CONTRACT N40085-17-B-0075

NAVFAC SPECIFICATION
NO. 05-17-0075

**INTERIOR/EXTERIOR REPAIRS BUILDING AS124**

AT THE

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

DESIGN BY:

TALLEY & SMITH ARCHITECTURE, INC.
409 E. Marion St.
P.O. Box 518 (28151)
Shelby, NC 28150

A/E Contract: N40085-15-D-0859

SPECIFICATION PREPARED BY:

Talley & Smith Architecture, Inc.
Shelby, NC

**Date: July 27, 2018**

SPECIFICATION APPROVED BY:

T. H. Burton, P.E., Director
Design Branch, Public Works Division

J. M. Roche, Commander, CEC, U.S. Navy
for Commander, Naval Facilities Engineering Command

05170075

# PROJECT TABLE OF CONTENTS

**DIVISION 01 - GENERAL REQUIREMENTS**

01 11 00 SUMMARY OF WORK
01 12 00 CUTTING AND PATCHING
01 14 00 WORK RESTRICTIONS
01 20 00 PRICE AND PAYMENT PROCEDURES
01 30 00 ADMINISTRATIVE REQUIREMENTS
01 31 50 TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY
01 32 16 CONSTRUCTION PROGRESS DOCUMENTATION
01 33 00 SUBMITTAL PROCEDURES
01 35 29 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS
01 42 00 SOURCES FOR REFERENCE PUBLICATIONS
01 45 10 QUALITY CONTROL
01 50 00 TEMPORARY FACILITIES AND CONTROLS
01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
01 78 00 CLOSEOUT PROCEDURES
01 78 23 OPERATION AND MAINTENANCE DATA
01 78 30 GIS DATA DELIVERABLES

**DIVISION 02 - EXISTING CONDITIONS**

02 41 00 DEMOLITION
02 82 16 REMOVAL AND DISPOSAL OF ASBESTOS MATERIALS
02 82 30 RE-ESTABLISHING VEGETATION
02 82 33.13 REMOVAL AND DISPOSAL OF MATERIALS COATED WITH LEAD-CONTAINING PAINT
02 83 13.00 20 LEAD IN CONSTRUCTION
02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY

**DIVISION 03 - CONCRETE**

03 30 04 CONCRETE FOR MINOR STRUCTURES

**DIVISION 04 - MASONRY**

04 20 00 UNIT MASONRY

**DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

06 10 00 ROUGH CARPENTRY
06 20 00 FINISH CARPENTRY

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

07 22 00 ROOF AND DECK INSULATION
07 42 13 METAL WALL PANELS
07 52 00 MODIFIED BITUMINOUS MEMBRANE ROOFING
07 60 00 FLASHING, SHEET METAL AND ROOF HATCH
07 61 15.00 20 ALUMINUM STANDING SEAM ROOFING
07 84 00 FIRESTOPPING
07 92 00 JOINT SEALANTS

**DIVISION 08 - OPENINGS**

08 11 13 STEEL DOORS AND FRAMES
08 33 23 OVERHEAD COILING DOORS

08 51 13 ALUMINUM WINDOWS
08 71 00 DOOR HARDWARE
08 81 00 GLAZING

**DIVISION 09 - FINISHES**

09 29 00 GYPSUM BOARD
09 67 23.13 STANDARD RESINOUS FLOORING
09 90 00 PAINTS AND COATINGS

**DIVISION 10 - SPECIALTIES**

10 28 13 TOILET ACCESSORIES
10 44 10 BUILDING ENUMERATION
10 44 30 ROOM SIGNS
10 52 20 FIRE EXTINGUISHERS AND CABINETS

**DIVISION 22 - PLUMBING**

22 00 00 PLUMBING, GENERAL PURPOSE

**DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS
23 05 92 TESTING/ADJUSTING/BALANCING: SMALL HEATING/VENTILATING/COOLING SYSTEMS
23 07 00 INSULATION OF MECHANICAL SYSTEMS
23 73 33 HEATING, VENTILATING, AND COOLING SYSTEM

**DIVISION 26 - ELECTRICAL**

26 00 00 BASIC ELECTRICAL MATERIALS AND METHODS
26 08 00 APPARATUS INSPECTION AND TESTING
26 20 00 INTERIOR DISTRIBUTION SYSTEM
26 51 00.00 22 INTERIOR LIGHTING

**DIVISION 27 - COMMUNICATIONS**

27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM

**DIVISION 31 - EARTHWORK**

31 23 00.00 20 EXCAVATION AND FILL

**DIVISION 32 - EXTERIOR IMPROVEMENTS**

32 10 00 BITUMINOUS CONCRETE PAVEMENT
32 11 23 AGGREGATE BASE COURSES

**DIVISION 33 - UTILITIES**

33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION
33 82 00 TELECOMMUNICATIONS OUTSIDE PLANT (OSP)

-- End of Project Table of Contents --

# 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 includes new finishes, roof and wall panels, roofing, plumbing, HVAC, electrical, doors, windows, masonry work, painting, and incidental related work.

#### 1.1.2 Location

The work shall be located at the Marine Corps Air Station New River, Camp Lejeune, Jacksonville, NC approximately as shown. The exact location will be indicated by the Contracting Officer.

### 1.2 EXISTING WORK

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

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

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

### 1.3 LOCATION OF UNDERGROUND FACILITIES

The Contractor will be responsible for obtaining the services of a professional utility locator to scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated or discovered during

scanning in locations to be traversed by piping, ducts, and other work to be installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.3.1 Notification Prior to Excavation

Notify the Contracting Officer 48 hours prior to starting excavation work in order to permit making arrangements with public works personnel to scan the area for unmarked utilities. Obtain station digging permits prior to starting excavation work.

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 CUTTING

Shall be done by sawing along straight lines. The amount cut out shall be the minimum necessary to accommodate the new work. No flame cutting will be permitted without written permission of the Officer in Charge of Construction.

### 1.2 HOLES

Shall be rotary drilled. The size shall be the minimum necessary to accommodate the new work.

### 1.3 PATCHING

Shall be done with materials which match the existing in color, quality and surface texture when finished.

## 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 CONTRACTOR ACCESS AND USE OF PREMISES

#### 1.1.1 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.

#### 1.1.2 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.

#### 1.1.3 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.

#### 1.1.4 Occupied and Existing Buildings

The Contractor shall be working in an existing building which is not occupied.

The existing buildings and their contents shall be kept secure at all times. Provide temporary closures as required to maintain security as directed by the Contracting Officer.

Leave attached equipment in place unless indicated otherwise, and protect it against damage, or temporarily disconnect, relocate, protect, and reinstall at the completion of the work.

The Government will remove other Government property in the areas of the building scheduled to receive work.

#### 1.1.5 Utility Cutovers and Interruptions

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

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

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, 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)

| | |
|---|---|
| EP-1110-1-8 | (2009) 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 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

**02/13**

## 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 Asbestos Containing Material

All contract requirements of Section 02 82 16, "Removal and Disposal of Asbestos Materials," assigned to the Private Qualified Person (PQP) shall be accomplished directly by a first tier subcontractor.

#### 1.4.9.2 Space Temperature Control, HVAC TAB, and Apparatus Inspection

All contract requirements of Section 23 05 92, "HVAC Testing/Adjusting/Balancing," and Section 26 08 00, "Apparatus Inspection and Testing" shall be accomplished directly by a first tier subcontractor. No work required by these Sections shall be accomplished by a second tier subcontractor.

#### 1.4.9.3 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.

#### 1.4.9.4 Paving Associated with Utility Cuts

All pavement repairs associated with utility cuts shall be completed within 14 days of completing work within paved area.

## 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 31 50

# TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

**01/07**

## PART 1 GENERAL

### 1.1 SUBMITTALS

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

SD-11 Closeout Submittals

Interim DD-1354, Transfer & Acceptance of Military Real Property

### 1.2 Interim DD-1354, Transfer & Acceptance of Military Real Property

Submit Interim DD-1354 thirty (30) days prior to beneficial occupancy date (draft copy attached).

## 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.

#### 1.2.1 HVAC TAB Milestones

Requirements for the milestones related to HVAC TAB work, Section 23 05 92, "HVAC Testing/Adjusting/Balancing," are specified in Section 01 20 00, "Price and Payment Procedures."

### 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 Network shall have a minimum of 25 activities and a maximum of 125 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

**06/17**

## 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-04 Samples

Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and

establish standards by which the work can be judged.

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

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

## SD-05 Design Data

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

## SD-06 Test Reports

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

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

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

Investigation reports

Daily 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-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

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 2 CD/DVD's

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 N40085-17-B-0075, 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 approved transmittal sheets, and provide two (2) CD/DVD's containing all submittals for the project.

The CD/DVD's shall be marked "Complete Submittal Package - Contract #_____."

### 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 Submittals

Except as otherwise noted, submit samples and submittals to:

Architect-Engineer Firm:

Attn: Steve Fender
Talley & Smith Architecture, Inc.
P.O. Box 518, Shelby, NC 28151
409 E. Marion St., Shelby, NC 28150

#### 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

Resident Officer in Charge of Construction (ROICC/OICC)
Jacksonville, North Carolina Area
1005 Michael Road
Camp Lejeune, NC 28542-2521.

1.8.1.3 TAB Submittals

Submit to ROICC/OICC for all projects.

1.8.1.4 HVAC DDC Submittals

Submit HVAC DDC Submittals, Section 23 09 23.13 to the specified address in paragraph 1.8.1. Concurrently submit shop drawings, Product Data, and Design Data electronically to Resident Officer in Charge of Construction (ROICC/OICC), Jacksonville, North Carolina Area. Electronic copy shall be PDF and should be submitted via email. Only if file size exceeds email limits, submit as a CD or DVD.

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

**10/15**

## 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 Z359.1 | (2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME B30.22 | (2010) Articulating Boom Cranes |
| ASME B30.3 | (2009) Tower Cranes |
| ASME B30.5 | (2007) Mobile and Locomotive Cranes |
| ASME B30.8 | (2010) Floating Cranes and Floating Derricks |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 10 | (2010) Standard for Portable Fire Extinguishers |
| NFPA 241 | (2009) Standard for Safeguarding Construction,Alteration, and Demolition Operations |
| NFPA 51B | (2009; TIA 09-1) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work |
| NFPA 70 | (2011) National Electrical Code |
| NFPA 70E | (2009; Errata 09-1) Standard for Electrical Safety in the Workplace |

U.S. ARMY CORPS OF ENGINEERS (USACE)

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

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

| | |
|---|---|
| 29 CFR 1910 | Occupational Safety and Health Standards |
| 29 CFR 1910.146 | Permit-required Confined Spaces |
| 29 CFR 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

#### 1.7.1.1 **Site Safety and Health Officer (SSHO)**

**The SSHO must meet the requirements of EM 385-1-1 section 1 and ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one (1) person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Designated Representative/alternate shall be at the work site at all times to implement and administer the Contractor's safety program and government-accepted Accident Prevention Plan. The SSHO's training, experience, and qualifications shall be as required by EM 385-1-1 paragraph 01.A.17, entitled SITE SAFETY AND HEALTH OFFICER (SSHO), and all associated sub-paragraphs.**

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

#### 1.7.1.2 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.

1.7.1.3 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.

1.7.1.4 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 ASSE/SAFE 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.**

### 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 ASSE/SAFE 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 ASSE/SAFE 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 by a qualified person**, installed, certified and used under the supervision of a **competent 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) 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. 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.

AMERICAN CONCRETE INSTITUTE 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

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
2111 Wilson Blvd, Suite 500
Arlington, VA 22201
Ph: 703-524-8800
Fax: 703-528-3816
E-mail: fdietz@ahrinet.org
Internet: http://www.ahrinet.org

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

ALUMINUM ASSOCIATION (AA)
National Headquarters
1525 Wilson Boulevard, Suite 600
Arlington, VA 22209
Ph: 703-358-2960

Fax: 703-358-2961
Internet: http://www.aluminum.org

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

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

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

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)
American Wood Council
ATTN: Publications Department
1111 Nineteenth Street NW, Suite 800
Washington, DC 20036
Ph: 800-890-7732 or 202-463-2766
Fax: 202-463-2791
E-mail: awcpubs@afandpa.org
Internet: http://www.awc.org/

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

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)
2700 Prosperity Ave., Suite 250
Fairfax, VA 22031
Tel: 703-849-8888
Fax: 703-207-3561
E-mail: infonet@aiha.org
Internet http://www.aiha.org

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)
7012 South Revere Parkway, Suite 140
Centennial, CO 80112
Ph: 303-792-9559

Fax: 303-792-0669
E-mail: info@aitc-glulam.org
Internet: http://www.aitc-glulam.org

AMERICAN IRON AND STEEL INSTITUTE (AISI)
1140 Connecticut Avenue, NW, Suite 705
Washington, DC 20036
Ph: 202-452-7100
Fax: 202-463-6577
E-mail: webmaster@steel.org
Internet: http://www.steel.org

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
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 RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)
10003 Derekwood Lane, Suite 210
Lanham, MD 20706
Ph: 301-459-3200
Fax: 301-459-8077
Internet: http://www.arema.org

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191-4400
Ph: 703-295-6300 - 800-548-2723
Fax: 703-295-6333
E-mail: member@asce.org
Internet: http://www.asce.org

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)
1791 Tullie Circle, NE
Atlanta, GA 30329
Ph: 800-527-4723 or 404-636-8400
Fax: 404-321-5478
E-mail: ashrae@ashrae.org
Internet: http://www.ashrae.org

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018-2187
Ph: 847-699-2929
Fax: 847-768-3434
E-mail: customerservice@asse.org

Internet: http://www.asse.org

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
901 Canterbury, Suite A
Westlake, OH 44145
Ph: 440-835-3040
Fax: 440-835-3488
E-mail: info@asse-plumbing.org
Internet: http://www.asse-plumbing.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

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

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

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

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

ASPHALT ROOFING MANUFACTURER'S ASSOCIATION (ARMA)
529 14th Street, NW
Washington D.C. 20045
Ph: 202-207-0917
Fax: 202-223-9741
Internet: http://www.asphaltroofing.org

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

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

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

COPPER DEVELOPMENT ASSOCIATION (CDA)
260 Madison Avenue
New York, NY 10016
Ph: 212-251-7200
Fax: 212-251-7234
E-mail: questions@cda.copper.org
Internet: http://www.copper.org

FM GLOBAL (FM)
270 Central Avenue
P.O. Box 7500
Johnston, RI 02919
Ph: 401-275-3000 ext. 1945
Fax: 401-275-3029
E-mail: servicedesk.myrisk@fmglobal.com
Internet: http://www.fmglobal.com

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)
University of South California
Kaprielian Hall 200
Los Angeles, CA 90089-2531
Ph: 213-740-2032 or 866-545-6340
Fax: 213-740-8399
E-mail: fccchr@usc.edu
Internet: http://www.usc.edu/dept/fccchr

GLASS ASSOCIATION OF NORTH AMERICA (GANA)
2945 SW Wanamaker Drive, Suite A
Topeka, KS 66614
Ph: 785-271-0208
Fax: 785-271-0166
E-mail: gana@glasswebsite.com
Internet: http://www.glasswebsite.com

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

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

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

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)
1901 North Moore Street
Arlington, VA 22209-1762
Ph: 703-525-1695
Fax: 703-528-2148
E-mail: isea@safety equipment.org
Internet: http://www.safetyequipment.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

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)
P.O. Box 1568
Carrollton, GA 30112
Ph: 1 800 447 3352
Fax: 1 303 397 2599
E-mail: global@ihs.com
Internet: http://www.icea.net

INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA)
27 N. Wacker Dr. Suite 365

Chicago, IL 60606-2800
Ph: 613-233-1510
Fax: 613-482-9436
E-mail: info@igmaonline.org
Internet: http://www.igmaonline.org

INTERNATIONAL CODE COUNCIL (ICC)
5360 Workman Mill Road
Whittier, CA 90601
Ph: 1-888-422-7233
Fax: 562-908-5524
E-mail: webmaster@iccsafe.org
Internet: www.iccsafe.org

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

3050 Centre Ave. Suite 102
Portage, MI 49024
Ph: 269-488-6382
Fax: 269-488-6383
E-mail: neta@netaworld.org
Internet: http://www.netaworld.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

MASTER PAINTERS INSTITUTE (MPI)
2800 Engleton Avenue
Burnaby, BC CANADA V5C 6G7
Ph: 604-298-7578
Fax: 604-298-7571
E-mail: info@paintinfo.com,jody@mpi.net,bgl@mpi.net
Internet: http://www.paintinfo.com/mpi

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

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

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)
3 Bethesda Metro Center, Suite 1100
Bethesda, MD 20814

Ph: 301-657-3110
Fax: 301-215-45002
Internet: http://www.necanet.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 ENVIRONMENTAL BALANCING BUREAU (NEBB)
8575 Grovemont Circle
Gaithersburg, MD 20877
Ph: 301-977-3698
Fax: 301-977-9589
E-Mail: elana@nebb.org
Internet: http://www.nebb.org

NATIONAL FENESTRATION RATING COUNCIL (NFRC)
6305 Ivy Lane, Suite 140
Greenbelt, MD 20770
Ph: 301-589-1776
Fax: 301-589-3884
E-Mail: info@nfrc.org
Internet: http://www.nfrc.org

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

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)
6830 Raleigh LaGrange Road
Memphis, TN 38184-0518
Ph: 901-377-1818
E-mail: info@nhla.com
Internet: http://www.natlhardwood.org

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
10255 West Higgins Road, Suite 600
Rosemont, IL 60018-5607
Ph: 847-299-9070
Fax: 847-299-1183
E-mail: form available online
Internet: http://www.nrca.net

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)
272 Tuttle Road
Cumberland, ME 04021
Ph: 207-829-6901
Fax: 207-829-4293
E-mail: barbara@nelma.org
Internet: http://www.nelma.org

NSF INTERNATIONAL (NSF)
789 North Dixboro Road
P.O. Box 130140
Ann Arbor, MI 48113-0140
Ph: 734-769-8010 or 800-NSF-MARK
Fax: 734-769-0109
E-mail: info@nsf.org
Internet: http://www.nsf.org

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

PORCELAIN ENAMEL INSTITUTE (PEI)
PO Box 920220
Norcross, GA 30010
Ph: 770-676-9366
Fax: 770-676-9368
E-mail: penamel@aol.com
Internet: http://www.porcelainenamel.com

REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)
405 Enfrente Drive, Suite 200
Novato, CA 94949
Ph: 415-382-0662 or 888-CALREDWOOD
Fax: 415-382-8531
E-Mail: info@calredwood.org
Internet: http://www.redwoodinspection.com/

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)
2200 Powell Street, Suite 725
Emeryville, CA 94608
Ph: 510-452-8000
Fax: 510-452-8001
Internet: http://www.scs1.com

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

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)
400 Penn Center Boulevard, Suite 530
Pittsburgh, PA 15235-5605
Ph: 412-829-0770
Fax: 412-829-0844
Internet: http://www.cypressinfo.org

