horizontal position or vertical position with flow direction upwards, and with hinge pin level.

3.3 FLANGED CONNECTIONS

Align mating flange surfaces parallel.

3.3.1 Assembly

Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads including anti-seize compound on bolts. Anti-seize compound shall be rated for temperatures to 400 degrees F. Tighten bolts gradually and uniformly with a torque wrench.

3.3.2 Flange Ratings

In cases where higher rated steel raised face flanges mate to lower rated cast iron flat face flanges, remove raised face from steel flange before bolting together.

3.3.3 Gaskets

Use gaskets as specified in Section 23 05 50 - GASKETS.

3.4 ADJUSTING, CLEANING, PAINTING AND IDENTIFICATION

3.4.1 Valve Adjustment

After piping systems have been tested and put into service, but before final testing, adjusting, and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks, replace valve if leak persists.

3.4.2 Cleaning

Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

-- End of Section --

SECTION 26 00 00

BASIC ELECTRICAL MATERIALS AND METHODS

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 in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 709	(2001; R 2007) Laminated Thermosetting Materials

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

29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 100	(1996) Dictionary of Electrical and Electronics Terms (IEEE)
IEEE C2	(2007; Errata 06-1; TIA 07-1; TIA 07-2; TIA 07-3; Errata 07-2; TIA 08-4; TIA 08-5; TIA 08-6; TIA 08-7; TIA 08-8; TIA 08-9; TIA 08-10; TIA 08-11; TIA 09-12; TIA 09-13; TIA 09-14; Errata 09-3; TIA 09-15; TIA 09-16; TIA 10-17) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 6	(1993; R 2006) Standard for Industrial Controls and Systems Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2011) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 16, "Electrical," of this project specification unless specified otherwise in the individual 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 Std 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 208Y/120 volts secondary, three phase, four wire. Final connections to the power distribution system at the existing distribution panelboard shall be made by the Contractor as directed by the Contracting Officer.

1.5 SUBMITTALS

Submittals required in the sections which refer to this section shall conform to the requirements of Section 01 33 00, "Submittal Procedures" and to the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

1.5.1 Manufacturer's Catalog Data

Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.

1.5.2 Drawings

Submit drawings a minimum of 14 by 20 inches in size using a minimum scale of 1/8 inch per foot, except as specified otherwise. 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.

1.5.3 Instructions

Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit

printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.

1.5.4 Certificates

Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.5.4.1 Reference Standard Compliance

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), American Society for Testing and Materials (ASTM), National Electrical Manufacturers 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.

1.5.4.2 Independent Testing Organization Certificate

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. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.5 Operation and Maintenance Manuals

1.5.5.1 Operating Instructions

Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections.

1.6 QUALITY ASSURANCE

1.6.1 Material and Equipment Qualifications

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 Regulatory Requirements

Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

1.6.3 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.4 Service Support

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.

1.6.5 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.

1.6.6 Modification of References

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.

1.6.7 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 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.

1.8 NAMEPLATES

ASTM D 709 and NEMA ICS 6. Provide laminated plastic nameplates for each panelboard, circuit breaker, switchboard circuit breaker, disconnect switch, magnetic motor starter, variable frequency controller, 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. Provide red laminated plastic label with white center core for equipment or emergency circuits where indicated. 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.

1.9 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.9.1 Motors and Equipment

1.9.2 Wiring and Conduit

Provide internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field-installed equipment under Section 26 20 00, "Interior Distribution System." Power wiring and conduit shall conform to Section 26 20 00, "Interior Distribution System." Control wiring and conduit shall be provided under, and conform to the requirements of the section specifying the associated equipment.

1.9.3 New Work

Provide electrical components for all mechanical equipment, such as motors, magnetic motor starters, variable frequency controllers, integral fusible (3 fuses) control power transformers, control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, Red "Running" LED pilot lights, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be provided under Division 16, except internal wiring for components of packaged equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the

section specifying that motor or equipment.

1.9.4 Modifications to Existing Systems

Where existing mechanical systems and motor-operated equipment require modifications, provide electrical components under Division 16.

1.10 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.

1.11 LOCKOUT REQUIREMENTS

Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Mechanical isolation of machines and other equipment shall be in accordance with requirements of Division 15, "Mechanical."

1.12 EQUIPMENT INVENTORY UPDATE

Submit information for each piece of equipment removed and supplied for use of Camp Lejeune to update the Maximo equipment inventory. For the purposes of this paragraph, inventoried equipment is defined as equipment listed on the Maximo Equipment Inventory Update form.

1.12.1 Requirements

The contractor shall prepare and submit one Maximo Equipment Inventory Update form for each individual item of inventoried equipment that is demolished, removed, replaced, or installed. (ex: three new condensing units would require the submission of three Equipment Inventory Update forms. The replacement of two existing air handling units with two new air handling units would require the submission of two Equipment Inventory Update forms).

1.12.1.1 Demolition of all equipment in a structure or facility

When all the inventoried equipment in a building or structure is demolished or removed, and not replaced, an Equipment Inventory Update form is not required.

1.12.1.2 Standards

The contractor shall provide accurate, complete, and legible information on all required forms. All required forms shall be completed and delivered to the Contracting Officer on or before the Beneficial Occupancy Date. All information on Equipment Inventory Update forms shall be obtained by visual inspection of equipment data plate(s).

1.12.1.3 Form Preparation

Each required Maximo Equipment Inventory Update form shall contain the following information:

(1) The name and telephone number of an individual who can be contacted for clarification or additional information pertaining to the data on the form.

(2) The date of data collection

(3) The building or structure identification number and the specific location of the equipment within the structure (ex: 3d deck mech room)

(4) A check adjacent to the description of the new or replacement item, and a check adjacent to the supplemental description if applicable (ex: circulating pump and HVAC or steam)

(5) The Maximo number or serial number of the demolished or removed item, if applicable

(6) All applicable data from the equipment data plate

Each Room Number List form shall contain the following information:

(1) The name and telephone number of the individual providing the information

(2) The date the form was completed

(3) The building or structure identification number

(4) A check in the box adjacent to each applicable room number

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PAINTING OF EQUIPMENT

3.1.1 Factory Applied

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical sections.

3.2 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.

MAXIMO EQUIPMENT INVENTORY UPDATE

Employee: _____ Phone: _____ Date: ____/____/____

Bldg: _____ Specific Location: _____

__ AC, Computer Room
__ AC, Package
__ AC, Package Terminal
__ Assembly, Trap line
__ Backflow Preventer
__ Boiler
__ Chiller, Air Cooled Recip
__ Chiller, Air Cooled Screw
__ Chiller, Air Cooled Scroll
__ Chiller, Water Cooled Recip
__ Chiller, Water Cooled Screw
__ Compressor, Control Air
__ Compressor, Industrial Air
__ Dryer, Refrigerated Air
__ Exchanger, Heat
__ Evaporator, Freezer
__ Evaporator, Refrigerator
__ Fan, Exhaust
__ Generator
__ Heater, Space
__ Heater, Unit
__ Heat Pump, Geo-Thermal
__ Heat Pump, Indoor Unit
__ Heat Pump, Outdoor Unit
__ Heat Pump, Package
__ Heat Pump, Package Terminal
__ Pump, Circulating, Chilled Water
__ Pump, Circulating, Domestic Water
__ Pump, Circulating, Dual Temp Water
__ Pump, Circulating, Heating Water
__ Pump, Condensate
__ Pump, Sump
__ Regulator, Temperature
__ Tank, Hot Water Storage
__ Tower, Cooling
__ Unit, Air Handling
__ Unit, AC Condensing
__ Unit, Freezer Condensing
__ Unit, Refrigerator Condensing
__ Unit, Fan Coil
__ Unit, TAB (Attach Room No. List)
__ Unit, VAV (Attach Room No. List)
__ Valve, Pressure Reducing
__ Valve, Steam Pilot
__ Water Heater

Demolished/Removed Equipment

Maximo no: _____ or Ser no: _____

New Equipment

Manufacturer: _____

Model no: _____

Ser no: _____

Type: __Elec __Oil __LP Gas __Nat Gas __Steam __Water __Air

Motor Data: HP____ Volts____ Phase____ RLA_____ RPM____ Frame____

Tons____ No. of Motors____ no. of Belts____ Belt size(s)____ CFM____

KW____ Refrig type_____ Refrig Qty_____ Filter Size(s)_____

INSERT EXCEL FORM - VAV/TAB ROOM NUMBER LIST

-- End of Section --

SECTION 26 05 19.00 10

INSULATED WIRE AND CABLE

11/08

PART 1 GENERAL

1.1 REFERENCES

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

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 70	(1999; Errata 2001) Standard for Non-Shielded Power Cable 2000 V or Less for the Distribution of Electrical Energy

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation Instructions

Cable manufacturing data as requested.

SD-06 Test Reports

Tests, Inspections, and Verifications

2 certified copies of test reports.