SOUTHERN PINE INSPECTION BUREAU (SPIB)
P.O. Box 10915
Pensacola, FL 32504-0915

Ph: 850-434-2611
Fax: 850-433-5594
E-mail: Fill out form at http://www.spib.org/contact.shtml
Internet: http://www.spib.org

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)
Division of State Documents
16 Francis Street
Annapolis, MD 21401
Ph: 410-974-2486x3872,(800) 633-9657 ext. 3872
Fax: 410-974-2546
E-mail: support@sos.state.md.us
Internet: www.dsd.state.md.us/comar/

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)
No. 1 South Wilmington Street
P.O. Box 25201
Raleigh, NC 27611
phone: 919-733-2520
fax: 919-733-9150
Internet:

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)
Virginia Code Commission
General Assembly Building, 2nd Floor
910 Capitol Street
Richmond, Virginia 23219
Ph: 804-786-3591
Fax: 804-692-0625
E-mail: tlong@dls.virginia.gov (Tina Long)
Internet: http://leg1.state.va.us/000/srr.htm

STEEL DOOR INSTITUTE (SDI/DOOR)
c/o Steel Door Institute
30200 Detroit Road
Cleveland, OH 44145-1967
Ph: 440-899-0010
Fax: 440-892-1404
E-mail: info@steeldoor.org
Internet: http://www.steeldoor.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

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)
2500 Wilson Blvd,. Suite 300
Arlington, VA 22201
Ph: 703-907-7700
Fax: 703-907-7727
Internet: http://www.tiaonline.org

TRUSS PLATE INSTITUTE (TPI)
218 N. Lee Street, Suite 312
Alexandria, VA 22314

Ph: 703-683-1010
Fax: 866-501-4012
E-mail: info@tpinst.org
Internet: http://www.tpinst.org

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/
UL Directories available through IHS at http://www.ihs.com

U.S. ARMY CORPS OF ENGINEERS (USACE)
Order CRD-C DOCUMENTS from:
U.S. Army Engineer Waterways Experiment Station
ATTN: Technical Report Distribution Section, Services Branch, TIC
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
E-mail: MTC-INFO@erdc.usace.army.mil
Internet:
http://gsl.erdc.usace.army.mil/SL/MTC/handbook/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 COMMERCE (DOC)
1401 Constitution Avenue, NW
Washington, DC 20230
Ph: 202-482-2000
Fax: 703-605-6900
E-mail: webmaster@doc.gov

Internet: http://www.commerce.gov/
Order Publications From:
National Technical Information Service (NTIS)
5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6050 or 1-888-584-8332
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

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. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
Order from:
HUD User
P.O. Box 23268
Washington, DC 20026-3268
Ph: 800-245-2691 or 202-708-9981
Fax: 202-708-9981
E-mail: helpdesk@Huduser.org
Internet: http://www.huduser.org

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-272-0167
for Fax and E-mail see below
Internet: http://www.epa.gov
--- Some EPA documents are available only from:
National Technical Information Service (NTIS)

5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6050 or 1-688-584-8332
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)
445 12th Street SW
Washington, DC 20554
Phone: 888-CALL-FCC
Fax: 866-418-0232
Internet: http://www.fcc.gov
E-mail: fccinfo@fcc.gov
Order Publications From:
Superintendent of Documents
U.S. Government Printing Office (GPO)
732 North Capitol Street, NW
Washington, DC 20401-0001
Ph: 202-512-1800
Fax: 866-418-0232
E-mail: gpoweb@gpo.gov
Internet: http://www.gpoaccess.gov/

U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
1800 F Street, NW
Washington, DC 20405
Ph: 202-501-0800
Internet: www.GSA.gov
Obtain documents 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

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

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

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)
Yeon Building
522 SW 5th Avenue
Suite 500
Portland, OR 97204-2122
Ph: 503-224-3930
Fax: 503-224-3934
E-mail: info@wwpa.org
Internet: http://www.wwpa.org

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)
401 N. Michigan Ave., Suite 2200
Chicago, IL 60611
Ph: 312-321-6802
Fax: 312-673-6922
E-mail: wdma@wdma.com
Internet: http://www.wdma.com

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

## 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 | (2010c) 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 | (2009) 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 ing 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 meet ing, 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, super intendent, 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 sponsered 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.

1.5.2.1 Electrical and Telecommunications Systems GXC Specialists

Text

| Qualification/Experience in Area of Responsibility | Area of Responsibility | Frequency |
|---|---|---|

| | | |
|---|---|---|
| Electrical Inspector Crew supervision for 10 years minimum Master Electrician licensed in North Carolina | Electrical Systems, all Division 26 Sections and Division 33 Electrical Sections | Full time during installation and testing of all systems |
| Telecommunications Systems Installation Specialist 10 years minimum experience in telecommunications systems installation | Telecommunications Systems, all Division 27 and 28 Sections, and Divison 33 Outside Plan (OSP) work | Full time during systems installation and testing |

## 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 meet ing. 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 documen tation 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 super intendent, 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 quali fied 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 78 00, "Closeout Procedures", 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.

# SECTION 01 50 00

# TEMPORARY FACILITIES AND CONTROLS

**05/13**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION(AWWA)

| | |
|---|---|
| AWWA C511 | (2007) Standard for Reduced-Pressure Principle Backflow Prevention Assembly |

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

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

### 1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

SD-03 Product Data

Backflow preventers

SD-06 Test Reports

Backflow Preventer Tests

SD-07 Certificates

Backflow Tester Certifications

Backflow Preventers Certificate of Full Approval

### 1.3 BACKFLOW TESTER CERTIFICATIONS

Certificate of Full Approval from FCCCHR List, University of Southern

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

### 1.3.1 Backflow Preventers Certificate

The Contractor shall submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours or training in backflow preventer installations. The certificate must be current.

## 1.4 TEMPORARY UTILITIES

### 1.4.1 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.

### 1.4.2 Trailers

Electrical service will be supplied by the Government, when available, except at Tarawa Terrace where Carolina Power and Light Company will be the supplier.

### 1.4.3 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.

### 1.4.4 Location of Underground Utilities

Location and Protection of underground utilities shall be the responsibility of the Contractor. Where existing-to-remain piping, utilities, and underground obstructions of any type are indicted in locations to be traversed by new piping, ducts, and other excavations the elevations of the existing utilities and obstructions shall be determined before the new work is completed.

a. In addition, the Contractor will be responsible for obtaining the services of a professional utility locator prior to digging. Contractor will provide documentation that the site has been surveyed and checked for underground utilities. All utilities must be located, including but not limited to power, water, sewer, storm drains, fiber optics, T.V. cable, telephone, and intrusion detection wiring. A set of known utility drawings will be available in the ROICC office for review to assist the locator.

b. It is mandatory that the Contractor also contact the Base Telephone Office (451-2531) prior to accomplishing any digging at Camp Lejeune. A telephone office representative will assist in locating telephone lines.

c. It is mandatory that the Contractor also contact Charter Communications, cable TV service prior to accomplishing any digging at Camp Lejeune, to ensure that all buried cable lines are identified. Contact Mr. Olin Criswell at 353-8677 for assistance.

d. It is mandatory that the contractor also contact the North Carolina One-Call Center to coordinate the location of underground natural gas infrastructure. North Carolina 811, Inc. can be reached at 811 on a touch-tone phone in the state of North Carolina or toll-free at 1.800.632.4949 if calling from out of state. Work requests may also be submitted online at www.nc811.org.

1.4.4.1 The Locations of Underground Utilities

The locations of underground utilities shown at only approximate and the information provided may be incomplete. Contractor shall attempt to ascertain locations of existing underground utilities prior to and during digging operations.

1.4.4.2 Damage to Underground Utilities

Immediate notice shall be delivered to the Contracting Officer of any damage. The Contractor shall make temporary repairs immediately, and shall provide permanent repairs as soon as practicable. For any additional work required by reason of conflict between the new and existing work, an adjustment in contract price will be made in accordance with Contract clause entitled "Differing Site Conditions", if appropriate.

1.5 WEATHER PROTECTION

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

1.5.1 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.

1.5.1.1 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.

## 1.6 STORAGE AREAS

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

### 1.6.1 Storage Size and Location

The open site available for storage shall be confined to the operations area beside the building, where it does not block access to adjacent facilities. Exact location shall be as directed by Contracting Officer.

### 1.6.2 Storage in Existing Buildings

The Contractor shall be working in an existing building; the storage of material will be allowed in the building to the extent that it does not impede construciton activities.

## 1.7 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.

## 1.8 TEMPORARY BUILDINGS

Locate these where directed by Contracting Officer and within the indicated operations area.

### 1.8.1 Maintenance of Temporary Facilities

Suitably paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

### 1.8.2 Trailers or Storage Buildings

Trailers or storage buildings will be permitted, where space is available, subject to the approval of the Contracting Officer. The trailers or buildings shall be in good condition, free from visible damage rust and deterioration, and meet all applicable safety requirements. Trailers shall be roadworthy and comply with all appropriate state and local vehicle requirements. Failure to maintain storage trailers or buildings to these standards shall result in the removal of non-complying units at the Contractor's expense. A sign not smaller than 24 by 24 inches shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number. Trailers shall be anchored to resist high winds and must meet applicable state of local standards for anchoring mobile trailers.

## PART 2 PRODUCTS

### 2.1 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, bronze, or brass mounted gate valve and strainer, 304 stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed shall be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and shall be accompanied by a Certificate of Full Approval from FCCCHR List.

## PART 3 EXECUTION

### 3.1 REDUCED PRESSURE BACKFLOW PREVENTERS

Provide an approved reduced pressure backflow prevention assembly at each location where the Contractor taps into the Government potable water supply.

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

Not used.

-- End of Section --

# SECTION 01 57 19

# TEMPORARY ENVIRONMENTAL CONTROLS

**09/14**

## PART 1 GENERAL

### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to 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 | (2007; Rev F) Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment |
| 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 | Standards Applicable to Generators of Hazardous Waste |
| 40 CFR 263 | Standards Applicable to Transporters of Hazardous Waste |
| 40 CFR 264 | Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities |
| 40 CFR 265 | Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities |
| 40 CFR 300 | National Oil and Hazardous Substances Pollution Contingency Plan |
| 49 CFR 171 | General Information, Regulations, and Definitions |

| | |
|---|---|
| 49 CFR 172 | Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements |
| 49 CFR 178 | Specifications for Packagings |

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

SD-11 Closeout Submittals

Solid waste disposal permit

Disposal permit for hazardous waste

Environmental training documentation

Permit to transport hazardous waste

Hazardous waste certification

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.

### 1.4.2 Disposal Permit for Hazardous Waste

Submit a copy of the applicable EPA and State permits, manifests, or licenses for transportation, treatment, storage, and disposal of hazardous waste by permitted facilities.

### 1.4.3 Permit to Transport Hazardous Waste

Submit one copy of the EPA or State permit license, or regulation for the transporter who will ship the hazardous waste to the permitted Treatment, Storage, and Disposal (TSD) facility.

### 1.4.4 Hazardous Waste Certification

Submit written certification that hazardous waste turned in for disposal was generated on Government property and is identified, packaged, and labeled in accordance with 40 CFR 261, 40 CFR 262, and 40 CFR 263.

## 1.5 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."

## 1.6 CAMP LEJEUNE SANITARY LANDFILL INFORMATION

1. Contractors may ONLY use the Camp Lejeune Sanitary Landfill for the disposal of asbestos containing materials, building products with tightly adhered lead containing paint, non-contaminated clean dirt and clean gravel. The hours of operation are 0730-1530.

2. Delivery of acceptable materials (identified above) shall be by appointment only. Appointments made by phone at 910-451-5011 or 910-451-2946. ALL other contractor generated material shall be weighed through the Base Landfill scales before being removed from the Base. Contractors utilizing the base scales will require Contracting Officer assisted pre-registration with the Landfill Manager.

3. The Contracting Officer will register the contract via E-mail, with the Base Landfill. All haul vehicles will maintain a secure vehicle placard as a condition to utilize the scale. E-mail the contract information to the Landfill Clerk, including the name on the Prime Contractor, contract number, job name/description, completion date and whether or not any of the above materials will be delivered to the Landfill.

4. As of May 01 2014 the above supersedes any other statements/specifications pertaining to the delivery of materials to the Base 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. Conform to the permitting requirements of the Clean Water Act.

#### 3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by Contracting Officer. Where such use of attach ropes, cables, or guys is authorized, the Contractor shall be responsible for any resultant damage.

##### 3.1.1.1 Protection of Trees

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed. Removal of trees and the procedure for removal requires approval of the Contracting Officer.

##### 3.1.1.2 Landscape Replacement

Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before removal or replacement.

##### 3.1.1.3 Temporary Construction

Remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other signs of construction. Grade temporary roads, parking areas, and similar temporarily used areas to conform with surrounding contours.

#### 3.1.2 Water Resources

##### 3.1.2.1 Stream Crossings

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

##### 3.1.2.2 Oily Wastes

Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Surround all temporary fuel oil or petroleum storage tanks with a temporary earth berm of sufficient size

and strength to contain the contents of the tanks in the event of leakage or spillage.

## 3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

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

## 3.3 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.

## 3.4 RESTRICTIONS ON EQUIPMENT

### 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.

### 3.4.2 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.

## 3.5 EROSION AND SEDIMENT CONTROL MEASURES

### 3.5.1 Burnoff

Burnoff of the ground cover is not permitted.

### 3.5.2 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or

specified. Immediately protect side and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize duration of exposure of unprotected soils.

3.5.3 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

3.5.3.1 Mechanical Retardation and Control of Runoff

Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, berms, and use of silt fences and strawbales to retard and divert runoff to protected drainage courses.

3.5.3.2 Vegetation and Mulch

Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

a. Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish a suitable stand of grass. Provide seeding as specified in Section 02 82 30.

3.6 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.

3.6.1 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.

3.6.2 Disposal of Rubbish and Debris

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

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

3.6.3 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

## 3.7 CONTROL AND DISPOSAL OF HAZARDOUS WASTE

### 3.7.1 Hazardous Waste Generation

Handle generated hazardous waste in accordance with 40 CFR 262.

### 3.7.2 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.

### 3.7.3 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.

### 3.7.4 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.

### 3.7.5 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.

3.7.6 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.

3.7.7 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.

3.7.8 Ozone Depleting Substances (ODS)

Remove ODS as specified in Section 02 41 00, "Demolition."

3.8 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.

3.9 SOIL

No dirt from construction sites shall leave Marine Corps Base Camp Lejeune or Marine Corps Air Station property (with the exception of environmental remedial activities). Any excess soil that cannot be reused on its originating site shall be transported to one of the following locations:

Areas managed by G-3/5 for re-use on training areas for various maintenance activities:

1. 3.1 acre storage east of OP-4 on Sneads Ferry Road (figure 1)

2. 3.5 acre storage within TLZ Condor off Verona Loop Road (figure 2)

Prior to delivering soil to these stockpile locations, the following must be conducted:

1. Coordinate with G-3/5 (Mr. Dave Lynch or Mr. Bill VanPelt, MCIEAST-MCB CAMLEJ, 910-451-5772/8799) to determine capacity available (i.e., how much soil can be stored)

2. All soils will be clear of organic material such as roots and timber.

3. Contact POCs listed above 7-10 days in advance to coordinate delivery of material at the storage locations

**NOTE:** Soil contaminated with debris or chemicals cannot be disposed at the stockpile locations. If contaminated soils are suspected or confirmed through presence of UXO, odors or visual staining, affected soils must be properly tested, manifested and disposed of in accordance with RCRA regulations. Contact Base EMD (ER Program Manager) for more information."

## 3.10 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

Page 1 of 3

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

**05/13**

## 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

Record of materials

Complete Submittal Package 2 CD/DVD's

Equipment/product warranty tag

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 as specified in Section 01 78 30, DIGITAL DATA DELIVERABLES (GIS).

### 1.2 As-Built Drawings

"FAC 5252.236-9310, Record Drawings." As-built drawings will be submitted in redline mark-up format.

### 1.3 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 |
|---|---|---|---|---|
| _____ | _____ | _____ | _____ | _____ |

## 1.4 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 MECHANICAL TESTING AND BALANCING

All contract requirements of of Section 23 05 92, "HVAC

Testing/Adjusting/Balancing," shall be fully completed, including testing and inspection, prior to contract completion date, except as noted otherwise in Section 26 08 00. The time required to complete all work and testing as prescribed by these Sections is included in the allotted calendar days for completion.

## 1.6 COMPLETE SUBMITTAL PACKAGE

Contractor shall make electronic copies of all submittals, including the approved transmittal sheets, and provide two (2) CD/DVD's containing all submittals for the project.

The CD/DVD's shall be marked "Complete Submittal Package - Contract #_____."

## 1.7 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
**08/15**

## 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 E1971 | (2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings |

### 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

O&M Database

Training Plan

Training Outline

Training Content

SD-11 Closeout Submittals

Training Video Recording

Validation of Training Completion

### 1.3 OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include 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.

#### 1.3.1 Package Quality

Documents must be fully legible. Operation and Maintenance data must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions.

### 1.3.2 Package Content

Provide data package content in accordance with paragraph 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.

### 1.3.3 Changes to Submittals

Provide manufacturer-originated changes or revisions to submitted data if a component of an item is so affected subsequent to acceptance of the O&M Data. Submit changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data within 30 calendar days of the notification of this change requirement.

## 1.4 O&M DATABASE

Develop an editable, electronic spreadsheet based on the equipment in the Operation and Maintenance Manuals that contains the information required to start a preventive maintenance program. As a minimum, provide list of system equipment, location installed, warranty expiration date, manufacturer, model, and serial number.

## 1.5 OPERATION AND MAINTENANCE MANUAL FILE FORMAT

Assemble data packages into electronic Operation and Maintenance Manuals. Assemble each manual into a composite electronically indexed file using the most current version of Adobe Acrobat or similar software capable of producing PDF file format. Provide compact disks (CD) or data digital versatile disk (DVD) as appropriate, so that each one contains operation, maintenance and record files, project record documents, and training videos. Include a complete electronically linked operation and maintenance directory.

### 1.5.1 Organization

Bookmark Product and Drawing Information documents using the current version of CSI Masterformat numbering system, and arrange submittals using the specification sections as a structure. Use CSI Masterformat and UFGS numbers along with descriptive bookmarked titles that explain the content of the information that is being bookmarked.

### 1.5.2 CD or DVD Label and Disk Holder or Case

Provide the following information on the disk label and disk holder or case:

a. Building Number

b. Project Title

c. Activity and Location

d. Construction Contract Number

e. Prepared For: (Contracting Agency)

f. Prepared By: (Name, title, phone number and email address)

g. Include the disk content on the disk label

h. Date

i. Virus scanning program used

## 1.6 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

The following are a detailed description of the data package items listed in paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES.

### 1.6.1 Operating Instructions

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

#### 1.6.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 29 GOVERNMENT SAFETY REQUIREMENTS. Provide recommended safeguards for each identified hazard.