1.3 DELIVERY, STORAGE, AND HANDLING

Furnish cables on reels or coils. Each cable and the outside of each reel or coil, shall be plainly marked or tagged to indicate the cable length, voltage rating, conductor size, and manufacturer's lot number and reel number. Each coil or reel of cable shall contain only one continuous cable without splices.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Wire Table

Furnish wire and cable conforming to the detailed requirements specified herein.

2.1.2 Rated Circuit Voltages

All wire and cable shall have minimum rated circuit voltages in accordance

with NEMA WC 70.

2.1.3 Conductors

2.1.3.1 Material for Conductors

Conductors shall conform to all the applicable requirements of NEMA WC 70, as applicable, and shall be annealed copper.

2.1.3.2 Size

Minimum wire size shall be No. 12 AWG for power and lighting circuits; No. 10 AWG for current transformer secondary circuits; No. 14 AWG for potential transformer, relaying, and control circuits; No. 16 AWG for annunciator circuits; and No. 16 AWG for alarm circuits.

2.1.3.3 Stranding

Conductor stranding classes cited herein shall be as defined in NEMA WC 70, as applicable. Any conductors used between stationary and moving devices, such as hinged doors or panels, shall have Class H or K stranding. All other conductors shall have Class B or C stranding, except that conductors shown on the drawings, or in the schedule, as No. 12 AWG may be 19 strands of No. 25 AWG, and conductors shown as No. 10 AWG may be 19 strands of No. 22 AWG.

2.1.3.4 Conductor Shielding

Use conductor shielding conforming to NEMA WC 70, as applicable, on power cables having a rated circuit voltage 2,000 volts or less. Strict precautions shall be taken after application of the conductor shielding to prevent the inclusion of voids or contamination between the conductor shielding and the subsequently applied insulation.

2.1.3.5 Separator Tape

Where conductor shielding, strand filling, or other special conductor treatment is not required, a separator tape between conductor and insulation is permitted.

2.1.4 Insulation

2.1.4.1 Insulation Material

Provide 600 volt insulation which is a cross-linked thermosetting polyethylene (XHHW) type, meeting the requirements of NEMA WC 70, as applicable:

a. XHHW.

2.1.4.2 Insulation Thickness

The insulation thickness for each conductor shall be based on its rated circuit voltage.

a. Power Cables/Single-Conductor Control Cables, 2,000 Volts and Below

b. Multiple-Conductor Control Cables - The insulation thickness of multiple-conductor cables used for control and related purposes shall

be as required by NEMA WC 70, as applicable.

2.2 CABLE IDENTIFICATION

2.2.1 Color-Coding

Insulation of individual conductors of multiple-conductor cables shall be color-coded in accordance with NEMA WC 70, except that colored braids will not be permitted. Only one color-code method shall be used for each cable construction type. Control cable color-coding shall be in accordance with NEMA WC 70. Power cable color-coding shall be black for Phase A, red for Phase B, blue for Phase C, white for grounded neutral, and green for an insulated grounding conductor.

2.2.2 Cabling

Individual conductors of multiple-conductor cables shall be assembled with flame-and moisture-resistant fillers, binders, and a lay conforming to NEMA WC 70, except that flat twin cables will not be permitted. Fillers shall be used in the interstices of multiple-conductor round cables with a common covering where necessary to give the completed cable a substantially circular cross section. Fillers shall be non-hygroscopic material, compatible with the cable insulation, jacket, and other components of the cable. The rubber-filled or other approved type of binding tape shall consist of a material that is compatible with the other components of the cable and shall be lapped at least 10 percent of its width.

2.2.3 Dimensional Tolerance

The outside diameters of single-conductor cables and of multiple-conductor cables shall not vary more than 5 percent and 10 percent, respectively, from the manufacturer's published catalog data.

PART 3 EXECUTION

3.1 INSTALLATION INSTRUCTIONS

The following information shall be provided by the cable manufacturer for each size, conductor quantity, and type of cable furnished:

a. Minimum bending radius, in inches - For multiple-conductor cables, this information shall be provided for both the individual conductors and the multiple-conductor cable.

b. Pulling tension and sidewall pressure limits, in pounds.

c. Instructions for stripping semiconducting insulation shields, if furnished, with minimum effort without damaging the insulation.

d. Upon request, compatibility of cable materials and construction with specific materials and hardware manufactured by others shall be stated. Also, if requested, recommendations shall be provided for various cable operations, including installing, splicing, terminating, etc.

3.2 TESTS, INSPECTIONS, AND VERIFICATIONS

3.2.1 Cable Data

Manufacture of the wire and cable shall not be started until all materials to be used in the fabrication of the finished wire or cable have been approved by the Contracting Officer. Cable data shall be submitted for approval including dimensioned sketches showing cable construction, and sufficient additional data to show that these specifications will be satisfied.

3.2.2 Inspection and Tests

Inspection and tests of wire and cable furnished under these specifications shall be made by and at the plant of the manufacturer, and shall be witnessed by the Contracting Officer or his authorized representative, unless waived in writing. The Government may perform further tests before or after installation. Testing in general shall comply with NEMA WC 70. Specific tests required for particular materials, components, and completed cables shall be as specified in the sections of the above standards applicable to those materials, components, and cable types. Tests shall also be performed in accordance with the additional requirements specified below.

-- End of Section --

SECTION 26 20 00

INTERIOR DISTRIBUTION SYSTEM

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 in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM B 1	(2001; R 2007) Standard Specification for Hard-Drawn Copper Wire
ASTM B 8	(2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C80.1	(2005) Standard for Electrical Rigid Steel Conduit (ERSC)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2011) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Rev thru Jul 2007) Standard for Flexible Metal Conduit
UL 486A	(1997; R 2001, Bul. 2002, 2003) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486C	(2004; Rev thru Apr 2009) Standard for Splicing Wire Connectors
UL 489	(2002; Rev thru Mar 2009) Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 510	(2005; Rev thru Aug 2005) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 6	(2007) Standard for Electrical Rigid Metal Conduit-Steel
UL 83	(20086) Standard for Thermoplastic-Insulated Wires and Cables

1.2 RELATED REQUIREMENTS

Section 26 00 00, "Basic Electrical Materials and Methods," applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

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

SD-03 Product Data

Circuit breakers

SD-06 Test Reports

600-volt wiring test

SD-10 Operation and Maintenance Data

Electrical Systems, Data Package 5

1.4 QUALITY ASSURANCE

1.4.1 Fuses

Submit coordination data as specified in article entitled, "FUSES" of this section.

1.5 MAINTENANCE

1.5.1 Electrical Systems

Submit operation and maintenance manuals for electrical systems that provide basic data relating to the design, operation, and maintenance of the electrical distribution system for the building. This shall include:

a. Schematic diagram of electrical control system (other than HVAC, covered elsewhere).

b. Manufacturers' operating and maintenance manuals on active electrical equipment.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials, equipment, and devices shall, as a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70.

2.2 CONDUIT AND FITTINGS

All conduits shall be rigid galvanized steel and shall conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Heavy Wall Zinc-Coated Steel Conduit

NEMA C80.1, UL 6.

2.2.2 Liquid-Tite Flexible Metal Conduit

UL 1.

2.2.3 Fittings for Rigid Metal Conduit

Threaded-type. Split couplings unacceptable.

2.3 OUTLET BOXES AND COVERS

Outlet boxes for all work shall be cat aluminum explosion proof, with threaded hubs and gasketed cover plates.

2.4 WIRES AND CABLES

Wires and cables shall be copper and shall meet applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.

2.4.1 Conductors

Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise. Conductor sizes and ampacities shown are based on copper, unless indicated otherwise. All conductors shall be copper. Aluminum conductors are not acceptable for use on this project.

2.4.1.1 Minimum Conductor Sizes

Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG; for Class 3 low-energy, remote-control, alarm and signal circuits.

2.4.2 Color Coding

Provide for service, feeder, branch, control, and signaling circuit conductors. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in same raceway or box, other neutral shall be white with colored (not green) stripe. Color of ungrounded conductors in different voltage systems shall be as follows:

a. 208/120 volt, three-phase

(1) Phase A - black

(2) Phase B - red

(3) Phase C - blue

(4) Netural - white

(5) Ground - green

2.4.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THWN/THHN and type XHHW conforming to UL 83.

2.4.4 Bonding Conductors

ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.5 SPLICES AND TERMINATION COMPONENTS

UL 486A for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires shall be insulated, pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.6 PANELBOARDS

Panelboards are existing to remain shall be re-used. Where new branch circuit requirements are extended to existing panelboards, provide new over-current devices. New circuit breakers for installation in existing panelboards shall exactly match in detail and performance; the existing circuit breakers currently installed.

2.7 CIRCUIT BREAKERS

Circuit breakers for installation in existing equipment shall match in detail and performance existing circuit breakers currently installed. UL 489, thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker shall be mounted. Breaker terminals shall be UL listed as suitable for type of conductor provided. Series rated circuit breakers and plug-in circuit breakers without a self-contained bracket and not secured by a positive locking device requiring mechanical release for removal are unacceptable. Series rated circuit breakers and plug-in circuit breakers are unacceptable.

2.7.1 Multipole Breakers

Provide common trip-type with single operating handle. Breaker design shall be such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

2.8 NAMEPLATES

Provide as specified in Section 26 00 00, "Basic Electrical Materials and Methods."

2.8.1 Conduit Sizing

Conduit shall be minimum of 3/4 in.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to requirements of NFPA 70 and to requirements specified herein.

3.1.1 Wiring Methods

Provide insulated conductors installed only in rigid steel conduit, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. All raceways installed exposed shall be provided with explosion proof seal-off fittings. Explosion proof fittings shall be PVC coated. Grounding conductor shall be separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Provide individual neutrals for each 120 volt circuit. Shared neutrals, are not permitted. Minimum conduit size shall be 3/4 inch in diameter for low voltage power circuits and low voltage control circuits. Conduit which penetrates building exterior walls, fire-rated partitions, shall be firestopped with two hour firestopping materials. All raceways penetrating exterior building walls shall be provided with explosion proof seal-off fittings.

3.1.1.1 Restrictions Applicable to Flexible Conduit

Use only as specified in paragraph entitled "Flexible Connections."

3.1.2 Conduit Installation

Unless indicated otherwise, all conduits shall be rigid galvanized steel and shall be installed exposed. Install conduit parallel with or at right angles to walls, and structural members where conduit will be visible after completion of project.

3.1.2.1 Conduit Support

Support conduit by pipe straps. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration resistant and shock-resistant. Conduit and box systems shall be supported independently of tie wires. Supporting means shall not be shared between electrical raceways and mechanical ducts. Installation shall be coordinated with mechanical systems to assure maximum accessibility to all systems. Where conduit crosses expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means.

3.1.2.2 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal

fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.2.3 Stub-Ups

Provide conduits stubbed up through concrete slabs and floors for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 in above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.

3.1.2.4 Flexible Connections

Provide flexible steel conduit between 3 and 6 ft in length for meters, alarms and for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack. Minimum liquid-tite flexible steel conduit size shall be 3/4 in diameter. Provide liquidtight flexible conduit only. Provide separate ground conductor across flexible connections.

3.1.2.5 Pull Wire

Install pull wires in empty conduits. Pull wire shall be plastic having minimum 200-lb tensile strength. Leave minimum 36 in of slack at each end of pull wire.

3.1.2.6 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.3 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways shall be explosion proof, cast-metal, hub-type. Each box shall have volume required by NFPA 70for number of conductors enclosed in box. Provide gaskets for cast-metal boxes. Fasten boxes and supports, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units. Threaded studs driven in by powder charge and provided with lockwashers and nuts may be used in lieu of expansion shields, or machine screws.

3.1.3.1 Boxes

Boxes for use with raceway systems shall be minimum 1 1/2 in deep and provide with threaded hubs.

3.1.4 Conductor Identification

Provide conductor identification within each enclosure where tap, splice,

or termination is made. For conductors No. 6 AWG and smaller diameter, color coding shall be by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, color coding shall be by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves.

3.1.5 Splices

Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

3.1.6 Grounding and Bonding

In accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic raceways, and neutral conductor of wiring systems. Interconnect all grounding media in or on the structure to provide a common ground potential.

3.1.7 Equipment Connections

Provide power wiring for the connection of control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications but shall be provided under the section specifying the associated equipment.

3.1.8 Workmanship

Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.

3.1.9 Existing Wiring to be Removed

Existing wiring to be removed shall be disconnected from its source. Remove conductors and conduits to the fullest extent possible. Cut conduit flush with floor, and through walls; and seal openings.

3.1.10 Continuation of Service

Maintain continuity of existing circuits of equipment to remain. Existing circuits of equipment shall remain energized. Circuits which are to remain but were disturbed during demolition shall have circuits wiring and power restored back to original condition.

3.2 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 10 working days notice prior to each test.

3.2.1 Devices Subject to Manual Operation

Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time.

3.2.2 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance shall be 250,000 ohms.

-- End of Section --

SECTION 28 05 26.00 40

GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY

11/08

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM B 3	(2001; R 2007) Standard Specification for Soft or Annealed Copper Wire

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2011) National Electrical Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-889	(Rev B, Notice 3) Dissimilar Metals

UNDERWRITERS LABORATORIES (UL)

UL 467	(2007) Standard for Grounding and Bonding Equipment

1.2 GENERAL REQUIREMENTS

Section 26 00 00 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

Submit material, equipment, and fixture lists for Grounding Systems including manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information.

SD-02 Shop Drawings

Submit Record Drawings in accordance with paragraph entitled, "Drawings," of this section.

SD-03 Product Data

Submit equipment and performance data for the following items

including life, test, system functional flows, safety features, and mechanical automated details.

Submit Manufacturer's catalog data for the following items:

Ground Wires

Connectors and Fasteners

Bonding

SD-06 Test Reports

Submit Test Reports for the following tests on grounding systems in accordance with the paragraph entitled, "Field Tests," of this section. Within the report include certified record of ground-resistance tests on each driven ground rod, ground rod assembly, and other grounding electrodes. Include within the record the number of rods driven and their depth at each location to meet the required resistance-to-ground measurements specified. Include a statement describing the condition of the soil at the time of measurement.

SD-08 Manufacturer's Instructions

Submit Manufacturer's instructions for the Grounding Systems including special provisions required to install equipment components and system packages. Within special notices, detail impedances, hazards and safety precautions.

1.4 DRAWINGS

Record Drawings must indicate the location of supplementary grounding electrodes, and other metal structures connected to the grounding system.

PART 2 PRODUCTS

2.1 GROUND WIRES

Ground and bond wires for all equipment must be annealed bare copper conforming to ASTM B 3, stranded, with 98 percent conductivity. Wire size must be in accordance with the grounding requirements of NFPA 70.

Ground wires for equipment receptacles for noncurrent carrying hardware, installed in conduit must be soft drawn copper, in accordance with ASTM B 3, stranded, with green insulation. Note wire size.

2.2 CONNECTORS AND FASTENERS

Grounding and bonding fasteners and connectors must conform to the requirements of UL 467.

PART 3 EXECUTION

3.1 BONDING AND GROUNDING

Bonding and grounding requirements must be in accordance with NFPA 70.

3.2 EQUIPMENT GROUNDING

In addition to the green colored equipment grounding conductor required in each raceway and sized in accordance with Table 250.122 of the NEC, each piece of electrical equipment, addressed under this contract, must be bonded to the grounding system with a stranded copper conductor, routed external to the feeder raceway.

Metallic raceway systems must have electrical continuity with equipment individually and be directly connected to the building ground, independent of the raceway system.

Individually and directly connect enclosures for panelboards to the building ground. Grounding conductor must not be less than No. 2 AWG and be connected from the building ground to a copper ground-bus terminal strip located in each panelboard.

Install secure ground systems for power and instrumentation. Independently connect each system to the building counterpoise as shown.

3.3 GROUNDING CONNECTIONS

Ground connections must be bonded connections in accordance with paragraph entitled, "Bonding."

Bolt connections in accessible locations. Connections to steel building columns in accessible locations must be cast-copper-alloy clamp lugs bolted exothermically fusion-welded to the structure.

Clean, grease, and remove foreign matter from ground connection surfaces. Do not penetrate clad material in the cleaning process. Make connection between like metals where possible. Where dissimilar metals are welded, brazed, or clamped, follow the weld kit manufacturer's instructions. Connections between dissimilar metals must not produce galvanic action in accordance with MIL-STD-889. Provide ground rods and cable for new antennas.

3.4 BONDING

3.4.1 Type of Bonds

Accomplish bonding of metal surfaces by clamping.

3.4.1.1 Clamping

In external locations, use clamping only where a disconnect type of connection is required. Connection device may utilize threaded fasteners. Construct device such that positive contact pressure is maintained at all times. Use machine bolts with tooth-type lockwashers.

3.4.2 Cleaning of Bonding Surfaces

Thoroughly clean surfaces that comprise the bond before joining. Apply an appropriate abrasive with gentle and uniform pressure to ensure a smooth and uniform surface. Do not remove excessive metal from the surface. Clean clad metals in such a manner that the cladding material is not penetrated by the cleaning process. Then clean bare metal with an appropriate solvent to remove any grease, oil, dirt, corrosion preventives, and other contaminants. Bond to the cleaned area must be made within one

hour after cleaning. Seal joint and refinish the exposed surfaces within two hours of exposure to prevent oxidation. When additional time is required, apply a corrosion preventive compound until the area can be refinished.