#### 1.6.1.2 Operator Prestart

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

#### 1.6.1.3 Startup, Shutdown, and Post-Shutdown Procedures

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

#### 1.6.1.4 Normal Operations

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

#### 1.6.1.5 Emergency Operations

Provide 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. Provide Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of utility systems including required valve positions, valve locations and zones or portions of systems controlled.

#### 1.6.1.6 Operator Service Requirements

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

#### 1.6.1.7 Environmental Conditions

Provide 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.

1.6.1.8 Operating Log

Provide forms, sample logs, and instructions for maintaining necessary operating records.

1.6.1.9 Additional Requirements for HVAC Control Systems

Provide Data Package 5 and the following for control systems:

a. Narrative description on how to perform and apply 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 checkout tests and calibrations performed by the Contractor (not Cx tests).

d. Full points list. Provide a listing of rooms with the following information for each room:

(1) Floor

(2) Room number

(3) Room name

(4) Air handler unit ID

(5) Reference drawing number

(6) Air terminal unit tag ID

(7) Heating or cooling valve tag ID

(8) Minimum cfm

(9) Maximum cfm

e. Full print out of all schedules and set points after testing and acceptance of the system.

f. Full as-built print out of software program.

g. Marking of system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.6.2 Preventive Maintenance

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

1.6.2.1 Lubrication Data

Include the following preventive maintenance lubrication data, in addition to instructions for lubrication required under paragraph 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.

1.6.2.2 Preventive Maintenance Plan, Schedule, and Procedures

Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. 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.

a. Define the anticipated time required to perform each of each test (work-hours), test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventive maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize repairs.

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

1.6.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E1971.

1.6.3 Repair

Provide 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.

1.6.3.1 Troubleshooting Guides and Diagnostic Techniques

Provide 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.

1.6.3.2 Wiring Diagrams and Control Diagrams

Provide 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.

1.6.3.3 Repair Procedures

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

1.6.3.4 Removal and Replacement Instructions

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

1.6.3.5 Spare Parts and Supply Lists

Provide lists of spare parts and supplies required for 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.

1.6.3.6 Repair Work-Hours

Provide manufacturer's projection of repair work-hours including requirements by type of craft. Identify, and tabulate separately, repair that requires the equipment manufacturer to complete or to participate.

1.6.4 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:

1.6.4.1 Product Submittal Data

Provide a copy of SD-03 Product Data submittals documented with the required approval.

1.6.4.2 Manufacturer's Instructions

Provide a copy of SD-08 Manufacturer's Instructions submittals documented with the required approval.

1.6.4.3 O&M Submittal Data

Provide a copy of SD-10 Operation and Maintenance Data submittals documented with the required approval.

1.6.4.4 Parts Identification

Provide identification and coverage for the 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 must show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Group the parts shown in the listings 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.

1.6.4.5 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 componentsof the system. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.6.4.6 Extended Warranty Information

List all warranties for products, equipment, components, and sub-components whose duration exceeds one year. For each warranty listed, indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference the specific operation and maintenance procedures that must be performed to keep the warranty valid. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.6.4.7 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.

1.6.4.8 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. Provide final set points.

1.6.4.9 Testing and Performance Data

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

1.6.4.10 Field Test Reports

Provide a copy of Field Test Reports (SD-06) submittals documented with the required approval.

1.6.4.11 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.

1.7 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Provide the O&M data packages specified in individual technical sections. The information required in each type of data package follows:

1.7.1 Data Package 1

a. Safety precautions and hazards

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Extended warranty information

f. Contractor information

g. Spare parts and supply list

1.7.2 Data Package 2

a. Safety precautions and hazards

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan, schedule, and procedures

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. Extended warranty information

m. Contractor information

1.7.3 Data Package 3

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Operating log

h. Lubrication data

i. Preventive maintenance plan, schedule, and procedures

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. Product submittal data

q. O&M submittal data

r. Parts identification

s. Warranty information

t. Extended warranty information

u. Testing equipment and special tool information

v. Testing and performance data

w. Contractor information

x. Field test reports

1.7.4 Data Package 4

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Operating log

i. Lubrication data

j. Preventive maintenance plan, schedule, and procedures

k. Cleaning recommendations

l. Troubleshooting guides and diagnostic techniques

m. Wiring diagrams and control diagrams

n. Repair procedures

o. Removal and replacement instructions

p. Spare parts and supply list

q. Repair work-hours

r. Product submittal data

s. O&M submittal data

t. Parts identification

u. Warranty information

v. Extended warranty information

w. Personnel training requirements

x. Testing equipment and special tool information

y. Testing and performance data

z. Contractor information

aa. Field test reports

1.7.5 Data Package 5

a. Safety precautions and hazards

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan, schedule, and procedures

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. Extended warranty information

s. Testing and performance data

t. Contractor information

u. Field test reports

v. Additional requirements for HVAC control systems

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

### 3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the Facilities Management Specialist, building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the Operation and Maintenance Manual submitted in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS.. Training must include classroom or field lectures based on the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

#### 3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan

must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the Contracting Officer and QC. Include within the plan the following elements:

a. Equipment included in training

b. Intended audience

c. Location of training

d. Dates of training

e. Objectives

f. Outline of the information to be presented and subjects covered including description

g. Start and finish times and duration of training on each subject

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

i. Instructor names and instructor qualifications for each subject

j. List of texts and other materials to be furnished by the Contractor that are required to support training

k. Description of proposed software to be used for video recording of training sessions.

### 3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Spend 95 percent of the instruction time during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

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

b. Relevant health and safety issues.

c. Discussion of how the feature or system is environmentally responsive. Advise adjustments and optimizing methods for energy conservation.

d. Design intent.

e. Use of O&M Manual Files.

f. Review of control drawings and schematics.

g. Interactions with other systems.

h. Special maintenance and replacement sources.

i. Tenant interaction issues.

### 3.1.3 Training Outline

Provide the Operation and Maintenance Manual Files (Bookmarked PDF) and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

### 3.1.4 Training Video Recording

Record classroom training session(s) on video. Provide to the Contracting Officer two copies of the training session(s) in DVD video recording format. Capture within the recording, in video and audio, the instructors' training presentations including question and answer periods with the attendees. The recording camera(s) must be attended by a person during the recording sessions to assure proper size of exhibits and projections during the recording are visible and readable when viewed as training.

### 3.1.5 Unresolved Questions from Attendees

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

### 3.1.6 Validation of Training Completion

Ensure that each attendee at each training session signs a class roster daily to confirm Government participation in the training. At the completion of training, submit a signed validation letter that includes a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was performed, and copies of the signed class rosters. Provide two copies of the validation to the Contracting Officer, and one copy to the Operation and Maintenance Manual Preparer for inclusion into the Manual's documentation.

### 3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 10 QUALITY CONTROL.

-- End of Section --

# SECTION 01 78 30

# GIS DATA DELIVERABLES

**08/18**

## PART 1 GENERAL

### 1.1 OBJECTIVE

The primary objective of this section is to provide detailed specifications for collection and delivery of geospatial data commonly referred to as Geographic Information System (GIS) data. Additionally, this section shall provide guidance to ensure that all GIS data delivered is compatible and will add value to the Marine Corps Base (MCB) Camp Lejeune Installation Geospatial Information and Services (IGI&S) GEOdatabase.

Failure to comply with the specifications outlined in this document will result in non-acceptance of data deliverables.

#### 1.1.1 Point of Contact for MCB Camp Lejeune

The Points of Contact (POC) for assistance in preparation of GIS deliverables are:

Resident Officer In Charge Of Construction
Construction Manager (CM)
1005 Michael Drive
Camp Lejeune, NC 28547-2521
(910) 451-2581

Public Works Division
Project Manager (PM) or GIS
1005 Michael Road
Camp Lejeune, NC 28547-2521
(910) 451-2212

### 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

GIS Data Deliverables

### 1.3 GOVERNMENT GEOSPATIAL DATA AND SCHEMA

1. The IGI&S repository model schema is based on the Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) GEOFidelis Data Model with recurring business driven modifications and or adaptations.

    a. Data will be created and delivered by developing an ARCGIS Personal GEODatabase using ArcGIS 10.1 or higher if a higher version is being utilized by the Government at the time the deliverable is being developed.

b. The Contractor is responsible for requesting the existing GIS Data, Schema and Domain Properties by means of a Data Request Package (DRP). Receipt of request will include Geospatial Database table structure, schema, Domain configuration, Attribute text format, i.e., case size as well as Meta Data information.

c. The DRP should be submitted prior to the start of data collection efforts and again every 6 months for the duration of the contract. The Contractor shall ensure that all GIS data has been created and delivered utilizing the most up to date IGI&S GEODatabase schema.

d. The Contractor shall verify the ArcGIS and schema version, via the CM or GIS Data Manager, at the time GIS deliverables are being created. All GIS DATA DELIVERABLES will be created in accordance with the current version and these specifications.

2. The Contractor shall submit a request for a Geospatial DRP to the CM or the PM.

a. Request shall be completely filled out and include the all information as instructed on the data request form.

b. Request only GIS data and or schema for feature classes that are relevant to the contract and within the boundary of project area.

c. Attach Scope of Work, which is defined by this GIS DATA DELIVERABLES section for each project request.

d. Return the DRP to the CM or PM, Project Manager, for sponsorship and submittal to the Installation Geospatial Information & Services (IGI&S) Office.

e. Incomplete forms may delay receipt of the requested GIS data and Schema

1.3.1 Global Positioning System (GPS) and Spatial Reference Properties

GPS data shall be completed in accordance with the GPS Data Collection and Documentation Standards, Version 4 (or higher version if available at the time of this project) as prepared by Geographic Information Coordinating Council (GICC) Statewide Mapping Advisory Committee (SMAC) and adopted by the North Carolina Geographic Information Coordinating Council.

1. Prior to GPS efforts, ALL underground utilities shall be located utilizing a utility locating service in order to verify and obtain accurate feature locations.

2. Only bench marks included in the North Carolina Geodetic Survey Base Station Network shall be used for GPS data collection.

3. Mission planning is essential and Contractor shall utilize the best Position Dilution of Precision (PDOP) values for data accuracy.

4. Utility data, as identified in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES" will be collected utilizing Survey Grade GPS data collection methods.

5. Infrastructure data, as identified in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES" shall be collected utilizing Sub-Foot or better GPS data collection methods.

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

        i. Sub-Foot requirements

            1) All points shall be within + 12 inches

            2) 95% accuracy rate for all points.

        ii. Survey Grade requirements

            1) All points shall be within + 1 centimeter

            2) 98% accuracy rate for all points

6. Every effort shall be made to capture feature locations without using offsets. All Offsets will be noted in the Final Report for each feature.

7. Excessive offsets included in the Final Data, which shall be referenced in the Final Report, shall be reviewed for quality control.

    a. Resubmittal of data will be required if PDOP planning was not observed per this specification.

The following GEODatabase Coordinate Systems and Spatial Reference Properties should be utilized for Camp Lejeune:

1. Transverse Mercator (UTM) Zone 18N

    a. GRS 1980 spheroid

    b. North American Datum 1983 (NAD83) horizontal datum

    c. North American Vertical Datum 1988 (NAVD88) vertical datum.

2. Domain precision of 1000 which will result in a database accuracy of 1/1000 m

1.3.2 Demolished and Abandoned in Place (AIP) features

The Contractor shall reference all Demolished and or AIP features in the data delivered. Should the current feature data class attributes and or domains not reference AIP or demolished features, the Contractor shall be responsible for appropriately delivering these features by creating an associated "Demolished" or AIP feature class, i.e., CLJN.CL.WastewaterUtilitySegment and CLJN.CL.WateUtilNode_wHydrant, etc.

The Contractor shall:

1. Utilize a blank schema for the associated feature class.

2. Rename associated feature class and add DEMO or AIP as a prefix, i.e., DEMO.CLJN.CL.WastewaterUtilitySegment, AIP.CLJN.CL.WastewaterUtilitySegment.

3. All demolished and or AIP features should provide existing spatial and non-spatial data which may be copied from existing data.

4. The Contractor will update attributes appropriately to include the following:

   a. Contract Number

   b. Drawing Number

   c. isDemolished

   d. dateDemolished or dateAIP

   e. Status

### 1.3.3 Creating a New Feature Class

Should a new feature class be required that is not readily available in the current GIS schema provided by the Government; the Contractor shall develop the feature class utilizing the schema consistent with the most current version of SDSFIE and document in the Final Report.

1. The Contractor shall include the following modifications (fields) to the schema structure and shall submit all information to the CM or PM for direction and final approval.

   a. Contract Number

   b. Drawing Number

### 1.3.4 GIS Topology Rules

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

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

2. Polygons must not have slivers.

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

4. Features will be snapped to the appropriate item.

5. Data will be created to represent the real world, for example, water, sewer and transportations systems, etc. will be drawn and or created in the direction of flow.

6. Utility and transportation systems will be created from source to sink, etc.

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

table.

1.3.5 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 'GEOFidelis Mandatory' and 'FGDC Mandatory' fields shall be completed for each geographic data set.

The Geospatial Information & Services (IGI&S) Metadata Authoring Guide is included in the DRP package.

Metadata generation tools included in the ArcGIS suite of software (or equivalent technology) shall be used in the production of the required metadata in XML format. Regardless of the tools used for metadata creation, the Contractor must ensure that the metadata is delivered in XML format and can be easily imported into the IGI&S GEODatabase. A copy of the FGDC metadata standard can be obtained on the internet at http://www.fgdc.gov or by contacting:

Federal Geographic Data Committee
590 National Center
Reston, Virginia 20192
Email: fgdc@fgdc.gov

(NOTE: The metadata should be formatted from the Government perspective, not the Contractor project perspective. Therefore such items as Point of Contact (POC) should be the POC currently associated with the data and NOT the Contractor's Project Manager. The Contractor shall use language and format consistent with existing metadata.)

1.3.6 New Feature Class Requirements

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 shall consult with the Government Project Manager for direction and final approval.

b. All new feature data classes shall be created in compliance with SDSFIE noted on the final report.

1.3.7 GIS Submittals Guidelines

All GIS Submittals will be submitted to the CM or PM and then analyzed by Government GIS personnel prior to final approval. Failure to comply with the specifications outlined in this document will result in non-acceptance of data deliverables.

1. Prior to any database development, the Contractor shall provide the Government with a technical approach document for review and approval. The Technical Approach document will describe in detail the Contractor's technical approach to designing and developing the database.

2. All attributes shall be populated in accordance with the "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES" and shall

be obtained via contract specifications, plans and record drawings.

3. The Contractor may be required to conduct research, collect data and make copies of reports and studies as necessary to verify existing and/or record drawing data. Record drawing data and closed contracts can be located in the Technical Records Section in the Public Works Department.

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

5. Actual spatial and non-spatial conditions in the field always supersede drawings. It is the Contractor's responsibility to locate and field verify all features to ensure attribute data and location is correctly recorded.

6. The Contractor shall submit a preliminary review of data at 15 to 25 percent contract completion to ensure specifications compliance.

7. The Contractor shall deliver digital geographic maps, GPS collection files and related data. All working text and documents and personal geodatabase shall be included for review in the draft and final delivery of data.

   a. All maps of GIS DATA DELIVERABLES will be ANSI C size and include a project title, contract number, scale, legend, standard symbology, attributes, i.e., building numbers, road names, segment diameters, etc.

8. The Contractor may be required to provide a technical consultant to meet on site.

9. The Contractor shall not deliver blank unused schema or feature class data with no attributes. Deliver only data pertinent to the contract that adds value to the GEODatabase per this section.

10. The Contractor shall deliver GIS Data at the end of each phase for all Phased Projects and Construction projects.

11. The Contractor accepts the responsibility to perform quality assurance for all data and related materials required in the section prior to submitting product to the Government.

12. The data will be analyzed for discrepancies in subject content, correct format in accordance with this statement of work, and compatibility with the existing GIS system as well as all other specifications in this section.

### 1.3.8 Formats, Versions and Guidelines

All data deliverables will be in the following formats and/or versions.

1. GIS data will be provided in an ArcGIS 10.1 or higher if a higher version is being used by the Government at the time of this project. The Contractor shall verify the ArcGIS version, via the CM or PM at the commencement of this contract.

2. Microsoft Office (MS) Suite data shall be delivered in MS 2010.

3. Microsoft Windows 7 operating system, unless otherwise approved by the Government.

4. All reports and maps will be delivered as a hard copy and in a searchable Adobe Portable Document Format (PDF).

5. All text, spreadsheet, and database files, reports and maps shall be delivered on Compact Disc read - only memory (CD-ROM) or Digital Versatile Disc read - only memory (DVD-ROM).

6. The Contractor shall verify required version(s) of software and schema, via the CM or PM.

7. Map submittals shall accompany each geospatial deliverable.

   a. Include ANSI C map for each project/area.

   b. Data should be labeled and attributed per specification.

   c. All maps should include the date, a legend, scale, contract title and number.

1.3.9 Final Report Requirements with additional Guidelines

The Contractor shall follow the following:

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

2. Submit all GPS data files.

3. Provide the date(s) the IGI&S schema and geospatial data was received.

4. Provide steps taken to create the GEODatabase.

5. Provide details on any offsets to include justification as to why offsets were utilized and on which features and or points offsets were used.

6. Describe all modifications to the geodatabase to include the name of all new features classes, i.e., new, demolished or AIP.

7. Provide the source that was utilized for required attributes.

   a. Include an ANSI C size copy of all design drawings that were referenced in the attribute data. This information should be included in all phases of delivery to include draft and final reviews.

   b. Provide the overall utility site plan drawing(s)with each submittal.

8. Specify Deliverable "Draft #" or "Final Submittal" when data is submitted to the CM or PM for review.

9. Provide the name and contact information for the GIS Technical Point of Contact who can answer questions regarding the data deliverable.

10. GIS DATA DELIVERABLES must be provided in a format that does not require translation or pre/post processing prior to being loaded into the IGI&S GEODatabase.

11. Provide any miscellaneous information that the Contractor deems significant.

12. Provide the current version of the GIS DATA DELIVERABLES specification utilized for this contract submittal.

1.3.10 Ownership

All digital files, final hardcopy products, GPS raw data, source data acquired for this project, and related materials, including that furnished by the Government, shall become the property of the Government and will not be issued, posted, distributed, or published by the Contractor.

Note: No endorsement of software or hardware is implied.

1.4 ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES

1.4.1 **CLJN.CL.Common**

GPS and collect attribute data as specified for each feature listed with GPS accuracy as described in paragraph "Global Positioning System (GPS) and Spatial Reference Properties."

GPS and collect the following attributes:

**CLJN.CL.RoadCenterline** (The center of the road area)

a) roadCategory
b) numberOfLanes
c) speedLimit
d) isPaved Y/N
e) isOneWay Y/N
f) baseRoadName
g) dateConstructed
h) gisFeatureCollectionMethod
i) contractNumber
j) designDrawingNumber

1.4.2 **CLJN.CL.REAL.PROPERTY**

GPS and collect attribute data as specified for each feature listed with GPS accuracy as described in paragraph "Global Positioning System (GPS) and Spatial Reference Properties."

GPS and collect the following attributes:

**CLJN.CL.AccessControl** (A structure (manned or unmanned) intended to control access to an area)

a) assessControlIDPK - Structure ID until Field is created in schema
b) controlType
c) contractNumber
d) designDrawingNumber
e) Installation date

f) gisFeatureCollectionMethod
g) isRangeAccess Y / N
h) sdsFeatureName (Subtype of access control point / gate)
i) sdsFeatureDescription

**CLJN.CL.AlternativeEnergyPoint** (Locations used for the production of alternative energy sources, such as wind turbines, photovoltaic, etc)

a) alternativeEnergyIDPK - Structure ID until Field is created in schema
b) InstallDate
c) alternativeEnergyType
d) contractNumber
e) designDrawingNumber
f) gisFeatureCollectionMethod
g) isPortable
h) wattage
i) operationalStatus
j) panelType
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.AlternativeEnergyArea** (Locations used for the production of alternative energy sources)

a) operationalStatus
b) isPortable
c) panelType
d) wattage (total)
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) sdsFeatureName - Structure ID until Field is created in schema
i) Installationdate
j) sdsFeatureDescription

**CLJN.CL.BoatRamp** (A partially submerged hard surfaced structure on a shoreline for launching or retrieving vessels or vehicles)

a) boatRampIDPK - Structure ID until Field is created in schema
b) numberofLaunchLanes
c) dateConstructed
d) gisFeatureCollectionMethod
e) contractNumber
f) designDrawingNumber
g) sdsFeatureName
h) sdsFeatureDescription

**CLJN.CL.Bridge** (A structure used by vehicles that allows passage over or under an obstacle such as a river, chasm, mountain, road or railroad)

a) bridgeIDPK - Structure ID until Field is created in schema
b) bridgeType

c) isFixed
d) structureMaterial
e) dateConstructed
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) sdsFeatureName
j) sdsFeatureDescription

**CLJN.CL.Building** (A roofed, floored and walled structure that is completely enclosed)

a) isDemolished
b) structureNumber
c) buildingType
d) buildingUse
e) heightMax
f) heightUOM
g) dateConstructed
h) dateDemolished
i) gisFeatureCollectionMethod
j) contractNumber
k) designDrawingNumber
l) sdsFeatureName
m) sdsFeatureDescription

**CLJN.CL.BuildingFloorPlan** (A linear representation of floor plans for buildings)

a) buildingFloorLevel
b) buildingIDFK - Structure ID until Field is created in schema
c) gisFeatureCollectionMethod
d) contractNumber
e) designDrawingNumber
f) sdsFeatureName
g) sdsFeatureDescription (Renovation Date)

**CLJN.CL.DocksAndWharfs** (A manmade water-land interface structure often for access to boats or ships)

a) typeOfDock
b) docksAndWharfsIDPK - Structure ID until Field is created in schema
c) accessType
d) dateConstructed
e) PurposeType
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) sdsFeatureName
j) sdsFeatureDescription

**CLJN.CL.Fence** (A freestanding structure designed to restrict or prevent movement across a boundary)

a) fenceIDPK - Structure ID until Field is created in schema
b) fenceMaterial
c) fenceUse
d) dateConstructed
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) sdsFeatureName
i) sdsFeatureDescription

**CLJN.CL.Marina** (Any facility or area for the exchange of people or materials from land to water such as a port, harbor, marina, launch area or small craft facility)

a) marinaIDPK - Structure ID until Field is created in schema
b) marinaType
c) gisFeatureCollectionMethod
d) contractNumber
e) designDrawingNumber
f) sdsFeatureName
g) createdDate (Construction Date)
h) sdsFeatureDescription

**CLJN.CL.NavigationalAid** (A visual or electronic device, on the ground or airborne, which provides point-to-point guidance information or position data to aircraft in flight)

a) navigationalAidIDPK - Structure ID until Field is created in schema
b) navaidType
c) operatingSpectrum
d) gisFeatureCollectionMethod
e) contractNumber
f) designDrawingNumber
g) sdsFeatureName
h) sdsFeatureDescription

**CLJN.CL.PavementSection** (A pavement section is a portion of a pavement branch that differs in some aspect from other sections such that further segmentation is required to uniquely identify that section)

a) pavementSectionIDPK - Structure ID until Field is created in schema
b) pavementSectionType
c) isLighted
d) isSurfaced
e) operationalStatus
f) pavementSurfaceType
g) hasLinesPainted
h) dateConstructed
i) gisFeatureCollectionMethod
j) contractNumber
k) designDrawingNumber
l) sdsFeatureName
m) sdsFeatureDescription

**CLJN.CL.RailTrack** (A track is the main designation for describing a physical linear portion of the network)

a) railTrackIDPK - Structure ID until Field is created in schema
b) railConstructionType
c) operationalStatus
d) dateConstructed
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) sdsFeatureName
i) sdsMetadataID
j) sdsFeatureDescription

**CLJN.CL.RecreationArea** (An area defined for recreational purposes)

a) recreationAreaIDPK - Structure ID until Field is created in schema
b) areaType
c) permittedHunting
d) recreationalFeatureType
e) dateConstructed
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) sdsFeatureName
j) sdsFeatureDescription

**CLJN.CL.RecreationTrail** (A location providing physical activities which are mentally relaxing, such as running/walking, biking, or hiking)

a) recreationTrailIDPK - Structure ID until Field is created in schema
b) trailType
c) isPaved
d) dateConstructed
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) sdsFeatureName
i) sdsFeatureDescription

**CLJN.CL.StructureArea** (A facility classified as other than a building or linear asset)

a) structureType
b) structureUse
c) structureNumber (structure Number)
d) structureMaterial
e) isDemolished
f) dateConstructed
g) dateDemolished
h) gisFeatureCollectionMethod

i) contractNumber
j) designDrawingNumber
k) sdsFeatureName
l) sdsMetadataID
m) sdsFeatureDescription

**CLJN.CL.StructurePoint** (Example: Flag poles; Point of Information Signs (POI) etc)

a) structureType
b) structureUse
c) structureNumber (Structure Number)
d) structureMaterial
e) isDemolished
f) dateConstructed
g) dateDemolished
h) gisFeatureCollectionMethod
i) contractNumber
j) designDrawingNumber
k) sdsFeatureDescription

**CLJN.CL.Tower** (A vertical projection, higher than its diameter, generally used for observation, storage, or electronic transmission)

a) towerUseType
b) heightMax
c) heightUOM
d) facilityName
e) towerType
f) structureUse
g) structureNumber
h) structureMaterial
i) isDemolished
j) dateConstructed
k) dateDemolished
l) gisFeatureCollectionMethod
m) contractNumber
n) designDrawingNumber
o) sdsFeatureDescription - street intersection

**CLJN.CL.TrafficControlLight** (A feature used to represent traffic lights)

a) trafficControlLightIDPK
b) realPropertyUniqueIdentifier
c) gisFeatureCollectionMethod
d) contractNumber
e) designDrawingNumber
f) sdsFeatureName
g) sdsMetadataID
h) sdsID
i) createdDate
j) createdBy
k) sdsFeatureDescription

**CLJN.CL.Wall** (A linear feature used for separation of facilities, ornamental decoration, or structural reinforcement (retaining wall)

a) wallIDPK - Structure ID until Field is created in schema
b) wallType
c) wallHeight
d) wallHeightUOM
e) dateConstructed
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) sdsFeatureName
j) sdsFeatureDescription

### 1.4.3 CLJN.CL.REAL_PROPERTY_RESTRICTED

GPS and collect attribute data as specified for each feature listed with GPS accuracy as described in paragraph "Global Positioning System (GPS) and Spatial Reference Properties."

GPS and collect the following attributes:

**CLJN.CL.Well** (A shaft dug or drilled into the Earth for the purpose of extracting fluids from the subsurface, collecting environmental samples, injecting fluids into the subsurface or extracting contamination or other impurities from the subsurface)

a. wellPointIDPK - Structure ID until Field is created in schema
b. wellPurpose
c. wellResource
d. operationalStatus
e. isPotable
f. isWellActive
g. dateConstructed
h. gisFeatureCollectionMethod
i. contractNumber
j. designDrawingNumber
k. sdsFeatureName
l. sdsFeatureDescription

### 1.4.4 CLJN.CL.UTILITIES

GPS and collect attribute data as specified for each feature listed with GPS accuracy as described in paragraph "Global Positioning System (GPS) and Spatial Reference Properties."

GPS and collect the following attributes:

**CLJN.CL.ElecUtilNode_eExteriorLight** (Exterior lighting is supplied by local distribution systems and is generally the only service for which the electric utility installs, operates and maintains utilization equipment)

a) exteriorLightType
b) electricalNodeType
c) operationalStatus
d) isLED
e) cableCircuitName

f) hasSensor
g) lightingFixtureHeight
h) heightUOM
i) gisFeatureCollectionMethod
j) contractNumber
k) designDrawingNumber
l) equipmentInstallationDate
m) sdsFeatureName
n) sdsFeatureDescription

**CLJN.CL.EnviDiscPoin_Stormwater** (A specific location of an intentional discharge of stormwater into the environment)

a) isPermitted
b) stormwaterBasinIDFK Structure ID
c) gisFeatureCollectionMethod
d) contractNumber
e) designDrawingNumber
f) equipmentInstallationDate
g) sdsFeatureName
h) sdsFeatureDescription

**CLJN.CL.GeothermalWell** (A geothermal well is part of a central heating and/or cooling system that pumps heat to or from the ground)

a) geothermalWellIDPK
b) pipeMaterial
c) geothermalWellCasingMaterial
d) thermalInsulationMaterial
e) geothermalWellDepth
f) geothermalWellDepthUOM
g) downholePipeDiameter
h) downholePipeDiameterUOM
i) hasBentoniteSeal
j) hasPump
k) operationalStatus
l) gisFeatureCollectionMethod
m) contractNumber
n) designDrawingNumber
o) equipmentInstallationDate
p) sdsFeatureDescription - Associated Building Number

**CLJN.CL.Impoundment_Stormwater** (An accumulation of stormwater that is impounded by a dam or wier)

a) permitID
b) impoundmentType
c) waterSurfaceElevation
d) waterSurfaceElevationUOM
e) impoundmentIDPK - Structure ID until Field is created in schema
f) dateConstructed
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) sdsFeatureName

k) sdsFeatureDescription

**CLJN.CL.StormwaterUtilityNode_swInlet** (The location at which stormwater is collected/received into the stormwater network)

a) stormwaterUtilityNodeIDPK - Structure ID until Field is created in schema
b) stormwaterNodeType
c) stormwaterInletType
d) numberOfPipes
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) equipmentInstallationDate
i) sdsFeatureName
j) sdsFeatureDescription

**CLJN.CL.StormwaterUtilitySegment** (A subdivision of a stormwater network, particularly a pipeline or drainage ditch for the transport of stormwater, between the source, holding facilities, and/or treatment facilities)

a) diameter
b) diameterUOM
c) pipeMaterial
d) isLined
e) downstreamInvertElevation
f) upstreamInvertElevation
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) equipmentInstallationDate
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.StorUtilNode_swManhole** (A stormwater manhole is an underground concrete structure with a top opening used for collecting and routing stormwater runoff through underground pipes)

a) stormwaterNodeType
b) stormwaterUtilityNodeIDPK - Structure Number unless another field becomes available
c) numberOfPipes
d) operationalStatus
e) stormwaterBasinIDFK
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.ThermalUtilityNode_tFitting** (The Thermal Fitting subclass represents the joint between two lines)

a) thermalNodeType
b) diameter
c) diameterUOM
d) operationalStatus
e) thermalFittingType
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.ThermalUtilitySegment** (A subdivision of a thermal distribution network, particularly a pipeline for the transmission of chilled water, refrigerant, hot water, or steam)

a) thermalSegmentType
b) networkSubType
c) thermalPipeMaterial
d) pipeLocation
e) diameter
f) diameterUOM
g) thermalInsulationMaterial
h) isClosedLoopSystem
i) isMarkedForLocating
j) gisFeatureCollectionMethod
k) contractNumber
l) designDrawingNumber
m) equipmentInstallationDate
n) sdsFeatureName
o) sdsFeatureDescription

**CLJN.CL.TherUtilNode_tProdStruc** (Thermal production structures are facilities which produce steam, high-temperature water, low-temperature water, dual-temperature water or chilled water)

a) thermalUtilityNodeIDPK - Structure ID until Field is created in schema
b) thermalNodeType
c) designCapacity
d) designCapacityUOM
e) operationalStatus
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.TherUtilNode_tSystemValve** (A thermal system valve is a device installed in a pipeline to isolate flow)

a) thermalNodeType
b) diameter
c) diameterUOM
d) operationalStatus

e) thermalValveType
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.UtilFeat_eSupportStructure** (A structure that supports electric devices. Examples include poles, towers, Hframes, and push brace poles.)

a) utilityFeatureType
b) networkType
c) heightValue
d) heightUOM
e) utilityOwner
f) operationalStatus
g) cableCircuitName - List is available from CM or PM
h) gisFeatureCollectionMethod
i) contractNumber
j) designDrawingNumber
k) equipmentInstallationDate
l) sdsFeatureName
m) sdsFeatureDescription

**CLJN.CL.UtilFeat_sPretreatmentDevice** (A wastewater pretreatment device is a piece of equipment that removes contaminants before they enter the waste stream, i.e., OWS & Trap, etc.)

a) utilityFeatureIDPK - Structure ID until Field is created in schema
b) utilityFeatureType
c) operationalStatus
d) pretreatmentDeviceType
e) designCapacity
f) designCapacityUOM
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) equipmentInstallationDate
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.UtilFeat_tUGEnclosureAccess** (A point feature class for locating the access point to a thermal manhole junction)

a) utilityFeatureType - Structure ID until Field is created in schema
b) networkType
c) networkSubType
d) operationalStatus
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) equipmentInstallationDate

i) sdsFeatureName
j) sdsFeatureDescription

**CLJN.CL.UtilityFeature_sPumpStation** (This is a collection of waste water Pump Station is a facility - this is used to show total capacity for the station)

a) utilityFeatureIDPK - Structure ID until Field is created in schema
b) utilityFeatureType
c) networkType
d) numberOfPumps
e) totalDesignCapacity
f) designCapacityUOM
g) totalRatedFlow
h) ratedFlowUOM
i) operationalStatus
j) gisFeatureCollectionMethod
k) contractNumber
l) designDrawingNumber
m) equipmentInstallationDate
n) sdsFeatureName
o) sdsFeatureDescription

**CLJN.CL.UtilityFeature_sSCADASensor** (The SCADA sensor is a feature that is used to remotely measure the status of network components)

a) utilityFeatureIDPK - Structure ID until Field is created in schema
b) utilityFeatureType
c) networkType
d) networkSubType
e) operationalStatus
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.UtilityFeature_sSepticTank** (A wastewater septic tank is a small-scale anaerobic digester and leach field designed to treat wastewater from an individual facility, and is not connected to the wastewater collection system)

a) utilityFeatureType
b) networkType
c) storageTankProduct
d) tankLocation
e) volume
f) volumeUOM
g) isContained
h) utilityFeatureIDPK - Structure ID until Field is created in schema
i) isRegulated
j) numberLaterals

k) operationalStatus
l) gisFeatureCollectionMethod
m) contractNumber
n) designDrawingNumber
o) equipmentInstallationDate
p) sdsFeatureName
q) sdsFeatureDescription

**CLJN.CL.UtilityFeature_sUtilityArea** (The sUtilityArea is an area of land surrounding a wastewater utility asset or an area of land specifically designated for wastewater utility use, i.e., septic fields, storm water basin, Oil water separator, etc)

a) utilityFeatureIDPK - Structure ID until Field is created in schema
b) utilityFeatureType
c) wastewaterUtilityAreaType
d) networkType
e) networkSubType
f) designCapacity
g) designCapacityUOM
h) operationalStatus
i) gisFeatureCollectionMethod
j) contractNumber
k) designDrawingNumber
l) equipmentInstallationDate
m) sdsFeatureName
n) sdsFeatureDescription

**CLJN.CL.WastewaterUtilityNode_sFitting** (The wastewater fitting class represents the joint between two lines)

a) wastewaterNodeType
b) networkSubType
c) diameter
d) diameterUOM
e) operationalStatus
f) pipeMaterial
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) equipmentInstallationDate
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.WastewaterUtilityNode_sManhole** (The wastewater fitting class represents the joint between two lines)

a) wastewaterUtilityNodeIDPK - Structure ID until Field is created in schema
b) wastewaterNodeType
c) operationalStatus
d) numberOfPipes
e) pipeMaterial
f) diameter
g) diameterUOM

h) rimElevation
i) elevationUOM
j) gisFeatureCollectionMethod
k) contractNumber
l) designDrawingNumber
m) equipmentInstallationDate
n) sdsFeatureName
o) sdsFeatureDescription

**CLJN.CL.WastewaterUtilityNode_sPump** (A wastewater pump is a piece of equipment that adds energy to a fluid being conveyed through a pipe or other closed conduit)

a) wastewaterUtilityNodeIDPK - Structure ID until Field is created in schema
b) networkSubType
c) ratedFlow
d) ratedFlowUOM
e) operationalStatus
f) pumpHorsepower
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) gisFeatureCollectionMethod
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.WastewaterUtilitySegment** (Wastewater Line - A pipeline for the transport of sewage or industrial waste between the source, holding facilities, and/or treatment facilities)

a) wastewaterSegmentType
b) networkSubType
c) pipeLocation
d) utilityOwner (CLJN / ONWASA)
e) operationalStatus
f) pipeMaterial
g) isLined
h) isMarkedForLocating
i) diameter
j) diameterUOM
k) gisFeatureCollectionMethod
l) contractNumber
m) designDrawingNumber
n) equipmentInstallationDate
o) sdsFeatureName
p) downstreamInvertElevation
q) upstreamInvertElevation
r) elevationUOM
s) slope
t) slopeUOM
u) sdsFeatureDescription

**CLJN.CL.WastUtilNode_sCleanOut** (A wastewater A clean out is an access point in a lateral used for maintenance purposes)

a) wastewaterNodeType
b) pipeMaterial
c) diameter
d) diameterUOM
e) operationalStatus
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.WastUtilNode_sSystemValve** (A system valve is a facility that is fitted to a pipeline or orifice in which the closure member is either rotated or moved transversely or longitudinally in the waterway so as to control or stop the flow)

a) wastewaterUtilityNodeIDPK - Structure ID until Field is created in schema
b) wastewaterNodeType
c) networkSubType
d) wastewaterValveMaterial
e) diameter
f) diameterUOM
g) operationalStatus
h) wastewaterValveType
i) gisFeatureCollectionMethod
j) contractNumber
k) designDrawingNumber
l) equipmentInstallationDate
m) sdsFeatureName
n) sdsFeatureDescription

**CLJN.CL.WastUtilNode_sTreatmentPlant** (A facility designed to treat wastewater using physical, chemical and/or biological processes prior to discharge into receiving waters)

a) wastewaterUtilityNodeIDPK - Structure ID until Field is created in schema
b) wastewaterNodeType
c) designCapacity
d) designCapacityUOM
e) operationalStatus
f) buildingIDFK
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) equipmentInstallationDate
k) sdsFeatureName
l) sdsFeatureDescription

### 1.4.5 CLJN.CL.UTILITIES_RESTRICTED

GPS and collect attribute data as specified for each feature listed with GPS accuracy as described in paragraph "Global Positioning System (GPS) and Spatial Reference Properties."