3.4.3 Bonding Straps and Jumpers

Install jumpers such that the vibration by the shock-mounted device will not change its electrical characteristics.

Bond straps directly to the basic structure and do not penetrate any adjacent parts. Install straps in an area that is accessible for maintenance.

Use single straps for the bonds and install such that they will not restrict movement of structural members. Do not connect two or more straps in series.

Install straps such that they will not weaken structural members to which they are attached.

3.4.4 Equipment and Enclosure Bonding

Each metallic enclosure and all electrical equipment must be bonded to ground. At least one copper connection must be made from the system ground point to one or more enclosures in the area such that all enclosures and equipment provide a low-impedance path to ground when properly bonded together.

3.4.5 Bonding of Conduit and Raceway Systems

Bond all metal conduit, fittings, junction boxes, outlet boxes, armored and metal sheathed cable, and other raceways. Take care to ensure adequate electrical contact at the joints and terminations.

3.4.5.1 Rigid Metal Conduit and Terminations

Threaded connections must be wrench-tight and there must be no exposed threads. Ream all ends of the conduit to remove burrs and rough edges. Conduits entering boxes and enclosures must be bonded to the box with locknuts and grounding-type bushings. Locknuts that gouge into the metal box when tightened are not acceptable.

3.4.5.2 Flexible Metal Conduit

Flexible conduit must have an integral grounding conductor.

3.4.6 Protection of Finished Bonds

Protect finished bonds by painting to match the original finish after the bond is made.

3.5 FIELD TESTS

Perform the following tests in the Contractor in the presence of the Contracting Officer.

-- End of Section --

SECTION 31 00 00

EARTHWORK

07/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2001; R 2004) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop
AASHTO T 224	(2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C600	(2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002e1) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 2434	(1968; R 2006) Permeability of Granular Soils (Constant Head)
ASTM D 2487	(2006) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 422	(1963; R 2002e1) Particle-Size Analysis of Soils
ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 698	(2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM. Satisfactory materials for grading comprise stones less than 8 inches, except for fill material for pavements and railroads which comprise stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.2.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.

1.2.5 Overhaul

Overhaul is the authorized transportation of satisfactory excavation or borrow materials in excess of the free-haul limit of 100 stations. Overhaul is the product of the quantity of materials hauled beyond the free-haul limit, and the distance such materials are hauled beyond the free-haul limit, expressed in station yards.

1.2.6 Topsoil

Material suitable for topsoils obtained from offsite areas is defined as:

Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

1.2.7 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 12 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.8 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.9 Unstable Material

Unstable material are too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.2.10 Select Granular Material

1.2.10.1 General Requirements

Select granular material consist of materials classified as GW, GP, SW, SP, by ASTM D 2487 where indicated. The liquid limit of such material must not exceed 35 percent when tested in accordance with ASTM D 4318. The plasticity index must not be greater than 12 percent when tested in accordance with ASTM D 4318, and not more than 35 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D 1140. Provide a minimum coefficient of permeability of 0.002 feet per minute when tested in accordance with ASTM D 2434.

1.2.11 Initial Backfill Material

Initial backfill consists of select granular material or satisfactory materials free from rocks 2 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, free the initial backfill material of stones larger than 2 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.3 MEASUREMENT

1.3.1 Excavation

The unit of measurement for excavation and borrow will be the cubic yard, computed by the average end area method from cross sections taken before

and after the excavation and borrow operations, including the excavation for ditches, gutters, and channel changes, when the material is acceptably utilized or disposed of as herein specified. The measurements will include authorized excavation of rock (except for piping trenches that is covered below), authorized excavation of unsatisfactory subgrade soil, and the volume of loose, scattered rocks and boulders collected within the limits of the work; allowance will be made on the same basis for selected backfill ordered as replacement. The measurement will not include the volume of subgrade material or other material that is scarified or plowed and reused in-place, and will not include the volume excavated without authorization or the volume of any material used for purposes other than directed. The volume of overburden stripped from borrow pits and the volume of excavation for ditches to drain borrow pits, unless used as borrow material, will not be measured for payment. The measurement will not include the volume of any excavation performed prior to the taking of elevations and measurements of the undisturbed grade.

1.3.2 Piping Trench Excavation

Measure trench excavation by the number of linear feet along the centerline of the trench and excavate to the depths and widths specified for the particular size of pipe. Replace unstable trench bottoms with a selected granular material. Include the additional width at manholes and similar structures, the furnishing, placing and removal of sheeting and bracing, pumping and bailing, and all incidentals necessary to complete the work required by this section.

1.3.3 Rock Excavation for Trenches

Measure and pay for rock excavation by the number of cubic yards of acceptably excavated rock material. Measure the material in place, but base volume on a maximum 30 inch width for pipes 12 inch in diameter or less, and a maximum width of 16 inch greater than the outside diameter of the pipe for pipes over 12 inch in diameter. Provide the measurement to include all authorized overdepth rock excavation as determined by the Contracting Officer. For manholes and other appurtenances, compute volumes of rock excavation on the basis of 1 foot outside of the wall lines of the structures.

1.3.4 Topsoil Requirements

Separate excavation, hauling, and spreading or piling of topsoil and related miscellaneous operations will be considered subsidiary obligations of the Contractor, covered under the contract unit price for excavation.

1.3.5 Overhaul Requirements

Allow the unit of measurement for overhaul to be the station-yard. The overhaul distance will be the distance in stations between the center of volume of the overhaul material in its original position and the center of volume after placing, minus the free-haul distance in stations. The haul distance will be measured along the shortest route determined by the Contracting Officer as feasible and satisfactory. Do no measure or waste unsatisfactory materials for overhaul where the length of haul for borrow is within the free-haul limits.

1.3.6 Select Granular Material

Measure select granular material in place as the actual cubic yards

replacing wet or unstable material in trench bottoms in authorized overdepth areas. Provide unit prices which include furnishing and placing the granular material, excavation and disposal of unsatisfactory material, and additional requirements for sheeting and bracing, pumping, bailing, cleaning, and other incidentals necessary to complete the work.

1.4 PAYMENT

Payment will constitute full compensation for all labor, equipment, tools, supplies, and incidentals necessary to complete the work.

1.4.1 Classified Excavation

Classified excavation will be paid for at the contract unit prices per cubic yard for common or rock excavation.

1.4.2 Piping Trench Excavation

Payment for trench excavation will constitute full payment for excavation and backfilling, including specified overdepth except in rock or unstable trench bottoms.

1.4.3 Rock Excavation for Trenches

Payment for rock excavation will be made in addition to the price bid for the trench excavation, and will include all necessary drilling and blasting and all incidentals necessary to excavate and dispose of the rock. Select granular material, used as backfill replacing rock excavation, will not be paid for separately, but will be included in the unit price for rock excavation.

1.4.4 Unclassified Excavation

Unclassified excavation will be paid for at the contract unit price per cubic yard for unclassified excavation.

1.4.5 Classified Borrow

Classified borrow will be paid for at the contract unit prices per cubic yard for common or rock borrow.

1.4.6 Unclassified Borrow

Unclassified borrow will be paid for at the contract unit price per cubic yard for unclassified borrow.

1.4.7 Authorized Overhaul

The number of station-yards of overhaul to be paid for will be the product of number of cubic yards of overhaul material measured in the original position, multiplied by the overhaul distance measured in stations of 100 feet and will be paid for at the contract unit price per station-yard for overhaul in excess of the free-haul limit as designated in paragraph DEFINITIONS.

1.5 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Testing

Within 24 hours of conclusion of physical tests, 3 copies of test results, including calibration curves and results of calibration tests. Results of testing at the borrow site.

SD-07 Certificates

Testing

Qualifications of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities.

1.6 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.6.1 BLASTING

Blasting will not be permitted.

1.7 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Ground water elevation is 3 feet below existing surface elevation.

1.8 DEWATERING WORK PLAN

Submit procedures for accomplishing dewatering work.

PART 2 PRODUCTS

2.1 BURIED WARNING AND IDENTIFICATION TAPE

Provide metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes

Red:	Electric
Yellow:	Gas, Oil; Dangerous Materials, Fuels
Blue:	Water Systems

2.1.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to

the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.1.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.2 DETECTION WIRE FOR NON-METALLIC PIPING

Insulate a single strand, solid copper detection wire with a minimum of 12 AWG.

2.3 MATERIAL FOR RIP-RAP

2.3.1 Bedding Material

Provide bedding material consisting of sand, gravel, or crushed rock, well graded, with a maximum particle size of 2 inch. Compose material of tough, durable particles. Allow fines passing the No. 200 standard sieve with a plasticity index less than six.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, strip topsoil to a depth of 4 inch. Spread topsoil on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inch in diameter, and other materials that would interfere with planting and maintenance operations. Remove from the site any surplus of topsoil from excavations and gradings.