GPS and collect the following attributes:

**CLJN.CL.ElectricalUtilityNode_eSwitch** (Electrical Switches are installed at strategic locations throughout distribution feeder circuits)

a) normalPosition
b) operationalStatus
c) electricalSwitchType
d) electricalSwitchInstallation
e) cableCircuitName
f) numberOfPhases
g) numberOfSwitches
h) voltage
i) utilityOwner
j) gisFeatureCollectionMethod
k) contractNumber
l) designDrawingNumber
m) equipmentInstallationDate
n) sdsFeatureName
o) sdsFeatureDescription

**CLJN.CL.ElectricalUtilitySegment** (A subdivision of an electrical distribution network, particularly a line for the transmission of electricity)

a) electricalSegmentType
b) electricCableMaterial
c) pipeLocation
d) voltage
e) utilityOwner
f) operationalStatus
g) electricalCableClass
h) electricCableMaterialSubtype
i) insulationMaterial
j) conductSize
k) neutralSize
l) numberOfConduct
m) numberOfNeutral
n) numberOfPhases
o) cableCircuitName - List is available from CM or PM
p) gisFeatureCollectionMethod
q) contractNumber
r) designDrawingNumber
s) equipmentInstallationDate
t) sdsFeatureName
u) sdsFeatureDescription

**CLJN.CL.ElecUtilNode_eGenerator** (Generator is a power source for providing electricity. Generators may be primary or standby power sources)

a) electricalNodeType
b) operationalStatus
c) modelNumber
d) serialNumber
e) isPortable

f) fuelCapacity
g) fuelCapacityUOM
h) voltage
i) generatorKVARating
j) cableCircuitName - List is available from CM or PM
k) osdSiteIDFK
l) gisFeatureCollectionMethod
m) contractNumber
n) designDrawingNumber
o) equipmentInstallationDate
p) sdsFeatureName (Manufacture)
q) sdsFeatureDescription(Structure Number)

**CLJN.CL.ElecUtilNode_eMeterPoint** (A water meter point represents the location of the metering device.)

a) electricalUtilityNodeIDPK - Structure Number unless another field becomes available
b) electricalNodeType
c) operationalStatus
d) utilityOwner
e) cableCircuitName - List is available from CM or PM
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsMetadataID
l) sdsID
m) sdsFeatureDescription

**CLJN.CL.ElecUtilNode_eTransformer** (The Transformer feature class captures information about distribution and power transformers)

a) electricalUtilityNodeIDPK - Structure ID until Field is created in schema
b) electricalNodeType
c) transformerType
d) operationalStatus
e) modelNumber
f) serialNumber
g) numberOfTransformers
h) primaryVoltage
i) secondaryVoltage
j) totalTransformerKVARating
k) transformerKVADescription
l) transformerCapacityDescription
m) cableCircuitName - List is available from CM or PM
n) electricalFacilitySiteIDFK - Source
o) gisFeatureCollectionMethod
p) contractNumber
q) designDrawingNumber
r) equipmentInstallationDate
s) sdsFeatureName (Manufacture)
t) sdsFeatureDescription

**CLJN.CL.ElecUtilNode_eVoltageRegulator** (Voltage regulators vary the ac supply or source voltage to the customer to maintain the voltage within desired limits)

a) electricalUtilityNodeIDPK - Structure ID until Field is created in schema
b) electricalNodeType
c) operationalStatus
d) facilityIDFK
e) primaryVoltage
f) secondaryVoltage
g) numberOfPhases
h) cableCircuitName - This available from CM or PM
i) electricalFacilitySiteIDFK - Structure ID until Field is created in schema
j) gisFeatureCollectionMethod
k) contractNumber
l) designDrawingNumber
m) equipmentInstallationDate
n) sdsFeatureName
o) sdsFeatureDescription

**CLJN.CL.POLUtilityNode_oDispenser** (A fuel dispenser is a machine at a fueling station that is used to pump fuel into vehicles or AGE equipment)

a) pOLUtilityNodeIDPK
b) polNodeType
c) networkSubType
d) operationalStatus
e) gisFeatureCollectionMethod
f) contractNumber
g) designDrawingNumber
h) equipmentInstallationDate
i) sdsFeatureName
j) sdsFeatureDescription (Structure Number)

**CLJN.CL.UtilFeat_eElecFacilitySite** (Polygon feature class to define boundaries of electrical facility stations)

a) utilityFeatureType
b) networkType
c) networkSubType
d) operationalStatus
e) cipIDFK
f) numberOfCircuits
g) numberOfSpareBays
h) numberOfTransformers
i) voltageIn
j) cableCircuitName
k) utilityOwner
l) gisFeatureCollectionMethod
m) contractNumber
n) designDrawingNumber
o) equipmentInstallationDate
p) sdsFeatureName
q) sdsFeatureDescription (Structure Number)

**CLJN.CL.UtilFeat_eUndergroundStructure** (UndergroundStructure is a simple junction feature that includes vaults and manholes that house and protect electrical equipment)

a) utilityFeatureIDPK (Structure Number)
b) utilityFeatureType
c) networkType
d) networkSubType
e) operationalStatus
f) electricalJunctionType (manhole, Junction Box, Handhole, etc)
g) diameter
h) diameterUOM
i) numberOfCables
j) rimElevation
k) rimElevationUOM
l) cableCircuitName List is available from CM or PM
m) gisFeatureCollectionMethod
n) contractNumber
o) designDrawingNumber
p) equipmentInstallationDate
q) sdsFeatureName
r) sdsFeatureDescription

**CLJN.CL.UtilFeat_oPumpingFacility** (A structure, typically a building, containing pumps, filters, and controls as part of a larger fuel handling system)

a) utilityFeatureIDPK - Structure ID until Field is created in schema
b) utilityFeatureType
c) networkType
d) networkSubType
e) operationalStatus
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.UtilFeat_wUGEnclosureAccess** (A point feature class for locating the access point to a water manhole junction)

a) utilityFeatureIDPK - Structure Number unless another fields becomes available
b) networkType
c) numberOfPipes
d) groundElevation
e) elevationUOM
f) operationalStatus
g) waterServiceAreaIDFK
h) gisFeatureCollectionMethod
i) contractNumber
j) designDrawingNumber

k) equipmentInstallationDate
l) sdsFeatureName
m) utilityFeatureType
n) sdsFeatureDescription

**CLJN.CL.WaterUtilityNode_wFitting** (The water fitting class represents the joint between two lines in the water network)

a) waterNodeType
b) diameter
c) diameterUOM
d) operationalStatus
e) waterFittingType
f) waterServiceAreaIDFK
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) equipmentInstallationDate
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.WaterUtilityNode_wHydrant** (A water distribution point that enables fire fighters to attach fire hoses)

a) waterNodeType
b) networkSubType
c) operationalStatus
d) waterHydrantConnectionType
e) waterServiceAreaIDFK
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.WaterUtilityNode_wMeterPoint** (A water meter point represents the location of the metering device)

a) waterNodeType
b) networkSubType
c) operationalStatus
d) WaterUtilityNode_wMeterPoint - Structure ID until Field is created in schema
e) waterServiceAreaIDFK
f) gisFeatureCollectionMethod
g) contractNumber
h) designDrawingNumber
i) equipmentInstallationDate
j) sdsFeatureName
k) sdsFeatureDescription

**CLJN.CL.WaterUtilityNode_wSystemValve** (A valve used to regulate pressure, isolate, throttle flow, prevent backflow, and relieve pressure)

a) diameter
b) diameterUOM
c) operationalStatus
d) waterValveType
e) valveElevation
f) groundElevation
g) elevationUOM
h) waterServiceAreaIDFK
i) gisFeatureCollectionMethod
j) contractNumber
k) designDrawingNumber
l) equipmentInstallationDate
m) sdsFeatureName
n) sdsFeatureDescription

**CLJN.CL.WaterUtilitySegment** (A subdivision of a water distribution network, particularly a distribution pipeline)

a) waterSegmentType
b) networkSubType
c) pipeLocation
d) waterPipeMaterial
e) diameter
f) diameterUOM
g) utilityOwner
h) operationalStatus
i) waterType
j) waterSegmentUse
k) waterServiceAreaIDFK
l) gisFeatureCollectionMethod
m) contractNumber
n) designDrawingNumber
o) equipmentInstallationDate
p) sdsFeatureName
q) isMarkedForLocating
r) sdsFeatureDescription

**CLJN.CL.WateUtilNode_wProdStructure** (Water production structures are facilities which produce raw or treated water)

a) waterUtilityNodeIDPK - Structure ID until Field is created in schema
b) waterNodeType
c) networkSubType
d) designCapacity
e) designCapacityUOM
f) operationalStatus
g) gisFeatureCollectionMethod
h) contractNumber
i) designDrawingNumber
j) equipmentInstallationDate
k) sdsFeatureName
l) sdsFeatureDescription

**CLJN.CL.WateUtilNode_wStorageStructure** (Water storage structures are

facilities that store large volumes of water - Water Tank)

a) waterUtilityNodeIDPK - Structure ID until Field is created in schema
b) waterNodeType
c) storageTankProduct
d) volume
e) volumeUOM
f) isContained
g) isRegulated
h) operationalStatus
i) diameter
j) diameterUOM
k) groundElevation
l) invertElevation
m) overflowElevation
n) topElevation
o) elevationUOM
p) tankHeight
q) waterServiceAreaIDFK
r) gisFeatureCollectionMethod
s) contractNumber
t) designDrawingNumber
u) equipmentInstallationDate
v) sdsFeatureName
w) sdsFeatureDescription

1.4.6 Non-Compliance

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

Note: Geospatial data delivery does not replace record drawing requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

# SECTION 02 41 00

# DEMOLITION
**05/10**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

| | |
|---|---|
| ASSP A10.6 | (2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations |

U.S. ARMY CORPS OF ENGINEERS (USACE)

| | |
|---|---|
| EM 385-1-1 | (2014) 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 PROJECT DESCRIPTION

#### 1.2.1 Demolition/Deconstruction Plan

Prepare a Demolition Plan and submit proposed demolition and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be removed, a detailed description of methods and equipment to be used for each operation and of the sequence of operations.

#### 1.2.2 General Requirements

Do not begin demolition until authorization is received from the Contracting Officer. 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 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer.

Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other 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 daily.

1.3.2 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a 6 foot high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.3.3 Utility Service

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

1.3.4 Facilities

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

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.5 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition Plan

SD-11 Closeout Submittals

Receipts

Receipts and Bills of Laden, as specified.

## 1.6 QUALITY ASSURANCE

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. 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 ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

### 1.6.1 Dust and Debris Control

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

## 1.7 PROTECTION

### 1.7.1 Traffic Control Signs

a. 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.

### 1.7.2 Protection of Personnel

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

## 1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Contracting Officer.

## 1.9 EXISTING CONDITIONS

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

# PART 2 PRODUCTS

Not used.

# PART 3 EXECUTION

## 3.1 EXISTING FACILITIES TO BE REMOVED

### 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 but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer.

### 3.1.2 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 25 foot lengths and store in rolls off the ground.

### 3.1.3 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base to a depth of 16 inches below new finish grade. Provide neat sawcuts at limits of pavement removal as indicated.

### 3.1.4 Concrete

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

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

## 3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

## 3.3 DISPOSITION OF MATERIAL

### 3.3.1 Title to Materials

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

## 3.4 CLEANUP

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

## 3.5 DISPOSAL OF REMOVED MATERIALS

### 3.5.1 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.

### 3.5.2 Burning on Government Property

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

### 3.5.3 Removal from Government Property

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

## 3.6 REUSE OF SALVAGED ITEMS

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

-- End of Section --

# SECTION 02 82 16

# REMOVAL AND DISPOSAL OF ASBESTOS MATERIALS (CAMP LEJEUNE COMPLEX)

**03/10**

## PART 1 GENERAL

### 1.1 APPLICABLE NORTH CAROLINA LAW

North Carolina State General Statues 130A, Article 19-444-452 and 10A North Carolina Administrative Chapter (NCAC) 41C .0600 through .0611.

#### 1.1.1 N.C. (DHHS-HHCU) Asbestos Accreditation

All personnel involved in asbestos removal shall be currently accredited for asbestos removal by N.C. (DHHS-HHCU). An application for accreditation may be requested from the State of North Carolina, Health Hazards Control Unit, Department of Health and Human Services, Division of Public Health,; 1912 Mail Service Center, Raleigh, NC 27699-1912; (919) 707-5950. Out of State accreditation will not be accepted.

### 1.2 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 Z88.2 | (1992) Respiratory Protection |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM C 732 | (1995) Aging Effects of Artificial Weathering on Latex Sealants |
| ASTM D 1331 | (1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents |
| ASTM E 84 | (2000a) Surface Burning Characteristics of Building Materials |
| ASTM E 96 | (1997; Rev A) Water Vapor Transmission of Materials |
| ASTM E 119 | (1998) Fire Tests of Building Construction and Materials |
| ASTM E 736 | (1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members |
| ASTM E 1368 | (1997) Visual Inspection of Asbestos Abatement Projects |

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

| | |
|---|---|
| 29 CFR 1910.103 | Respiratory Protection |
| 29 CFR 1926.59 | Hazard Communication |
| 29 CFR 1926.1101 | Asbestos |
| 40 CFR 61, SUBPART A | General Provisions |
| 40 CFR 61, SUBPART M | National Emission Standard for Hazardous Air Pollutants |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|---|---|
| EPA 560/5-85-024 | (1985) Guidance for Controlling Asbestos Containing Materials in Buildings |
| EPA SW-846 | (Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 586 | (1996; Rev thru Aug 1999) High-Efficiency, Particulate, Air Filter Units |

## 1.3 DEFINITIONS

### 1.3.1 Asbestos Containing Material (ACM)

All building materials that have more than 1% of chrysotile, amosite, crocidolite, tremolite, anthopyhlite, or any other form of asbestos in the serpentine or anthobole class.

### 1.3.2 Action Level/Permissive Exposure Limit (PEL)

An airborne concentration of asbestos fibers, in the breathing zone of a worker equaling 0.1 fibers per cubic centimeter of air calculated as an 8-hour time weighted average.

### 1.3.3 Amended Water

Water containing a wetting agent or surfactant with a surface tension of 29 dynes per square centimeter when tested in accordance with ASTM D 1331 shall be utilized. In the event where wetting operations are suspended due to freezing temperatues, the operator or abatement contractor shall record the temperature on Form DHHS 3787..

### 1.3.4 Area Sampling

Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.3.5 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content is more than 1% of the material by area.

1.3.6 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris. Two examples of an asbestos control area are: a full containment and a "glovebag."

1.3.7 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

1.3.8 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average as defined by 29 CFR 1926.1101 or other federal legislation having legal jurisdiction for the protection of workers health.

1.3.9 Background

Normal airborne asbestos concentration in an area similar to the asbestos abatement area but in an uncontaminated (with asbestos) state.

1.3.10 Contractor

The Contractor is that individual, or entity under contract to the Navy to perform the herein listed work.

1.3.11 Encapsulants

Specific materials in various forms used to chemically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

a. Removal Encapsulant (can be used as a wetting agent)

b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)

c. Penetrating Encapsulant (used to penetrate the asbestos containing material down to substrate, encapsulating all asbestos fibers)

d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed)

1.3.12 Friable Asbestos Material

Material that contains more than 1% asbestos by area and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

1.3.13 Full Containment

Those engineering control techniques described in 29 CFR 1926.1101 for major asbestos removal, renovation and demolition operations.

1.3.14 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.

1.3.15 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.3.16 Navy Industrial Hygienist (NIH)

That industrial hygienist employed by the Navy to monitor, sample, and/or inspect the work separate from the original construction contract. The NIH can be either a Federal civil servant or a private consultant as determined by the Navy. In some instances the NIH shall perform assigned duties vicariously through a trained subordinate but only with the specific consent of the Contracting Officer.

1.3.17 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been temporarily locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers will be released under other conditions such as demolition or removal.

1.3.18 PCM - Phased Contrast Microscopy

A method of analyzing air samples for fibers using a light microscope.

1.3.19 PLM - Polarized Light Microscopy

A method of analyzing bulk samples for asbestos in which the sample is illuminated with polarized light (light which vibrates in only one plane) and viewed under a light microscope.

1.3.20 Personal Sampling

Air sampling to determine asbestos fiber concentrations within the breathing zone of a specific employee, performed in accordance with 29 CFR 1926.1101.

1.3.21 Supervising Air Monitor (SAM)

That supervising air monitor hired by the Contractor to perform the herein listed industrial hygiene tasks. In some instances, the SAM can perform this role vicariously through a trained subordinate, but only with the specific consent of the Contracting Officer. Under N.C. Statue, the SAM must make a site visit on any project exceeding 10 days and once every 30 days thereafter.

1.3.22 TEM

Refers to Transmission Electron Microscopy (TEM). Technique whereby a beam of electrons is transmitted through an ultra think specimen, interacting with the specimen as it passes through. An image is formed from the interaction of the electrons transmitted through the specimen; the image is magnified and focused onto an imaging device, such as a fluorescent screen, on a layer of photographic film, or to be detected by a sensor such as a CCB camera.

1.3.23 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers. At least three full shift samples per person are required to establish that person's TWA exposure.

1.3.24 Wetting Agent

That specific agent used to reduce airborne asbestos levels by physically bonding asbestos fibers to material to be removed. An equivalent wetting agent must have a surface tension of at least 29 dynes per square centimeter as tested in accordance with ASTM D 1331. In the event where wetting operations are suspended due to freezing temperatures, the operator or abatement contractor shall record the temperature on Form DHHS 3787.

1.4 REQUIREMENTS

1.4.1 Description of Work

The work covered by this section includes the handling of asbestos containing materials which are encountered during repair, construction and demolition projects and describes some of the resultant procedures and equipment required to protect workers and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of the generated asbestos containing materials. Under normal conditions non-friable or chemically bound materials containing asbestos would not be considered hazardous; however, this material will release airborne asbestos fibers during demolition and removal and therefore must be handled in accordance with North Carolina Regulations.

1.4.2 N. C. (DHHS-HHCU) North Carolina Department of Health and Human Services - Health Hazards Control Unit

Obtain necessary permits in conjunction with asbestos removal, hauling, and disposition, and furnish timely notification of such actions required by federal, state, regional, and local authorities. A permit is only required when you will be abating more than 260 linear feet, 160 square feet, or 35 cubic feet of an asbestos-containing building material. Also, if mechanical means of removing non-friable asbestos is utilized the contractor will need to provide permit. Notify the N.C. (DHHS-HHCU) and the Contracting Officer in writing 10 days prior to the commencement of work. Submit a copy of the permit to the Contracting Officer.