3.2 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the

grading limits from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed. Where pile foundations are to be used, stop the excavation of each pit at an elevation 1 foot above the base of the footing, as specified, before piles are driven. After the pile driving has been completed, remove loose and displaced material and complete excavation, leaving a smooth, solid, undisturbed surface to receive the concrete or masonry.

3.2.2 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.3 Dewatering

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Do not permit French drains, sumps, ditches or trenches within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Take control measures by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, maintain the water level continuously, at least 1 feet below the working level.

3.2.4 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls more than 4 feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in.

Shore vertical trench walls more than 4 feet high. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inch inside diameter, and do not exceed 36 inch plus pipe outside diameter for sizes larger than 24 inch inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.2.4.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 2 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.2.4.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, remove such material 4 inch below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.2.4.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.2.4.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures sufficient to leave at least 12 inch clear between the outer structure surfaces and the face of the excavation or support members. Clean rock of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Specify removal of unstable material. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.2.4.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, provide excavation by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.2.5 Underground Utilities

The Contractor is responsible for movement of construction machinery and

equipment over pipes and utilities during construction. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.2.6 Structural Excavation

Ensure that footing subgrades have been inspected and approved by the Contracting Officer prior to concrete placement. Excavate to bottom of pile cap prior to placing or driving piles, unless authorized otherwise by the Contracting Officer. Backfill and compact over excavations and changes in grade due to pile driving operations to 95 percent of ASTM D 698 maximum density.

3.3 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Obtain borrow material from the borrow areas from approved private sources. Unless otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. Consider necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon related operations to the borrow excavation.

3.4 SHORING

3.4.1 General Requirements

Submit a Shoring and Sheeting plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Finish shoring, including sheet piling, and install as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove shoring, bracing, and sheeting as excavations are backfilled, in a manner to prevent caving.

3.4.2 Geotechnical Engineer

The Contractor is required to hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer is responsible for updating the excavation, sheeting and dewatering plans as construction progresses to reflect changing conditions and submit an updated plan if necessary. Submit a monthly written report, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present

or potential problems. The Contracting Officer is responsible for arranging meetings with the Geotechnical Engineer at any time throughout the contract duration.

3.5 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.6 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.7 GROUND SURFACE PREPARATION

3.7.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6 inch before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 6 inch, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inch and compact it as specified for the adjacent fill.

3.7.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

3.8 UTILIZATION OF EXCAVATED MATERIALS

Dispose unsatisfactory materials removing from excavations into designated waste disposal or spoil areas. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills,

embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Do not waste any satisfactory excavated material without specific written authorization. Dispose of satisfactory material, authorized to be wasted, in designated areas approved for surplus material storage or designated waste areas as directed. Clear and grub newly designated waste areas on Government-controlled land before disposal of waste material thereon. Stockpile and use coarse rock from excavations for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. Do not dispose excavated material to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.9 BURIED TAPE AND DETECTION WIRE

3.9.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inch below finished grade; under pavements and slabs, bury tape 6 inch below top of subgrade.

3.9.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inch above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over it's entire length. Install wires at manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, terminate the wire in the valve pit at the pump station end of the pipe.

3.10 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed as specified in paragraph GROUND SURFACE PREPARATION. Provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.10.1 Trench Backfill

Backfill trenches to the grade shown.

3.10.1.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with select granular material or initial backfill material.

3.10.1.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of the trench or excavation with select granular material placed in layers not exceeding 6

inch loose thickness.

3.10.1.3 Bedding and Initial Backfill

Place initial backfill material and compact it with approved tampers to a height of at least one foot above the utility pipe or conduit. Bring up the backfill evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to top of pipe to 95 percent of ASTM D 698 maximum density. Provide plastic piping with bedding to spring line of pipe. Provide materials as follows:

a. Class I: Angular, 0.25 to 1.5 inch, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.

b. Class II: Coarse sands and gravels with maximum particle size of 1.5 inch, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

c. Clean, coarse-grained sand classified as gradation of the DOT or SW or SP by ASTM D 2487 for bedding and backfill as indicated.

d. Clean, coarsely graded natural gravel, crushed stone or a combination thereof identified as stone gradation 57 of the DOT State Standard or having a classification of GW or GP in accordance with ASTM D 2487 for bedding and backfill as indicated. Do not exceed maximum particle size of 3 inch.

3.10.1.4 Final Backfill

Fill the remainder of the trench, except for special materials for roadways, railroads and airfields, with satisfactory material. Place backfill material and compact as follows:

a. Roadways, Railroads, and Airfields: Place backfill up to the required elevation as specified. Do not permit water flooding or jetting methods of compaction.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Deposit backfill in layers of a maximum of 12 inch loose thickness, and compact it to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Apply this requirement to all other areas not specifically designated above.

3.10.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed place backfill in such a manner that the structure is not be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.11 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.11.1 Gas Distribution

Excavate trenches to a depth that will provide a minimum 18 inch of cover in rock excavation and a minimum 24 inch of cover in other excavation.

3.11.2 Water Lines

Excavate trenches to a depth that provides a minimum cover of 2 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

3.11.3 Electrical Distribution System

Provide a minimum cover of 24 inch from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated.

3.11.4 Rip-Rap Construction

Construct rip-rap on filter fabric in the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.11.4.1 Bedding Placement

Spread filter fabric bedding material uniformly to a thickness of at least 3 inch on prepared subgrade as indicated.

3.11.4.2 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above.

3.12 EMBANKMENTS

3.12.1 Earth Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than 12 inch in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise brake up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired

rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.13 SUBGRADE PREPARATION

3.13.1 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inch below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. Do not vary the elevation of the finish subgrade more than 0.05 foot from the established grade and cross section.

3.13.2 Compaction

Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.13.2.1 Subgrade for Pavements

Compact subgrade for pavements to at least 95 percentage laboratory maximum density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, thoroughly blend, reshape, and compact the top 6 inch of subgrade.

3.14 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.14.1 Subgrade and Embankments

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do no disturb the finished subgrade by traffic or other operation. The Contractor is responsible for protecting and maintaining the finsihed subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, or frozen subgrade.

3.14.2 Capillary Water Barrier

Place a capillary water barrier under concrete floor and area-way slabs grade directly on the subgrade and compact with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.14.3 Grading Around Structures

Construct areas within 5 feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

3.15 PLACING TOPSOIL

On areas to receive topsoil, prepare the compacted subgrade soil to a 2 inch depth for bonding of topsoil with subsoil. Spread topsoil evenly to a thickness of 4 inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively wet or dry. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas.

3.16 TESTING

Perform testing by a Corps validated commercial testing laboratory or the Contractor's validated testing facility. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected, Corps validated and approved by the Contracting Officer. Determine field in-place density in accordance with ASTM D 1556. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompacted areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.17 DISPOSITION OF SURPLUS MATERIAL

Provide surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and NED/timber as removed from Government property as directed by the Contracting Officer.

-- End of Section --

SECTION 31 32 11

SOIL SURFACE EROSION CONTROL

10/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 1248	(2005) Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D 1560	(2005e1) Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
ASTM D 1777	(1996; R 2007) Thickness of Textile Materials
ASTM D 2028	(1997; R 2004) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2844	(2007) Resistance R-Value and Expansion Pressure of Compacted Soils
ASTM D 3776	(2007) Mass Per Unit Area (Weight) of Fabric
ASTM D 3787	(2007) Bursting Strength of Textiles - Constant-Rate-of-Traverse (CRT), Ball Burst Test
ASTM D 3884	(2001; R 2007) Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
ASTM D 4355	(2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	(1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles

ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2000e1) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4972	(2001; R 2007) pH of Soils
ASTM D 5268	(2007) Topsoil Used for Landscaping Purposes
ASTM D 5852	(2000; R 2007) Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
ASTM D 648	(2007) Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM D 6629	(2001; R 2007) Selection of Methods for Estimating Soil Loss by Erosion
ASTM D 977	(2005) Emulsified Asphalt

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Work sequence schedule

SD-02 Shop Drawings

Erosion Control

Scale drawings defining areas to receive recommended materials as required by federal, state or local regulations.

Seed Establishment Period

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record

Record of maintenance work performed, of measurements and findings for product failure, recommendations for repair, and products replaced.

SD-03 Product Data

Equipment

A listing of equipment to be used for the application of erosion control materials.

Finished Grade
Erosion Control Blankets

Condition of finish grade status prior to installation; location of underground utilities and facilities.

SD-06 Test Reports

Geotextile Fabrics
Erosion Control Blankets

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

Sieve test results. Sand shall be uniformly graded.

SD-07 Certificates

Geotextile Fabrics

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following.

For items listed in this section:

a. Certification of recycled content or,

b. Statement of recycled content.

c. Certification of origin including the name, address and telephone number of manufacturer.