1.4.2.1 N.C. (DHHS-HHCU) mailing address is:

Health Hazards Control Unit
N.C. Department of Health and Human Services
Division of Public Health
1912 Mail Service Center
Raleigh, NC 27699-1912
Phone: (919) 733-0820

1.4.2.2 Changes in Work

Changes in Work which affect items on the attached form shall be covered by an amended form submitted to the same address.

1.4.3 Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of federal, state, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61, SUBPART A, 40 CFR 61, SUBPART M. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Contracting Officer shall apply.

1.4.4 Respiratory Protection Program

Establish and implement a respirator program as required by ANSI Z88.2 and 29 CFR 1910.103.

1.4.5 Supervising Air Monitor (SAM)

Conduct personal area/environmental air sampling and training under the direction of a North Carolina accredited supervising air monitor. For the purpose of this contract, the Contractor shall retain the services of a SAM to perform the Contractor's industrial hygiene tasks.

1.5 SUBMITTALS

Submit 4 copies of the following in accordance with Section 01 33 00, "Submittal Procedures."

SD-06 Test Reports

Air sampling results

Pressure differential recordings for local exhaust system

Clearance sampling

SD-07 Certificates

Asbestos hazard abatement plan (Abatement Design)

SD-11 Closeout Submittals

Asbestos Waste Shipment Record N.C. (DHHS-HHCU) Form 3787

Daily log

North Carolina permit

Modifications to the North Carolina permit

Asbestos Inspection Reporting Form

Closeout submittals shall be submitted within 60 days of asbestos activity completion.

1.5.1 Asbestos Hazard Abatement Plan (NC Abatement Design)

An asbestos abatement design shall be prepared by a N.C. accredited asbestos abatement designer for each individually permitted removal of more than 260 linear feet, 160 square feet, or 35 cubic feet of regulated asbestos containing materials. The plan shall be prepared, signed, and sealed, including accreditation number and date, by an accredited abatement designer. The respirator program and air monitoring strategies portion of this plan shall be prepared by the supervising air monitor. Such plan shall include but not be limited to the precise personal protective equipment to be used, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control pollution. The plan shall also include (both fire and medical emergency) response plans. The Contractor and designer shall meet with the Contracting Officer prior to beginning work, to discuss in detail the asbestos plan, including work procedures and safety precautions. The plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan shall be identified specifically in the plan. The plan shall comply with all federal and state requirements and this specification, and shall serve as the North Carolina Abatement Design. Submit a copy of plan to the Contracting Officer.

1.5.2 Air Sampling Results

Complete fiber counting and provide results to the SAM for review within 16 hours. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees within 3 working days, signed by the employee performing air sampling, the employee that analyzed the sample, and the SAM.

1.5.3 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external of the enclosure and operate it continuously, 24 hours a day, until the enclosure of the asbestos control area is removed. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. Submit pressure differential recordings

for each work day to the SAM for review and to the Contracting Officer within 24 hours from the end of each work day. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance shall levels exceed 0.1 fibers per cubic centimeter.

### 1.5.4 Asbestos Waste Shipment Record N.C. (DHHS-HHCU) Form 3787

Record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for the amount of asbestos containing material released for disposal. Use "Asbestos Waste Shipment Record N.C. (DHHS-HHCU) Form 3787 for this report. A copy of the (DHHS-HHCU) Form 3787 must accompany any asbestos waste shipment to the Base sanitary landfill.

### 1.5.5 Daily Log

A daily log documenting work practices, sample locations, and all other asbestos related job conditions shall be maintained, by the testing lab and be available for Government examination throughout the course of work. At the completion of testing, a copy of this log shall be immediately delivered to the Government.

### 1.5.6 North Carolina Permit

Submit one copy of the North Carolina Permit before beginning abatement activities to the Contracting Officer.

### 1.5.7 Modifications to the North Carolina Permit

Submit a copy of all permit modifications to the Contracting Officer. These must be received before they become effective. The Contractor is responsible for proper permit modification notification to the State. Modifications may be delivered to the Contracts Office or transmitted by facsimile to (910) 411-5899.

### 1.5.8 Asbestos Inspection Reporting Form

This Asbestos Inspection Reporting Form is included at the end of this section and shows the homogeneous areas involved with this project. The Contractor shall mark the line "confirmed ACM from this HA:" as either "Abated" or "Managed in Place." Abated shall be defined as removed. If an HA is partially abated, approximate the percentage of asbestos removed and mark in the comments area. Provide any other descriptive data, such as rooms/areas removed or rooms/areas where asbestos not removed. The intent of this requirement is to report "as built" conditions. The Contractor is not required to perform any additional asbestos surveys or inspections as a result of this paragraph. Include this report with drawing of abated areas with other closeout documentation.

## 1.6 PRE-ABATEMENT MEETING

The Contractor and designer shall meet with the Contracting Officer prior to beginning work, to discuss in detail the asbestos plan, including work

procedures and safety precautions.

## 1.7 ASBESTOS INSPECTION REPORTING FORM AND ASBESTOS SAMPLE REPORTING FORM

These two forms are included at the end of this section for informational purposes. They do not define or modify the scope of work.

# PART 2 PRODUCTS

## 2.1 ENCAPSULANTS

Shall conform to current USEPA requirements, shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and shall conform to the following performance requirements. Use of encapsulants is generally restricted to the surface of the temporary enclosure and to areas that are not to be refinished such as attics and crawlspaces. The proposed use of encapsulants shall be included in the abatement design.

### 2.1.1 Removal Encapsulants

| Requirement | Test Standard |
|---|---|
| Flame Spread - 25, Smoke Emission - 50 | ASTM E 84 |
| Life Expectancy - 20 years | ASTM C 732, Accelerated Aging Test |
| Permeability - Minimum 0.4 perms | ASTM E 96 |

### 2.1.2 Lock-down Encapsulant

| Requirement | Test Standard |
|---|---|
| Flame Spread - 25, Smoke Emission - 50 | ASTM E 84 |
| Life Expectancy - 20 years | ASTM C 732 Accelerated Aging Test |
| Permeability - Minimum 0.4 perms | ASTM E 96 |
| Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Tested with fireproofing over encapsulant applied directly to steel member) | ASTM E 119 |
| Bond Strength - 100 pounds of force/ foot (Tests compatibility with cementitious and fibrous fire-proofing) | ASTM E 736 |

### 2.1.3 Plastic Sheet

Plastic sheet, polyethylene, 6 mil minimum thickness, unless otherwise specified, in sizes to minimize the frequency of joints. All asbestos material or debris will be at least double bagged or wrapped in two layers

of 6 mil poly sheeting.

2.1.4 Tape

Capable of sealing joints of adjacent sheets or plastic sheets and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under dry and wet conditions, including use of amended water.

2.1.5 Disposal Bags

Bags shall be a minimum of 6 mil thick polyethylene. Affix a warning and Department of Transportation (DOT) label to each bag or use bags with the approved warnings and DOT labeling preprinted on the bag.

2.1.6 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

PART 3 EXECUTION

3.1 DISPOSAL SITE

CAMP LEJEUNE SANITARY LANDFILL
982 PINEY GREEN ROAD
CAMP LEJEUNE, NC 28542
(910) 451-5011

Base Sanitary Landfill shall be used for disposal of all asbestos waste. The Base Sanitary Landfill is approved and is available for use by the Contractor providing the following requirements are satisfied:

a. The Contracting Officer must be informed at least five working days in advance of the anticipated delivery date of the asbestos material to the Landfill. On larger projects, the notification should be accompanied by a cubic yard estimate of the anticipated volume, updated weekly if the disposal period extends for more than one week. The Government will be responsible for digging the trenches and covering the debris at the end of the working day. Debris will not be accepted before 8:00 AM or after 10:00 AM, except in an emergency situation.

b. Asbestos will be accepted only if adequately wet and double bagged in heavy-duty 6 mil plastic bags which are clearly marked "Asbestos." If a Contractor desires to handle the asbestos in a manner other than double-bagged, written application, along with a description of the proposed deviation, must be submitted to the OICC and Landfill Manager for approval.

c. Asbestos insulated piping with the asbestos insulation intact will be accepted if the following requirements are met:

1. The pipe is cut in eight foot or shorter lengths

2. Each section of pipe is double wrapped, sealed, and labeled as asbestos.

3. All pipe is palletized on a 7/8-inch, 4- by 8-foot sheet of plywood. The whole pallet is banded with a minimum of three 1-inch wide metal bands with the coupling on top and wrapped with 6-mil plastic. The pallet is not higher than 3-inches.

d. All asbestos, except palletized pipe will be off loaded and placed in the trench pipe hand.

e. Asbestos disposal is restricted to one designated location in the Landfill and the landfill operators must be informed of and direct each delivery. Asbestos shall be disposed of from 0800 to 1000 hours daily, except holidays and weekends. Trucks hauling asbestos must be properly covered with tarpaulins or equivalent. Trucks not covered properly must be parked until the Contracting Officer approves corrective actions.

f. The Contractor will ensure asbestos contaminated material delivered to the Base Sanitary Landfill contain no free liquids. Free liquids are defined as material which fails the EPA SW-846 free liquids test.

g. The Contractor will include all asbestos waste shipment records (DHHS-HHCU Form 3787) that are filled out completely with the correct information, to the project manager after abatement job is completed.

## 3.2 EQUIPMENT

Make available to the Contracting Officer or the Contracting Officer's Representative, two complete sets of personal protective equipment as required herein for entry to the asbestos control area at all times for inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment required to contain airborne asbestos fibers.

### 3.2.1 Respirators

Comply with 29 CFR 1926.1101.

## 3.3 WORK PROCEDURE

Remove all friable and non-friable ACM in accordance with all Federal, State, and local Marine Corps regulations. Ensure that the asbestos abatement plan is followed throughout all aspects of the abatement process.

### 3.3.1 Furnishings

Furniture and equipment will be removed from the area of work by the Government before asbestos work begins, except as indicated in drawings.

### 3.3.2 Pipe Insulation

Pipe may be removed with the asbestos insulation in place by wrapping the entire length of pipe and associated insulation with double thickness 6 mil plastic secured with duct tape. Mechanically cutting of asbestos containing insulation is prohibited. When using the "candy-stripe" method the abatement contractor must use glovebag operations to establish an "asbestos free" area to cut the pipe into appropriate lengths. Cut piping simultaneously into lengths suitable for transportation to disposal area, but no greater than 8 feet in length. Continuously wet the cutting site during the process. As soon as a length of pipe is completely cut loose, cover exposed ends with double thickness 6 mil plastic secured with duct tape. If the pipe is to remain in service, the removed pipe must be replaced in accordance with this Specification, with a pipe of the same size that is removed.

#### 3.3.2.1 Attic Insulation

In those buildings indicated on the drawings, attic insulation consisting of any combination of blown-in or batt fiberglass or rockwool material, has been contaminated with asbestos materials, and is to be removed as contaminated asbestos material. The insulation material shall be wet with a fine mist of amended water. The material shall be placed immediately in double thickness 6 mil plastic bags for disposal as asbestos waste.

#### 3.3.2.2 Contaminated Soil

In those buildings so indicated on the drawings, asbestos materials are located in the building crawl spaces and deterioration of the asbestos material has resulted in contamination of the soil under the building. Under the indicated area of these buildings, asbestos material and 2 inches of soil shall be removed and one sheet of plastic, 6 mils thick, spread over the area with seams lapped a minimum of 4 inches. Sand shall be placed a minimum of 2 inches thick over the plastic. Removal shall occur just prior to clean-up operations. All debris in the crawl space shall be disposed of with the soil as asbestos materials. Workers shall be equipped with respirators and protective clothing during the removal of soil and debris.

#### 3.3.2.3 Non-Organic Bound (NOB) Asbestos Materials

These kind of materials include floor tile, mastic, caulking, roofing material, and other non-friable material. Materials are to be adequately wet before removal and double bagged with a 6 mil poly bag. Ensure that bags have been labeled properly before they are taken to the Base Landfill.

### 3.3.3 Air Sampling

Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101 and as specified herein. Sampling

performed in accordance with 29 CFR 1926.1101 shall be performed by the SAM. Sampling performed for environmental and quality control reasons shall be performed by the SAM. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government results shall prevail.

3.3.3.1 Sampling During Asbestos Work

The SAM shall provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. Thereafter, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the containment, outside the clean room entrance to the containment, and at the exhaust opening of the local exhaust system. Also, where an enclosure is not provided, conduct area monitoring of airborne asbestos fibers during the work shift at the designated limits of the asbestos work area at such frequency as recommended by the SAM and conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work). If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter whichever is lesser outside of the containment area, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Contracting Officer. This sampling may be duplicated by the government at the discretion of the Contracting Officer. If the air sampling results obtained by the government differ from those obtained by the Contractor, the government results shall prevail. If adjacent areas are contaminated as determined by the Contracting Officer, clean the contaminated areas, monitor, and visually inspect the area as specified herein.If sampling outside the containment shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where glovebag methods are used, perform personal and area air sampling at locations and frequencies thatwill accurately characterize the evolving airborne asbestos levels.

3.3.3.2 Sampling After Final Clean-Up (Clearance Sampling) For All Areas Unless Noted Otherwise

Provide area sampling of asbestos fibers using aggressive air sampling techniques as defined in the EPA 560/5-85-024 and establish an air borne asbestos concentration of less than 70 structures per square millimeter after final clean-up but before removal of the containment or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the SAM shall perform a visual inspection, in accordance with ASTM E 1368, to insure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Use transmission electron microscopy (TEM) to analyze clearance samples and report the results in accordance with current NIOSH criteria. The asbestos fiber counts from these samples shall be less than 70 structures per square millimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher

value, the Contractor shall take appropriate actions to re-clean the area and shall repeat the sampling and TEM analysis at the Contractor's expense.

### 3.3.4 Lock Down

Prior to removal of plastic barriers and after pre-clearance clean up of gross contamination, a visual inspection by the SAM, of all areas affected by the removal of the asbestos contaminated materials for any visible fibers, shall be conducted and approved by the SAM. A post removal (lock down) encapsulant shall then be spray applied to ceiling, walls, floors and other areas exposed in the removal area. The exposed area shall include but not be limited to plastic barriers, furnishings and articles to be discarded as well as dirty change room, air locks for bag removal and decon chambers.

### 3.3.5 Site Inspection

While performing asbestos removal work, the Contractor shall be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. Standby time required to resolve the violation shall be at the Contractor's expense.

## 3.4 CLEAN-UP AND DISPOSAL

### 3.4.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. Do not blow down the space with compressed air. When asbestos removal is complete, all asbestos waste is removed from the work-site, final clean-up is completed, and final air sampling results are reported, the SAM will certify the area as safe and the Conrracting Officer will approve the abatement completion, before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the containment removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos-contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper work ing order. The Contracting Officer will visually inspect all surfaces within the containment for residual material or accumulated dust or debris. The Contractor shall re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The SAM will provide written certification that the work area is safe within all standards as referenced within this contract before unrestricted entry is permitted. The Government shall have the option to perform monitoring to certify the areas are safe before entry is permitted.

### 3.4.2 Title to Materials

All materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified in applicable local, state, and Federal

regulations and herein. All building materials that are cross contaminated must be disposed of as an ACM at Base Landfill.

3.4.3 Disposal of Asbestos

3.4.3.1 Procedure for Disposal

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiberproof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be wetted to insure the security of the material in case of container breeching. Affix a warning and Department of Transportation (DOT) label to each bag or use at least 6 mil thick bags with the approved warnings and DOT labeling preprinted on the bag. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Procedure for haul ing and disposal shall comply with 40 CFR 61, SUBPART M, state, regional, and local standards.

3.4.3.2 Disposal Material Shall Contain No Free Liquid

The Contractor will ensure asbestos contaminated material delivered to the Base Sanitary Landfill contain no free liquids. Free liquids are defined as material which fails the EPA SW-846 Free Liquids Test.

-- End of Section --

# SECTION 02 82 30

# RE-ESTABLISHING VEGETATION

**03/12**

## PART 1 GENERAL

### 1.1 GENERAL REQUIREMENTS

The work covered by this section consists of preparing seedbeds; furnishing and placing limestone, fertilizer, and seed; compacting seedbeds; furnishing, placing, and securing mulch; mowing; and other operations necessary for the permanent establishment of grasses.

Seeding and mulching shall be performed on all earth areas disturbed by construction. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the successful establishment and growth.

The quantity of mowing to be performed will be affected by the actual conditions which occur during the construction of the project. The quantity of mowing may be increased, decreased, or eliminated entirely at the direction of the Contracting Officer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

## PART 2 PRODUCTS

### 2.1 FERTILIZER

The quality of all fertilizer and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Fertilizer Law and with the rules and regulations, adopted by the North Carolina Board of Agriculture in accordance with the provisions of said law, in effect at the time of sampling. Fertilizer shall be 10-10-10. Dry fertilizer shall have been manufactured from cured stock. Liquid fertilizer shall be stored and cared for after manufacture in a manner that will prevent loss of plant food values.

### 2.2 LIMESTONE

The quality of all limestone and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Lime Law and with the rules and regulations adopted by the North Carolina Board of. Limestone shall be agricultural grade ground Dolomitic limestone. All limestone shall contain not less than 90 percent calcium carbonate equivalents. Dolomitic limestone shall contain not less than 10 percent of magnesium. Dolomitic limestone shall be so graded that at least 90 percent will pass through a U.S. Standard 20 mesh screen, and at least 35 percent will pass through a U.S. Standard 100 mesh screen.

### 2.3 SOD

Sod shall consist of a live, dense, well rooted growth of centipede grass free from an excessive amount of restricted noxious weeds as defined by

the North Carolina Board of Agriculture. The area from which sod is to be obtained shall have been mowed to a height of not less than 2 inches. Sod shall be cut into rectangular sections of sizes convenient for handling without breaking or loss of soil. It shall be cut with a sod cutter or other acceptable means to a depth that will retain in the sod practically all of the dense root system of the grass. During wet weather the sod shall be allowed to dry sufficiently before lifting to prevent tearing during handling and placing, and during extremely dry weather it shall be watered before lifting if such watering is necessary to insure its vitality and to prevent loss of soil during handling.

## 2.4 MULCH FOR EROSION CONTROL

Mulch for erosion control shall consist of grain straw or other acceptable material, and shall have been approved by the Contracting Officer before being used. All mulch shall be reasonably free from mature seed bearing stalks, roots, or bulblets. Material for holding mulch in place shall be asphalt or other approved binding material.

## 2.5 SEED

The quality of all seed and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Seed Law and with the rules and regulations adopted by the North Carolina Board of Agriculture. Seed shall have been approved by the North Carolina Department of Agriculture before being sown. No seed will be accepted with a date of test more than 8 months prior to the date of sowing, excluding the month in which the test was completed. Seed mix by weight shall be as specified on the plans.

## 2.6 MATTING FOR EROSION CONTROL

### 2.6.1 General

Matting for erosion control shall be or excelsior matting. Other acceptable material manufactured especially for erosion control may be used when approved by the Contracting Officer in writing before being used. Matting for erosion control shall not be dyed, bleached, or otherwise treated in a manner that will result in toxicity to vegetation.

### 2.6.2 Erosion Control Matting

Matting shall consist of a machine produced mat of curled wood excelsior a minimum of 47 inches in width. The mat shall weigh 1.6 pounds per square yard with a tolerance of plus or minus 10 percent. At least 80 percent of the individual fibers shall be 6 inches or more in length. The fibers shall be evenly distributed over the entire area of the blanket. One side of the excelsior matting shall be covered with an extruded plastic mesh. The mesh size for the plastic mesh shall be a maximum of 1 inch x 1 inch.

### 2.6.3 Wire Staples

Staples shall be machine made of No. 11 gage new steel wire formed into a "U" shape. The size when formed shall be not less than 6 inches in length with a throat of not less than 1 inch in width.

## 2.7 WATER

Water used in the planting or care of vegetation shall meet the requirements

of Class C fresh waters as defined in 15 NAC 2B.0200.

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

The work shall be performed immediately upon completion of earthwork areas. No exception will be made to this requirement unless otherwise permitted in writing by the Contracting Officer. Upon failure or neglect on the part of the Contractor to coordinate his grading with seeding and mulching operations and diligently pursue the control of erosion and siltation, the Contracting Officer may suspend the Contractor's operations until such time as the work is coordinated in a manner acceptable to the Contracting Officer.

### 3.2 SEEDBED PREPARATION

The Contractor shall cut and satisfactorily dispose of weeds or other unacceptable growth on the areas to be seeded. The soil shall then be scarified or otherwise loosened to a depth of not less than 3 inches except as otherwise provided below or otherwise directed by the Contracting Officer. Clods shall be broken and the top 2 to 3 inches of soil shall be worked into an acceptable seedbed by the use of soil pulverizers, drags, or harrows; or by other methods approved by the Contracting Officer. All rock and debris 3 inches or larger shall be removed prior to the application of seed and fertilizer. On cut slopes that are 2:1 and steeper, both the depth of preparation and the degree of smoothness of the seedbed may be reduced as permitted by the Contracting Officer, but in all cases the slope surface shall be scarified, grooved, trenched, or punctured so as to provide pockets, ridges, or trenches in which the seeding materials can lodge. On cut slopes that are either 2:1 or steeper, the Contracting Officer may permit the preparation of a partial or complete seedbed during the initial grading of the slope. If at the time of final sodding and mulching operations such initial preparation is still in a condition acceptable to the Contracting Officer, additional seedbed preparation may be reduced or eliminated. Seedbed preparation within 2 feet of the edge of any pavement shall be limited to a depth of 2 to 3 inches. The preparation of seedbeds shall not be done when the soil is frozen, extremely wet, or when the Contracting Officer determines that it is an otherwise unfavorable working condition.

### 3.3 LIMESTONE AND FERTILIZER

Limestone may be applied as a part of the seedbed preparation, provided it is immediately worked into the soil. If not so applied, limestone and fertilizer shall be distributed uniformly over the prepared seedbed and then harrowed, raked, or otherwise thoroughly worked into the seedbed. Apply fertilizer at the rate as specified on the plans. Apply lime at the rate as specified on the plans. Application equipment for liquid fertilizer, other than a hydraulic seeder, shall be calibrated to ensure that the required rate of fertilizer is applied uniformly.

### 3.4 SODDING

Extreme care shall be exercised to prevent breaking the sod sections and to prevent the sod from drying out. Any sod that is torn, broken, or too dry will be rejected. Torn or broken sod, if kept moist, may be used for filling unavoidable small gaps in sod cover as permitted by the Contracting Officer. Sod shall be placed on the designated areas within 24

hours after being cut. The area to be sodded shall be brought to a firm uniform surface. The limestone and fertilizer shall be distributed uniformly over the area. The area shall be roughened by means of picks, rakes, or other approved means to a depth of not less than 2 inches without distorting the uniformity of the surface. The finished surface shall be moistened with water prior to placing the sod. Within 24 hours after soil preparation has been completed, place the sod. Each piece of sod shall be packed tightly against the edge of adjacent pieces so that the fewest possible gaps will be left between the pieces. Unavoidable gaps shall be closed with small pieces of sod. Sod shall be placed beginning at either the top or the toe of the slope. Sod shall be placed with the long edge horizontal and with staggered vertical joints. The edge of the sod shall be turned slightly into the ground at the top of a slope and a layer of earth placed over it and tamped as to conduct the surface water over and onto the top of the sod. On all slopes 2:1 or steeper, in drainage channels, and on any areas that are in such condition that there is danger of sod slipping, sod shall be stapled in place by driving staples flush with the sod. Stapling shall be done concurrently with sod placement and prior to tamping. Use wire staples, per Section 2.6.3. The number of staples shall be sufficient to prevent slipping or displacement of the sod. Staples shall be driven perpendicular to the slope. Where backfill is necessary on cut slopes to obtain a uniform sodding area, staples shall be of sufficient length to reach a minimum of 3 inches into the solid earth underneath the backfill. Sod shall not be placed when the atmospheric temperature is below 32 degrees F. Frozen sod shall not be used. After sod has been placed and tamped, it shall be carefully and thoroughly watered as required to maintain the sod in a healthy condition. Watering shall be conducted until final acceptance. Application of water may be made by the use of hydraulic seeding equipment, farm type irrigation equipment, or by other acceptable means.

## 3.5 MULCHING

All seeded areas shall be mulched. Grain straw or excelsior mat may be used as mulch at any time of the year. Mulch shall be applied within 24 hours after completion of seeding unless otherwise permitted by the Contracting Officer. Care shall be exercised to prevent displacement of soil or seed or other damage to the seeded area during the mulching operations. Mulch shall be uniformly spread by hand or by approved mechanical spreaders or blowers which will provide an acceptable application. An acceptable application will be that which will allow some sunlight to penetrate and air to circulate but also partially shade the ground, reduce erosion, and conserve soil moisture. Mulch shall be held in place by applying a sufficient amount of asphalt or other approved binding material to assure that the mulch is properly held in place. The rate and method of application of binding material shall meet the approval of the Contracting Officer. Where the binding material is not applied directly with the mulch it shall be applied immediately following the mulch application. During the application of binding material, adequate precautions shall be taken to prevent damage to vehicles, structures, guardrails, and devices. Areas where seeding and mulching have been performed shall be maintained in a satisfactory condition until final acceptance of the project. Maintenance shall include mowing at the location and times directed by the Contracting Officer. Areas of damage or failure due to any cause shall be corrected by being repaired or by being completely redone as may be directed by the Contracting Officer. Excelsior matting shall be installed on all seeded slopes greater than 3:1 (h:v). Install the matting per the manufacturer's printed instructions.

## 3.6 SEEDING

Seed shall be distributed uniformly over the seedbed at the rate as specified on the plans. Seed shall be harrowed, dragged, raked, or otherwise worked so as to cover the seed with a layer of soil. The depth of covering shall be 1/4 inch. When a hydraulic seeder is used for application of seed and fertilizer, the seed shall not remain in water containing fertilizer for more than 30 minutes prior to application unless otherwise permitted by the Contracting Officer. Immediately after seed has been properly covered the seedbed shall be compacted in the manner and degree approved by the Contracting Officer.

-- End of Section --

# SECTION 02 82 33.13

# REMOVAL AND DISPOSAL OF MATERIALS COATED WITH LEAD-CONTAINING PAINT

**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 within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

| | |
|---|---|
| ANSI Z9.2 | (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems |
| ANSI Z88.2 | (1992) Respiratory Protection |

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

| | |
|---|---|
| 29 CFR 1926.55 | Gases, Vapors, Fumes, Dusts, and Mists |
| 29 CFR 1926.57 | Ventilation |
| 29 CFR 1926.59 | Hazard Communication |
| 29 CFR 1926.62 | Lead Exposure in Construction |
| 29 CFR 1926.103 | Respiratory Protection |
| 40 CFR 258 | Disposal of Hazardous Materials |
| 40 CFR 261 | Identification and Listing of Hazardous Waste |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 586 | (1996; Rev thru Aug 1999) High-Efficiency, Particulate, Air Filter Units |

### 1.2 DEFINITIONS

#### 1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, "30 micrograms per cubic meter of air" refers to the action level.

#### 1.2.2 Area Monitoring

Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially

exposed to lead.

1.2.3 Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."

1.2.4 Certified Industrial Hygienist (CIH)

As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.

1.2.5 Change Rooms and Shower Facilities

Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.

1.2.6 Decontamination Room

Room for removal of contaminated personal protective equipment (PPE).

1.2.7 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.

1.2.8 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.

1.2.9 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.

1.2.10 Lead Control Area

An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

1.2.11 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.12 Personal Monitoring

Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

1.3 QUALITY ASSURANCE

1.3.1 Medical Examinations

Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1926.59. The examination will not be required if adequate records show that employees have been examined as required by 29 CFR 1926.59 within the last year.

1.3.1.1 Medical Records

Maintain complete and accurate medical records of employees for a period of at least 40 years or for the duration of employment plus 20 years, whichever is longer.

1.3.2 CIH Responsibilities

a. Certify training.

b. Review and approve materials coated with lead-containing paint Removal Work Plan for conformance to the applicable referenced standards.

c. Inspect lead-containing paint removal work for conformance with the approved plan.

d. Direct monitoring.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.

1.3.3 Training

Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1926.62.

1.3.3.1 Training Certification

Submit certificates signed and dated by the CIH and by each employee stating that the employee has received training.

1.3.4 Respiratory Protection Program

a. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 6 months thereafter

as required by 29 CFR 1926.62.

b. Establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.3.5 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.3.6 Hazardous Waste Management

The Hazardous Waste Management plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations and address:

a. Identification of hazardous wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes consisting of lead chips and/or dust not intact lead-coated materials. Include the facility location and a 24-hour point of contact. Furnish two copies of EPA, state, and local hazardous waste permits and EPA Identification numbers.

d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures to be implemented.

g. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.

h. Cost for hazardous waste disposal according to this plan.

1.3.7 Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply.

1.3.8 Pre-Construction Conference

Along with the CIH, meet with the Contracting Officer to discuss in detail the materials coated with lead-containing paint removal work plan, including work procedures and precautions for the work plan.

## 1.4 SUBMITTALS

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

SD-03 Product Data

Vacuum filters

Respirators

SD-06 Test Reports

Monitoring Results

SD-07 Certificates

Qualifications of CIH

Testing laboratory qualifications

Materials coated with lead-containing paint removal work plan

Rental equipment notification

CIH approval of work plan (signature, date, and certification number)

Respiratory protection program

Hazard communication program

EPA approved hazardous waste treatment or disposal facility for lead disposal

Hazardous waste management plan

Vacuum filters

SD-11 Closeout Submittals

Completed and signed hazardous waste manifest from treatment or disposal facility

Certification of medical examinations

Employee training certification

### 1.4.1 Qualifications of CIH

Submit name, address, and telephone number of the CIH selected to perform responsibilities in paragraph entitled "CIH Responsibilities." Provide previous experience of the CIH. Submit proper documentation that the Industrial Hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification/recertification.

### 1.4.2 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reaccreditation.

### 1.4.3 Materials Coated with Lead-Containing Paint Removal Work Plan

Submit a detailed job-specific plan of the work procedures to be used in the removal of materials coated with lead-containing paint. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation system. Include in the plan, eating, drinking, smoking and restroom procedures, interface of trades, sequencing of lead related work, collected wastewater and paint debris disposal plan, air sampling plan, respirators, protective equipment, and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area. Include air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion of the plan.

### 1.4.4 Air Monitoring

Submit monitoring results to the Contracting Officer within 3 working days, signed by the testing laboratory employee performing the air monitoring, the employee that analyzed the sample, and the CIH.

## 1.5 REMOVAL

### 1.5.1 Title to Materials

Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of in accordance with Section 02 41 00, "Demolition," except as specified herein.

## 1.6 EQUIPMENT

Furnish the Contracting Officer with two complete sets of personal protective equipment daily, as required herein, for entry into and inspection of the removal work within the lead controlled area. Personal protective equipment shall include fitted respirators and disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor.

### 1.6.1 Respirators

Furnish appropriate respirators approved by the NIOSH, Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62 and 29 CFR 1926.103.

1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with appropriate disposable protective whole body clothing, head covering, gloves, and foot coverings. Furnish appropriate disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CIH.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during lead-containing paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the Contracting Officer.

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Notification

Notify the Contracting Officer 20 days prior to the start of any removal work.

3.1.2 Lead Control Area Requirements

a. Establish a lead control area by completely enclosing with containment screens the area or structure where materials coated with lead-containing paint removal operations will be performed.

or if an airborne dust is created

b. Contain removal operations by the use of a negative pressure full containment system with at least one change room and with HEPA filtered exhaust.

3.1.3 Protection of Existing Work to Remain

Perform removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

3.1.4 Boundary Requirements

Provide physical boundaries around the lead control area by roping off the area or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

### 3.1.5 Furnishings

The Government will remove furniture and equipment from the work area before lead-containing paint removal work begins.

### 3.1.6 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

### 3.1.7 Change Room and Shower Facilities

Provide clean change rooms and shower facilities within the physical boundary around the designated lead control area in accordance with requirements of 29 CFR 1926.62.

### 3.1.8 Mechanical Ventilation System

a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.

b. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters or other collection systems, approved by the industrial hygienist. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with ANSI Z9.2.

### 3.1.9 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been given appropriate training and protective equipment.

### 3.1.10 Warning Signs

Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

## 3.2 WORK PROCEDURES

The work shall include removal of materials coated with lead containing paint. Materials shall be removed with coating adhered and intact. No sanding, sandblasting or other procedures which may cause lead containing particles to become airborne shall be used for demolition. The Contractor is advised of these conditions and shall be responsible for compliance with all EPA, Federal, State and Local Requirements.

### 3.2.1 Painted Cabinets, Wood Trim, Drywall, Windows, and Doors

Remove all painted cabinets, wood trim, drywall, windows, and doors with coating intact. Perform removal of materials coated with lead-containing paint in accordance with approved procedures. Use procedures and equipment required to limit occupational environmental exposure to lead when materials coated with lead-containing paint are removed in accordance

with 29 CFR 1926.62, except as specified herein.

3.2.2 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

a. Vacuum themselves off.

b. Remove protective clothing in the decontamination room, and place them in an approved impermeable disposal bag.

c. Shower.

d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.

3.2.3 Monitoring

Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1926.62 and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH.

a. The CIH or the IH Technician under the direction of the CIH shall be on the jobsite directing the monitoring, and inspecting the lead-containing paint removal work to ensure that the requirements of the Contract have been satisfied during the entire removal of materials coated with lead-containing paint operation.

b. Take personal air monitoring samples on employees who are anticipated to have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air monitoring samples, signed by the CIH, within 72 hours after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.

3.2.3.1 Monitoring During Removal Work

Perform personal and area monitoring during the entire removal operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Removal work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring daily on each shift in which lead paint removal operations are performed in areas immediately adjacent to the lead control area. For

outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of lead contamination.

## 3.3 MATERIALS COATED WITH LEAD-CONTAINING PAINT REMOVAL

Manual or power sanding of interior and exterior surfaces is not permitted. Remove materials coated with lead containing paint within the areas designated on the drawings. Take whatever precautions are necessary to minimize damage to the underlying substrate or adjacent surfaces to remain.

## 3.4 CLEANUP AND DISPOSAL

### 3.4.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner and wet mopping the area.

### 3.4.2 Certification

The CIH shall certify in writing that the inside and outside the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, the respiratory protection for the employees was adequate, the work procedures were performed in accordance with 29 CFR 1926.62, and that there were no visible accumulations of lead-contaminated paint and dust on the worksite. Do not remove the lead control area or roped-off boundary and warning signs prior to the Contracting Officer's receipt of the CIH's certification. Reclean areas showing dust or residual paint chips.

### 3.4.3 Testing of Lead-Containing Paint Residue

Test lead containing paint residue in accordance with 40 CFR 261 for hazardous waste. A composite sample of dust and debris collected after removal is complete must be tested for lead using EPA protocol Total Characteristic Leachate Procedure (TCLP) Test. If the results of that test are less than five parts per million (PPM), it may be disposed of at the Base Landfill. If the results are greater than five PPM, it will be considered a hazardous waste and disposed of accordingly.

### 3.4.4 Disposal

Dispose of removed materials and associated waste in compliance with Environmental Protection Agency (EPA), Federal, State, and Local requirements and the approved work plans for removal and disposal.

a. Materials (except metals) coated with lead-containing paint which is well adhered shall be disposed of in the Base Sanitary Landfill, provided all Base and Landfill requirements are complied with. Comply with the land disposal restriction notification requirements of 40 CFR 258.

b. All debris, paint chips, and dust may be considered a hazardous waste. Dispose of this material (if TCLP = 5ppm) off Base in an approved hazardous waste facility.

-- End of Section --

SECTION 02 83 13.00 20

LEAD IN CONSTRUCTION
**08/11**

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 INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

| | |
|---|---|
| AIHA Z88.6 | (2006) Respiratory Protection - Respirator Use-Physical Qualifications for Personnel |

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)

| | |
|---|---|
| 16 VAC 25-35 | Title 16, Agency 25, Chapter 35: Regulation Concerning Certified Lead Contractor's Notification, Lead Project Permits And Permit Fees |
| 18 VAC 15-30 | Title 18, Agency 15, Chapter 30: Virginia Lead-Based Paint Activities Regulations |

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

| | |
|---|---|
| HUD 6780 | (1995; Errata Aug 1996;Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing |

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

| | |
|---|---|
| 29 CFR 1926.103 | Respiratory Protection |
| 29 CFR 1926.21 | Safety Training and Education |
| 29 CFR 1926.33 | Access to Employee Exposure and Medical Records |
| 29 CFR 1926.55 | Gases, Vapors, Fumes, Dusts, and Mists |
| 29 CFR 1926.59 | Hazard Communication |
| 29 CFR 1926.62 | Lead |
| 29 CFR 1926.65 | Hazardous Waste Operations and Emergency Response |
| 40 CFR 260 | Hazardous Waste Management System: General |
| 40 CFR 261 | Identification and Listing of Hazardous Waste |
| 40 CFR 262 | Standards Applicable to Generators of |

| | |
|---|---|
| | Hazardous Waste |
| 40 CFR 263 | Standards Applicable to Transporters of Hazardous Waste |
| 40 CFR 264 | Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities |
| 40 CFR 265 | Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities |
| 40 CFR 268 | Land Disposal Restrictions |
| 40 CFR 745 | Lead-Based Paint Poisoning Prevention in Certain Residential Structures |
| 49 CFR 172 | Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements |
| 49 CFR 178 | Specifications for Packagings |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 586 | (2009; Reprint Sep 2014) Standard for High-Efficiency Particulate, Air Filter Units |

## 1.2 DEFINITIONS

### 1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period.

### 1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

### 1.2.3 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead hazard. A Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals is the best choice.

### 1.2.4 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment

(PPE).

1.2.5 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.6 High Efficiency Particulate Arrestor (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

1.2.7 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds.

1.2.8 Lead Control Area

A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.2.9 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.10 Material Containing Lead/Paint with Lead (MCL/PWL)

Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.2.11 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.12 Physical Boundary

Area physically roped or partitioned off around lead control area to limit

unauthorized entry of personnel.