Geosynthetic Binders
Synthetic Soil Binders

Certification for binders showing EPA registered uses, toxicity levels, and application hazards.

Installer's Qualification

The installer's company name and address; training and experience and or certification.

Recycled Plastic

Individual component and assembled unit structural integrity test; creep tolerance; deflection tolerance; and vertical load test results. Life-cycle durability.

Seed

Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

Asphalt Adhesive
Tackifier

Composition.

Wood By-Products

Composition, source, and particle size. Products shall be free from toxic chemicals or hazardous material.

Wood Cellulose Fiber

Certification stating that wood components were obtained from managed forests.

SD-10 Operation and Maintenance Data

Maintenance Instructions

Instruction for year-round care of installed material. The Contractor shall include manufacturer supplied spare parts.

1.3 MEASUREMENT AND PAYMENT

1.3.1 Standard and Geosynthetic Binder

The standard and geosynthetic binder shall be measured by the square yard of surface area covered. No measurement for payment shall be made for fine grading, trenching or other miscellaneous materials necessary for placement of the binder.

1.3.2 Mulch and Compost

Mulch and compost shall be measured by the square yard of surface area covered. No measurement for payment shall be made for binder, dye or other miscellaneous materials or equipment necessary for placement of the mulch or compost.

1.3.3 Geotextile Fabric

Measure geotextile fabrics by the square yard of surface area covered. No measurement for payment shall be made for fine grading, trenching or other miscellaneous materials necessary for placement of the fabric.

1.3.4 Erosion Control Blankets

Measure erosion control blankets by the square yard of surface area covered. No measurement for payment shall be made for fine grading, trenching or other miscellaneous materials necessary for placement of the erosion control blankets.

1.4 DESCRIPTION OF WORK

The work consists of furnishing and installing temporary and permanent soil surface erosion control materials to prevent the pollution of air, water, and land, including fine grading, blanketing, stapling, mulching, vegetative measures, structural measures, and miscellaneous related work, within project limits and in areas outside the project limits where the soil surface is disturbed from work under this contract at the designated locations. This work includes all necessary materials, labor, supervision and equipment for installation of a complete system. Coordinate this section with the requirements of Section 31 00 00 EARTHWORK.

1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

Store materials in designated areas and as recommended by the manufacturer protected from the elements, direct exposure, and damage. Do not drop containers from trucks. Material shall be free of defects that would void required performance or warranty. Deliver geosynthetic binders and synthetic soil binders in the manufacturer's original sealed containers and stored in a secure area.

a. Furnish erosion control blankets and geotextile fabric in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure prior to placement. Label erosion control blanket and geotextile fabric rolls to provide identification sufficient for inventory and quality control purposes.

b. All synthetic grids, synthetic sheets, and articulating cellular concrete block grids shall be sound and free of defects that would interfere with the proper placing of the block or impair the strength or permanence of the construction. Minor cracks in synthetic grids and concrete cellular block, incidental to the usual methods of manufacture, or resulting from standard methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

c. Seed shall be inspected upon arrival at the jobsite for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected.

1.6 SUBSTITUTIONS

Substitutions will not be allowed without written request and approval from the Contracting Officer.

1.7 QUALITY ASSURANCE

1.7.1 Installer's Qualification

The installer shall be certified by the manufacturer for training and experience installing the material.

1.7.2 Erosion Potential

Assess potential effects of soil management practices on soil loss in accordance with ASTM D 6629. Assess erodibility of soil with dominant soil structure less than 2.8 to 3.1 inches in accordance with ASTM D 5852.

1.8 SCHEDULING

Submit a construction work sequence schedule, with the approved erosion control plan a minimum of 30 days prior to start of construction. The work schedule shall coordinate the timing of land disturbing activities with the provision of erosion control measures to reduce on-site erosion and off-site sedimentation. Coordinate installation of temporary erosion control features with the construction of permanent erosion control features to assure effective and continuous control of erosion, pollution, and sediment deposition. Include a vegetative plan with planting and seeding dates and fertilizer, lime, and mulching rates. Distribute copies of the work schedule and erosion control plan to site subcontractors. Address the following in the erosion control plan:

a. Statement of erosion control and stormwater control objectives.

b. Description of temporary and permanent erosion control, stormwater control, and air pollution control measures to be implemented on site.

c. Description of the type and frequency of maintenance activities required for the chosen erosion control methods.

d. Comparison of proposed post-development stormwater runoff conditions with predevelopment conditions.

1.9 TIME LIMITATIONS

Complete backfilling the openings in synthetic grid systems and articulating cellular concrete block systems a maximum 7 days after placement to protect the material from ultraviolet radiation.

1.10 WARRANTY

Erosion control material shall have a warranty for use and durable condition for project specific installations. Temporary erosion control materials shall carry a minimum eighteen month warranty. Permanent erosion control materials shall carry a minimum three year warranty.

PART 2 PRODUCTS

2.1 RECYCLED PLASTIC

Recycled plastic shall contain a minimum 85 percent of recycled post-consumer product. Recycled material shall be constructed or manufactured with a maximum 1/4 inch deflection or creep in any member, according to ASTM D 648 and ASTM D 1248. The components shall be molded of ultraviolet (UV) and color stabilized polyethylene. The material shall consist of a minimum 75 percent plastic profile of high-density polyethylene, low-density polyethylene, and polypropylene raw material. The material shall be non-toxic and have no discernible contaminates such as paper, foil, or wood. The material shall contain a maximum 3 percent air voids and shall be free of splinters, chips, peels, buckling, and cracks. Material shall be resistant to deformation from solar heat gain.

2.2 BINDERS

2.2.1 Synthetic Soil Binders

Calcium chloride, or other standard manufacturer's spray on adhesives designed for dust suppression.

2.2.2 Geosynthetic Binders

Geosynthetic binders shall be manufactured in accordance with ASTM D 1560, ASTM D 2844; and shall be referred to as products manufactured for use as modified emulsions for the purpose of erosion control and soil stabilization. Emulsions shall be manufactured from all natural materials and provide a hard durable finish.

2.3 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.3.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.3.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.3.3 Wood Cellulose Fiber

Wood cellulose fiber shall be 100 percent recycled material and shall not contain any growth or germination-inhibiting factors and shall be dyed with non-toxic, biodegradable dye an appropriate color to facilitate placement during application. Composition on air-dry weight basis: a minimum 9 to a maximum 15 percent moisture, and between a minimum 4.5 to a maximum 6.0 pH.

2.3.4 Paper Fiber

Paper fiber mulch shall be 100 percent post-consumer recycled news print that is shredded for the purpose of mulching seed.

2.3.5 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

2.3.6 Wood By-Products

Wood locally chipped or ground bark shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2 inch wide by 4 inch long.

2.3.7 Coir

Coir shall be manufactured from 100 percent coconut fiber cured in fresh water for a minimum of 6 months.

2.3.8 Asphalt Adhesive

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1; and cutback asphalt, conforming to ASTM D 2028, Designation RC-70.

2.3.9 Mulch Control Netting and Filter Fabric

Mulch control netting and filter fabric may be constructed of lightweight recycled plastic, cotton, or paper or organic fiber. The recycled plastic shall be a woven or nonwoven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from UV, and with the following properties:

a. Minimum grab tensile strength (TF 25 #1/ASTM D 4632), 180 pounds.

b. Minimum Puncture (TF 25 #4/ASTM D 3787), 75 psi in the weakest direction.

c. Apparent opening sieve size of a minimum 40 and maximum 80 (U.S. Sieve Size).

d. Minimum Trapezoidal tear strength (TF 25 #2/ASTM D 4533), 50 pounds.

2.3.10 Tackifier

Tackifier shall be a blended polyacrylimide material with non-ionic galactomannan of Gramineae endosperm in powder and crystalline form with molecular weights over 250,000. Tackifier shall be pre-packaged in the hydraulic mulch at the rate of 2 ounces per lb of wood fiber.

2.3.11 Dye

Dye shall be a water-activated, green color. Pre-package dye in water dissolvable packets in the hydraulic mulch.

2.4 GEOTEXTILE FABRICS

Geotextile fabrics shall be woven of polyester filaments formed into a stable network so that the filaments retain their relative position to each other. Sewn seams shall have strength equal to or greater than the geotextile itself. Install fabric to withstand maximum velocity flows as recommended by the manufacturer. The geotextile shall conform to the following minimum average roll values:

Property	Performance	Test Method
Weight		ASTM D 3776
Thickness		ASTM D 1777
Permeability		ASTM D 4491
Abrasion Resistance, Type (percent strength retained)	58 percent X 81 percent	ASTM D 3884
Tensile Grab Strength	1,467 N X 1, 933 N	ASTM D 4632
Grab Elongation	15percent X 20percent	ASTM D 4632

Property	Performance	Test Method
Burst Strength	5,510 kN/m^2	ASTM D 3787
Puncture Strength	733 N	ASTM D 4833
Trapezoid Tear	533 N X 533 N	ASTM D 4533
Apparent Opening Size	40 US Std Sieve	ASTM D 4751
UV Resistance @ 500 hrs	90 percent	ASTM D 4355

2.5 EROSION CONTROL BLANKETS

2.5.1 Erosion Control Blankets Type I

Use Type I blankets for erosion control and vegetation establishment on roadside embankments, abutments, berms, shoulders, and median swales where natural vegetation will provide long term stabilization. Erosion control blankets shall be a machine-produced mat of 100% straw. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. cover the blanket on the top side with a photodegradable polypropylene netting having an approximate 1/2 by 1/2 inch mesh and be sewn together on a maximum 1.5 inch centers with degradable thread. The erosion control blanket shall have the following properties:

Material Content

Straw	100 percent with approximately 0.50 lb/yd^2 weight
Netting	One side only, lightweight photodegradable with approximately 1.64 lb/1,000 ft^2 weight.
Thread	Degradable

Note 1: Photodegradable life a minimum of 2 months with a minimum 90 percent light penetration. Apply to slopes up to a maximum 3:1 gradient.

2.5.2 Erosion Control Blankets Type II

Erosion control blankets shall be a machine-produced mat of 100 percent straw. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. Cover the blanket on the top side with a polypropylene netting having an approximate 1/2 by 1/2 inch mesh with photodegradable accelerators to provide breakdown of the netting within approximately 45 days, depending upon geographic location and elevation. Sew the blanket together on a maximum 1.5 inch centers with degradable thread. The erosion control blanket shall have the following properties:

Material Content

Straw	100 percent with approximately 0.50 lb/yd^2 weight.
Netting	One side only, photodegradable with photo accelerators and approximately 1.64 lb/1,000 ft^2 weight.
Thread	Degradable

Material Content

NOTE: Photodegradable life a minimum of 10 months with a minimum 90 percent light penetration. Apply to slopes up to a maximum 3:1 gradient.

2.5.3 Seed

2.5.3.1 Seed Classification

State-certified native seed mix of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Conform labels to the AMS Seed Act and applicable state seed laws. Submit the Seed Establishment Period information as specified in the Submittals paragraph.

2.5.3.2 Permanent Seed Species and Mixtures

Proportion permanent seed species and mixtures by weight as follows:

Mixture Percent by Weight	Percent Pure Live Seed	Botanical Name	Common Name
10%	97%	_____	Kentucky Bluegrass
90%	97%	_____	Tall Fescue Blend

2.5.3.3 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.5.4 Staking

Stakes shall be 100 percent biodegradable manufactured from recycled plastic or wood and shall be designed to safely and effectively secure erosion control blankets for temporary or permanent applications. The biodegradable stake shall be fully degradable by biological activity within a reasonable time frame. The bio-plastic resin used in production of the biodegradable stake shall consist of polylactide, a natural, completely biodegradable substance derived from renewable agricultural resources. The biodegradable stake must exhibit ample rigidity to enable being driven into hard ground, with sufficient flexibility to resist shattering. Serrate the biodegradable stake on the leg to increase resistance to pull-out from the soil.

2.5.5 Staples

Staples shall be as recommended by the manufacturer.

2.6 SEDIMENT FENCING

Wood or burlap.

2.7 WATER

Unless otherwise directed, water is the responsibility of the Contractor. Water shall be potable or supplied by an existing irrigation system.

PART 3 EXECUTION

3.1 CONDITIONS

Perform erosion control operations under favorable weather conditions; when excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work shall be stopped as directed. When special conditions warrant a variance to earthwork operations, submit a revised construction schedule for approval. Do not apply erosion control materials in adverse weather conditions which could affect their performance.

3.1.1 Finished Grade

Verify that finished grades are as indicated on the drawings; complete finish grading and compaction in accordance with Section 31 00 00 EARTHWORK, prior to the commencement of the work. Verify and mark the location of underground utilities and facilities in the area of the work. Repair damage to underground utilities and facilities at the Contractor's expense.

3.1.2 Placement of Erosion Control Blankets

Before placing the erosion control blankets, ensure the subgrade has been graded smooth; has no depressed, void areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter. Verify that mesh does not include invasive species. Vehicles shall not be permitted directly on the blankets.

3.2 SITE PREPARATION

3.2.1 Soil Test

Test soil in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size and mechanical analysis. Sample collection onsite shall be random over the entire site. The test shall determine the soil particle size as compatible for the specified material.

3.2.2 Layout

Erosion control material locations may be adjusted to meet field conditions. When soil tests result in unacceptable particle sizes, a shop drawing shall be submitted indicating the corrective measures.

3.2.3 Protecting Existing Vegetation

When there are established lawns in the work area, the turf shall be covered and/or protected or replaced after construction operations. Identify existing trees, shrubs, plant beds, and landscape features that are to be preserved on site by appropriate tags and barricade with reusable, high-visibility fencing along the dripline. Mitigate damage to existing trees at no additional cost to the Government. Damage shall be assessed by a state certified arborist or other approved professional using the National Arborist Association's tree valuation guideline.

3.2.4 Obstructions Below Ground

When obstructions below ground affect the work, submit shop drawings showing proposed adjustments to placement of erosion control material for approval.

3.3 INSTALLATION

Immediately stabilize exposed soil using fabric, mulch, compost, and seed. Stabilize areas for construction access immediately as specified in the paragraph Construction Entrance. Install principal sediment basins and traps before any major site grading takes place. Provide additional sediment traps and sediment fences as grading progresses. Provide inlet and outlet protection at the ends of new drainage systems. Remove temporary erosion control measures at the end of construction and provide permanent seeding.

3.3.1 Construction Entrance

Provide as indicated on drawings, a minimum of 6 inches thick, at points of vehicular ingress and egress on the construction site. Construction entrances shall be cleared and grubbed, and then excavated a minimum of 3 inches prior to placement of the filter fabric and aggregate. The aggregate shall be placed in a manner that will prevent damage and movement of the fabric. Place fabric in one piece, where possible. Overlap fabric joints a minimum of 12 inches.

3.3.2 Synthetic Binders

Apply synthetic binders heaviest at edges of areas and at crests of ridges and banks to prevent displacement. Apply binders to the remainder of the area evenly as recommended by the manufacturer.

3.3.3 Seeding

When seeding is required prior to installing mulch on synthetic grid systems verify that seeding will be completed in accordance with Sections 31 00 00 EARTHWORK.

3.3.4 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.3.5 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be sprayed at a rate between 10 to 13 gallons/1000 square feet. Do no completely exclude sunlight from penetrating to the ground surface.

3.3.6 Non-Asphaltic Tackifier

Apply hydrophilic colloid at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. Apply a uniform mixture over the area.

3.3.7 Asphalt Adhesive Coated Mulch

Hay or straw mulch may be spread simultaneously with asphalt adhesive applied at a rate between 10 to 13 gallons/1000 square feet, using power mulch equipment equipped with suitable asphalt pump and nozzle. Apply the adhesive-coated mulch evenly over the surface. Do not completely exclude sunlight from penetrating to the ground surface.

3.3.8 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Apply wood cellulose fiber, paper fiber, or recycled paper as part of the hydraulic mulch operation.

3.3.9 Erosion Control Blankets

a. Install erosion control blankets as indicated and in accordance with manufacturer's recommendations. The extent of erosion control blankets shall be as shown on drawings.

b. Orient erosion control blankets in vertical strips and anchored with staples, as indicated. Abut adjacent strips to allow for installation of a common row of staples. Overlap horizontal joints between erosion control blankets sufficiently to accommodate a common row of staples with the uphill end on top.

c. Where exposed to overland sheet flow, locate a trench at the uphill termination. Staple the erosion control blanket to the bottom of the trench. Backfill and compact the trench as required.

d. Where terminating in a channel containing an installed blanket, the erosion control blanket shall overlap installed blanket sufficiently to accommodate a common row of staples.

3.3.10 Articulating Cellular Concrete Block System Installation

3.3.10.1 Seeding, Fertilizing, Mulching

Install as specified.

3.3.11 Sediment Fencing

Install posts at the spacing indicated on drawings and at an angle between 2 degrees and 20 degrees towards the potential silt load area. Sediment fence height shall be approximately 16 inches. Do not attach filter fabric to existing trees. Secure filter fabric to the post and wire fabric using staples, tie wire, or hog rings. Imbed the filter fabric into the ground as indicated on drawings. Splice filter fabric at support pole using a 6 inches overlap and securely seal.

3.4 CLEAN-UP

Dispose of excess material, debris, and waste materials offsite at an approved landfill or recycling center. Clear adjacent paved areas. Immediately upon completion of the installation in an area, protect the area against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.5 WATERING SEED

Start watering immediately after installing erosion control blanket type XI (revegetation mat). Apply water to supplement rainfall at a sufficient rate to ensure moist soil conditions to a minimum 1 inch depth. Prevent run-off and puddling. Do no drive watering trucks over turf areas, unless otherwise directed. Prevent watering of other adjacent areas or plant material.

3.6 MAINTENANCE RECORD

Furnish a record describing the maintenance work performed, record of measurements and findings for product failure, recommendations for repair, and products replaced.

3.6.1 Maintenance

Maintenance shall include eradicating weeds; protecting embankments and ditches from surface erosion; maintaining the performance of the erosion control materials and mulch; protecting installed areas from traffic.

3.6.2 Maintenance Instructions

Furnish written instructions containing drawings and other necessary information, describing the care of the installed material; including, when and where maintenance should occur, and the procedures for material replacement.

3.6.3 Patching and Replacement

Unless otherwise directed, material shall be placed, seamed or patched as recommended by the manufacturer. Remove material not meeting the required performance as a result of placement, seaming or patching from the site. Replace the unacceptable material at no additional cost to the Government.

3.7 SATISFACTORY STAND OF GRASS PLANTS

When erosion control blanket type XI (revegetation mat) is installed, evaluate the grass plants for species and health when the grass plants are a minimum 1 inch high. A satisfactory stand of grass plants from the revegetation mat area shall be a minimum 10 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total revegetation mat area.

-- End of Section --

SECTION 32 10 00

BITUMINOUS CONCRETE PAVEMENT

07/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 230	(1968; R 2000) Determining Degree of Pavement Compaction of Bituminous Aggregate Mixtures
AASHTO T 30	(2007) Mechanical Analysis of Extracted Aggregate

ASTM INTERNATIONAL (ASTM)

ASTM D 1559	(1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2172	(2005) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2950	(2005) Density of Bituminous Concrete in Place by Nuclear Methods

1.2 SUBMITTALS

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

SD-06 Test Reports

Trial batch reports

Mix design

Asphalt concrete

Density

Thickness

Straightedge test

Submit reports for testing specified under paragraph entitled "Field Quality Control."

SD-07 Certificates

Asphalt mix delivery record

Asphalt concrete and material sources

Obtain approval of the Contracting Officer for materials and material sources 2 days prior to the use of such material in the work.

Asphalt concrete

Submit certificates, signed by the producer, that paving materials and incidental construction items conform to specification requirements.

1.3 QUALITY ASSURANCE

1.3.1 Regulatory Requirements

Provide work and materials in accordance with applicable requirements of SHS. Paragraphs in SHS _____ entitled "Quantity and Payment" "Method of Measurement" and "Basis of Payment" shall not apply.

1.3.2 Modification of References

Where term "Engineer" is used in SHS _____ it shall be construed to mean Contracting Officer. Where term "state" is used, it shall mean "Federal Government".

1.3.3 Mix Delivery Record Data

Record and submit the following information to each load of mix delivered to the job site. Submit within one day after delivery on Government-furnished forms:

a. Truck No:

b. Time In:

c. Time Out:

d. Tonnage and Discharge Temperature:

e. Mix Type:

f. Location:

1.3.4 Trial Batch

Submit current bituminous design reports for all mix types proposed for use on the project.

1.3.5 Mix Design

Submit results of laboratory tests performed on each mix design. Testing shall have been accomplished not more than one year prior to date of material placement.

1.4 ENVIRONMENTAL REQUIREMENTS

Do not produce or place bituminous concrete when the weather is rainy or foggy, when the base course is frozen or has excess moisture, or when the ambient temperature is less than 40 degrees F in the shade away from artificial heat.

PART 2 PRODUCTS

2.1 ASPHALT CONCRETE

Provide asphalt concrete in accordance with the applicable requirements of the SHS, except where specified otherwise. Recycled asphalt pavement material may be used as permitted by SHS.

2.1.1 Albedo

Installed system shall have a minimum solar reflectance of 0.3.

2.2 SUBBASE

SHS, materials for construction of the subbase shall be in accordance with Division 5, Section 510.

2.3 BASE COURSE

SHS, materials for construction of the base course shall be in accordance with Division 5, Section 520.

2.4 SURFACE COURSE

SHS, materials for construction of the surface course shall be in accordance with Division 6, Section 650.

2.5 COMPOSITION OF MIXTURE REQUIREMENTS

2.5.1 Mixture Properties

Gradation of mineral aggregate shall be as specified. Percentage of bituminous material provided in the bituminous mixtures shall be within the limits specified. Mixtures shall have the following physical properties:

Test Property	Values
Stability (50 Blows)	Not less than 1000 pounds
Flow (0.01 inch)	Not more than 20 nor less than 8
Percent Air Voids	Not less than 3 nor more than 8 for binder course; not less than 3 nor more than 5 for wearing course
Percent Voids in Mineral Aggregates	See Table I

TABLE I

MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE (VMA)

U.S.A. Standard Sieve Designation	Nominal Maximum Particle Size, Inch	Minimum VMA Percent

TABLE I

MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE (VMA)

No. 4	0.187	18
3/8 inch	0.375	16
1/2 inch	0.500	15
3/4 inch	0.750	14
1 inch	1.000	13

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Excavation and Filling

Excavation and filling to establish elevation of subgrade is specified in Section 31 00 00 EXCAVATION.

3.2 CONSTRUCTION

Provide construction in accordance with the applicable requirements of the SHS, except where indicated or specified otherwise.

3.2.1 Subgrade

SHS, preparation of subgrade shall be in accordance with Division 5, Section 500.

3.2.2 Subbase

SHS, methods of construction of the subbase shall be in accordance with Division 5, Section 520.

3.2.3 Base Course

SHS, methods of construction of the base course shall be in accordance with Division 5, Section 520.

3.2.4 Edge Restraints

Install edge restraints of pervious systems per the drawings and manufacturer's recommendations.

3.2.5 Surface Course

SHS, methods of construction of the surface course shall be in accordance with Division 6, Section 650. Placement will not be permitted unless the Contractor has a working asphalt thermometer on site. Install surface elevation of the pervious paving system 1/8 to 1/4 inch above adjacent drainage inlets, concrete collars, or channels.

3.3 FIELD QUALITY CONTROL

Sample shall be taken by Contractor as specified herein. Contractor shall replace pavement where sample cores have been removed. Submit 2 pavement cores when using the in-place nuclear density method.

3.3.1 Sample and Core Identification

Place each sample and core in a container and securely seal to prevent loss of material. Tag each sample for identification. Tag shall contain the following information:

a. Contract No.

b. Sample No.

c. Quantity

d. Date of Sample

e. Sample Description

f. Source/Location/Stations Placed/depth below the finish grade

g. Intended Use

h. Thicknesses of various lifts placed

3.3.2 Testing

3.3.2.1 Bituminous Mix Testing

Take two samples per day per mix type at plant or from truck. Test uncompacted mix for extraction in accordance with ASTM D 2172 and sieve analysis in accordance with AASHTO T 30. Test samples for stability and flow in accordance with ASTM D 1559. When two consecutive tests fail to meet requirements of specifications, cease placement operations and test a new trial batch prior to resumption of placement operations. Submit 2 per day of each mix type. When two tests on uncompacted mix fail submit new trial batch for approval.

3.3.2.2 Testing of Pavement Course

a. Density: Determine density of pavement by testing cores obtained from the binder and wearing course in accordance with AASHTO T 230. Take three cores at location designated by Contracting Officer for each 200 tons, or fraction thereof, of asphalt placed. Deliver cores undisturbed and undamaged to laboratory and provide test results within 48 hours of each day placement of paving materials.

b. Thickness: Determine thickness of the binder and wearing course from cores taken for density test.

c. Straightedge Test: Test compacted surface of binder course and wearing course with a straightedge as work progresses. Apply straightedge parallel with and at right angles to center line after final rolling. Variations in the binder course surface shall not be more than 1/4 inches from the lower edge of the 10 foot straightedge; variations in wearing course surface shall not be more than 1/4 from the lower edge of the 10 foot straightedge.

3.3.2.3 Alternate Testing Method for Pavement Courses

At Contractor's option the following in-place testing method may be used to

determine density and thickness in lieu of testing specified above. Frequency of testing shall be the same. When in-place nuclear method to determine density is used, take two pavement cores at locations designated by Contracting Officer and turn over to Government to verify pavement thickness.

a. Density: Determine density of pavement by in-place testing using Nuclear Method in accordance with ASTM D 2950.

b. Thickness: Determine thickness of finished pavement by use of following equation:

$$t = \frac{W}{0.75d}$$

Where t= pavement thickness, in inches.
W= average weight per square yard of mixture actually used in work.
d= compacted density as measured by nuclear density device.

3.4 WASTE MANAGEMENT

Protect excess material from contamination and return to manufacturer, or reuse on-site for walkways, patching, ditch beds, speed bumps, or curbs.

-- End of Section --