## 1.3 DESCRIPTION

### 1.3.1 Description of Work

Construction activities impacting PWL or material containing lead which are covered by this specification include the demolition and/or removal of material containing lead located as indicated on the drawings. Due to age of the facility, lead is likely in any painted surface. Take precautions as necessary to protect health and safety of all personnel.

### 1.3.2 Coordination with Other Work

The contractor shall coordinate with work being performed in adjacent areas. Coordination procedures shall be explained in the Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead activities.

## 1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Lead Compliance Plan including CP approval (signature, date, and certification number);

Competent Person qualifications;

Training Certification of workers and supervisors;

lead waste management plan;

Certification of Medical Examinations;

SD-06 Test Reports

sampling results;

Occupational and Environmental Assessment Data Report;

SD-07 Certificates

Testing laboratory qualifications;

Clearance Certification;

SD-11 Closeout Submittals

Completed and signed hazardous waste manifest from treatment or disposal facility; G

Waste turn-in documents or weight tickets for non-hazardous wastes that are disposed of at sanitary or construction and demolition landfills; G

## 1.5 QUALITY ASSURANCE

### 1.5.1 Qualifications

#### 1.5.1.1 Competent Person (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard ( 29 CFR 1926.62) which shows ability to assess occupational and environmental exposure to lead, experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Submit proper documentation that the CP is trained and certified in accordance with federal, State (18 VAC 15-30) and local laws. The competent person shall be a licensed lead-based paint abatement Supervisor/Project Designer in the State of NC.

#### 1.5.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the training provider, stating that the employee has received the required lead training specified in 29 CFR 1926.62(l)and is certified to perform or supervise deleading, lead removal or demolition activities in the state of NC.

#### 1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air analysis, testing, and reporting of airborne concentrations of lead. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis shall be OSHA approved.

### 1.5.2 Requirements

#### 1.5.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all federal, State, and local requirements.

b. Review and approve Lead Compliance Plan for conformance to the applicable referenced standards.

c. Continuously inspect PWL or MCL work for conformance with the approved plan.

d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Control work to prevent hazardous exposure to human beings and to the environment at all times.

g. Supervise final cleaning of the lead control area, take clearance wipe samples if necessary; review clearance sample results and make recommendations for further cleaning.

h. Certify the conditions of the work as called for elsewhere in this specification.

1.5.2.2 Lead Compliance Plan

Submit a detailed job-specific plan of the work procedures to be used in the disturbance of PWL or MCL. The plan shall include a sketch showing the location, size, and details of lead control areas, critical barriers, physical boundaries, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and dust containing lead and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside of the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multicontractor worksites to inform affected employees and to clarify responsibilities to control exposures.

The plan shall be developed by a certified planner/project designer in the State of NC.

1.5.2.3 Occupational and Environmental Assessment Data Report

If initial monitoring is necessary, submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

In order to reduce the full implementation of 29 CFR 1926.62, the Contractor shall provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of 29 CFR 1926.62 and supporting the Lead Compliance Plan.

a. The initial monitoring shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead for stated work.

b. Submit worker exposure data gathered during the task based trigger operations of 29 CFR 1926.62 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead containing coatings are

present.

c. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

1.5.2.4 Medical Examinations

Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

1.5.2.5 Training

Train each employee performing work that disturbs lead, who performs MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State (18 VAC 15-30) and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.

b. Establish and implement a respiratory protection program as required by AIHA Z88.6, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.5.2.8 Lead Waste Management

The Lead Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations. and address:

a. Identification and classification of wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of USEPA, State (in accordance with 16 VAC 25-35) and local hazardous waste permits and USEPA Identification numbers.

d. Names and qualifications (experience and training) of personnel who

will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal and disposal. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Wastes shall be cleaned up and containerized daily.

h. Include any process that may alter or treat waste rendering a hazardous waste non hazardous.

i. Unit cost for hazardous waste disposal according to this plan.

1.5.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, State, and local authorities regarding lead. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply.

1.5.3 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the Lead Waste Management Plan and the Lead Compliance Plan, including procedures and precautions for the work.

1.6 EQUIPMENT

1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust, fume and mist. Respirators shall comply with the requirements of 29 CFR 1926.62.

1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper disposable protective whole body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, eye, and hand protection. PPE shall remain the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

a. Notify the Contracting Officer 20 days prior to the start of any lead work.

3.1.1.2 Lead Control Area

a. Physical Boundary - Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside of the lead control area.

b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Furnishings

The Government will remove furniture and equipment from the building before lead work begins, unless indicated otherwise in drawings.

#### 3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

#### 3.1.1.5 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

#### 3.1.1.6 Eye Wash Station

Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

#### 3.1.1.7 Mechanical Ventilation System

a. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Local exhaust ventilation systems shall be evaluated and maintained in accordance with 29 CFR 1926.62.

b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.

c. Use locally exhausted, power actuated tools or manual hand tools.

#### 3.1.1.8 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

## 3.2 ERECTION

### 3.2.1 Lead Control Area Requirements

Establish a lead control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

## 3.3 APPLICATION

### 3.3.1 Lead Work

Perform lead work in accordance with approved Lead Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when the work is performed in accordance with 29 CFR 1926.62 or 40 CFR 745, and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, State, and local requirements.

### 3.3.2 Paint with Lead or Material Containing Lead Removal

Manual or power sanding or grinding of lead surfaces or materials is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited. Provide methodology for removing lead in the Lead Compliance Plan. Select lead removal processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this removal process in the Lead Compliance Plan.

#### 3.3.2.1 Paint with Lead or Material Containing Lead - Indoor Removal

Perform removal in the lead control areas using enclosures, barriers or containments. Collect residue and debris for disposal in accordance with federal, State, and local requirements.

#### 3.3.2.2 Paint with Lead or Material Containing Lead - Outdoor Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the Lead Compliance Plan. The worksite preparation (barriers or containments) shall be job dependent and presented in the Lead Compliance Plan.

### 3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn in the control area:

a. Vacuum all clothing before entering the contaminated change room.

b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.

c. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing, move to an appropriate shower facility, shower.

d. Change to clean clothes prior to leaving the clean clothes storage area.

## 3.4 FIELD QUALITY CONTROL

### 3.4.1 Tests

#### 3.4.1.1 Air and Wipe Sampling

Conduct sampling for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

a. The CP shall be on the job site directing the air and wipe sampling and inspecting the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.

b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition,

collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, signed by the CP, within 72 hours after the air samples are taken.

d. Conduct area air sampling daily, on each shift in which lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after the CP and the Contracting Officer give approval.

f. Surface Wipe Samples - Collect surface wipe samples on floors at a location no greater than 10 feet outside the lead control area at a frequency of once per day while lead removal work is conducted in occupied buildings. Surface wipe results shall meet criteria in paragraph "Clearance Certification.

3.4.1.2 Sampling After Removal

After the visual inspection, collect wipe samples according to the HUD protocol contained in HUD 6780 to determine the lead content of settled dust in micrograms per square meter foot of surface area.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead operation has been completed, clean the controlled area of visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before clearance testing.

3.5.1.1 Clearance Certification

The CP shall certify in writing that air samples collected outside the lead control area during paint removal operations are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

Clear the lead control area in industrial facilities of all visible dust and debris.

3.5.2 Disposal

a. All material, whether hazardous or non-hazardous shall be disposed in accordance with all laws and provisions and all federal, State or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

b. Contractor is responsible for segregation of waste. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261.

c. Dispose of lead-contaminated material classified as hazardous waste at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Government property.

d. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. For hazardous waste, the collection drum requires marking/labeling in accordance with 40 CFR 262 during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

e. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

3.5.2.1 Disposal Documentation

Submit written evidence to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Contractor shall provide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for non-hazardous waste disposal.

3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials or non-hazardous waste delivered is returned and a copy is furnished to the Government.

-- End of Section --

# SECTION 02 84 16

# HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY
**04/06**

## PART 1 GENERAL

### 1.1 REFERENCES

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

STATE OF MARYLAND CODE OF MARYLAND REGULATIONS (COMAR)

| | |
|---|---|
| COMAR 26.13 | (1988) Chapters .01- .13, Disposal of Controlled Hazardous Substances |

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)

| | |
|---|---|
| 9 VAC 20-60 | Title 9, Agency 20, Chapter 60: Hazardous Waste Management Regulations |
| 9 VAC 20-80 | Title 9, Agency 20, Chapter 80: Solid Waste Management Regulations |

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

| | |
|---|---|
| 29 CFR 1910.1000 | Air Contaminants |
| 40 CFR 260 | Hazardous Waste Management System: General |
| 40 CFR 261 | Identification and Listing of Hazardous Waste |
| 40 CFR 262 | Standards Applicable to Generators of Hazardous Waste |
| 40 CFR 263 | Standards Applicable to Transporters of Hazardous Waste |
| 40 CFR 264 | Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities |
| 40 CFR 265 | Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities |
| 40 CFR 268 | Land Disposal Restrictions |
| 40 CFR 270 | EPA Administered Permit Programs: The Hazardous Waste Permit Program |
| 40 CFR 273 | Standards For Universal Waste Management |
| 40 CFR 761 | Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in |

Commerce, and Use Prohibitions

49 CFR 178 Specifications for Packagings

## 1.2 REQUIREMENTS

Removal and disposal of PCB containing lighting ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB ballasts.

## 1.3 DEFINITIONS

### 1.3.1 Certified Industrial Hygienist (CIH)

A industrial hygienist hired by the contractor shall be certified by the American Board of Industrial Hygiene.

### 1.3.2 Leak

Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

### 1.3.3 Lamps

Lamp, also referred to as "universal waste lamp", is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common universal waste electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

### 1.3.4 Polychlorinated Biphenyls (PCBs)

PCBs as used in this specification shall mean the same as PCBs, PCB containing lighting ballast, and PCB container, as defined in 40 CFR 761, Section 3, Definitions.

### 1.3.5 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

### 1.3.6 Universal Waste

Universal Waste means any of the following hazardous wastes that are managed under the universal waste requirements 40 CFR 273:

(1) Batteries as described in Sec. 273.2 of this chapter;
(2) Pesticides as described in Sec. 273.3 of this chapter;
(3) Thermostats as described in Sec. 273.4 of this chapter; and
(4) Lamps as described in Sec. 273.5 of this chapter.

## 1.4 QUALITY ASSURANCE

### 1.4.1 Regulatory Requirements

Perform PCB related work in accordance with 40 CFR 761 and 9 VAC 20-60 and

9 VAC 20-80. Perform mercury-containing lamps storage and transport in accordance with 40 CFR 261, 40 CFR 264, 40 CFR 265, 40 CFR 273 and 9 VAC 20-60 and 9 VAC 20-80.

1.4.2 Training

Certified industrial hygienist (CIH) shall instruct and certify the training of all persons involved in the removal of PCB containing lighting ballasts and mercury-containing lamps. The instruction shall include: The dangers of PCB and mercury exposure, decontamination, safe work practices, and applicable OSHA and EPA regulations. The CIH shall review and approve the PCB and Mercury-Containing Lamp Removal Work Plans.

1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 265, 40 CFR 268, 40 CFR 270, 40 CFR 273 and COMAR 26.13, 9 VAC 20-60 9 VAC 20-80 and of the Contractor removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

1.5 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Qualifications of CIH;

Training Certification;

PCB and Lamp Removal Work Plan;

PCB and Lamp Disposal Plan;

SD-11 Closeout Submittals

Transporter certification of notification to EPA of their PCB waste activities and EPA ID numbers;

Certification of Decontamination

Certificate of Disposal and/or recycling. Submit to the Government before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.

DD Form 1348-1

1.6 ENVIRONMENTAL REQUIREMENTS

Use special clothing:

a. Disposable gloves (polyethylene)

b. Eye protection

c. PPE as required by CIH

## 1.7 SCHEDULING

Notify the Contracting Officer 20 days prior to the start of PCB and mercury-containing lamp removal work.

## 1.8 QUALITY ASSURANCE

### 1.8.1 Qualifications of CIH

Submit the name, address, and telephone number of the Industrial Hygienist selected to perform the duties in paragraph entitled "Certified Industrial Hygienist." Submit training certification that the Industrial Hygienist is certified, including certification number and date of certification or re certification.

### 1.8.2 PCB and Lamp Removal Work Plan

Submit a job-specific plan within 20 calendar days after award of contract of the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps. Include in the plan: Requirements for Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. The plan shall be approved and signed by the Certified Industrial Hygienist. Obtain approval of the plan by the Contracting Officer prior to the start of PCB and/or lamp removal work.

### 1.8.3 PCB and Lamp Disposal Plan

Submit a PCB and lamp Disposal Plan with 45 calendar days after award of contract. The PCB and Lamp Disposal Plan shall comply with applicable requirements of federal, state, and local PCB and Universal waste regulations and address:

a. Estimated quantities of wastes to be generated, disposed of, and recycled.

b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste permit applications and EPA identification numbers, as required.

c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp wastes.

d. Spill prevention, containment, and cleanup contingency measures to be implemented.

e. Work plan and schedule for PCB and mercury-containing lamp waste removal, containment, storage, transportation, disposal and or recycling. Wastes shall be cleaned up and containerize daily.

# PART 2 PRODUCTS

Not used.

# PART 3 EXECUTION

## 3.1 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the removal of PCB containing lighting ballasts, associated mercury-containing fluorescent lamps, and high intensity discharge (HID) lamps in accordance with local, state, or federal regulations. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not break mercury containing fluorescent lamps or high intensity discharge lamps.

### 3.1.1 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:

a. Obtaining suitable PCB and mercury-containing lamp storage sites.

b. Notifying Contracting Officer prior to commencing the operation.

c. Reporting leaks and spills to the Contracting Officer.

d. Cleaning up spills.

e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.

f. Maintaining inspection, inventory and spill records.

## 3.2 PCB SPILL CLEANUP REQUIREMENTS

### 3.2.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills.

### 3.2.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

### 3.2.3 PCB Spill Cleanup

40 CFR 761, subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

### 3.2.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide test results of cleanup and certification of decontamination.

## 3.3 REMOVAL

### 3.3.1 Ballasts

As ballast are removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label shall be assumed to contain PCBs and containerized and disposed of as required under paragraphs STORAGE FOR DISPOSAL and DISPOSAL. If there are less than 1600 "No PCB" labeled lighting ballasts dispose of them as normal demolition debris.

### 3.3.2 Lighting Lamps

Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as universal waste as specified herein.

## 3.4 STORAGE FOR DISPOSAL

### 3.4.1 Storage Containers for PCBs

49 CFR 178. Store PCB in containers approved by DOT for PCB.

### 3.4.2 Storage Containers for lamps

Store mercury containing lamps in appropriate DOT containers. The boxes shall be stored and labeled for transport in accordance with 40 CFR 273.

### 3.4.3 Labeling of Waste Containers

Label with the following:

a. Date the item was placed in storage and the name of the cognizant activity/building.

b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.

c. Label mercury-containing lamp waste in accordance with 40 CFR 273. Affix labels to all lighting waste containers.

## 3.5 DISPOSAL

Dispose of off Government property in accordance with EPA, DOT, and local regulations at a permitted site.

### 3.5.1 Identification Number

Federal regulations 40 CFR 761, and 40 CFR 263 require that generators, transporters, commercial storers, and disposers of PCB waste posses U.S. EPA identification numbers. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work. For mercury containing lamp removal, Federal regulations 40 CFR 273 require that large quantity handlers of Universal waste (LQHUW) must provide notification of universal waste management to the appropriate EPA Region (or state director in authorized

states), obtain an EPA identification number, and retain for three years records of off-site shipments of universal waste. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Universal Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work.

### 3.5.2 Transporter Certification

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB waste from the Government. Return a signed copy to the Government before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities (EPA Form 7710-53).

#### 3.5.2.1 Certificate of Disposal and/or Recycling

40 CFR 761. Certificate for the PCBs and PCB items disposed shall include:

a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.

b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.

c. A statement certifying the fact of disposal and or recycling of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.

d. A certification as defined in 40 CFR 761.

### 3.5.3 Disposal by the Government

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Load and haul PCBs to the storage site in accrodance with Base guidelines.

#### 3.5.3.1 DD Form 1348-1

Prepare DD Form 1348-1 Turn-in Document (TID), which will accompany the PCB to the storage site. Ensure that a responsible person from the activity that owns the PCB signs the DD Form 1348-1.

-- End of Section --

# SECTION 03 30 04

# CONCRETE FOR MINOR STRUCTURES
**04/06**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

| | |
|---|---|
| ACI 308R | (2001) Guide to Curing Concrete |
| ACI 318/318R | (2005) Building Code Requirements for Structural Concrete and Commentary |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A 185 | (2002) Steel Welded Wire Reinforcement, Plain, for Concrete |
| ASTM A 615/A 615M | (2005a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement |
| ASTM C 143/C 143M | (2005) Slump of Hydraulic Cement Concrete |
| ASTM C 150 | (2007) Standard Specification for Portland Cement |
| ASTM C 171 | (2003) Sheet Materials for Curing Concrete |
| ASTM C 172 | (2004) Sampling Freshly Mixed Concrete |
| ASTM C 231 | (2009a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method |
| ASTM C 260 | (2001) Air-Entraining Admixtures for Concrete |
| ASTM C 309 | (2003) Liquid Membrane-Forming Compounds for Curing Concrete |
| ASTM C 31/C 31M | (2003a) Making and Curing Concrete Test Specimens in the Field |
| ASTM C 33 | (2003) Concrete Aggregates |
| ASTM C 39/C 39M | (2004a) Compressive Strength of Cylindrical Concrete Specimens |
| ASTM C 494/C 494M | (2005) Chemical Admixtures for Concrete |

| | |
|---|---|
| ASTM C 94/C 94M | (2007) Standard Specification for Ready-Mixed Concrete |
| ASTM D 1752 | (2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion |
| ASTM D 75 | (2003) Sampling Aggregates |
| ASTM D 98 | (1998) Calcium Chloride |

U.S. ARMY CORPS OF ENGINEERS (USACE)

| | |
|---|---|
| COE CRD-C 400 | (1963) Requirements for Water for Use in Mixing or Curing Concrete |

## 1.2 SUBMITTALS

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

### SD-03 Product Data

Air-Entraining Admixture
Water-Reducing or Retarding Admixture
Curing Materials
Reinforcing Steel
Expansion Joint Filler Strips, Premolded

Manufacturer's literature is available from suppliers which demonstrates compliance with applicable specifications for the above materials.

### SD-06 Test Reports

Aggregates

Aggregates will be accepted on the basis of certificates of compliance and test reports that show the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

Concrete Mixture Proportions

Ten days prior to placement of concrete, the contractor shall submit the mixture proportions that will produce concrete of the quality required. Applicable test reports shall be submitted to verify that the concrete mixture proportions selected will produce concrete of the quality specified.

### SD-07 Certificates

Cementitious Materials

Certificates of compliance attesting that the concrete materials meet the requirements of the specifications shall be submitted in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE". Cementitious material will be accepted on the basis of a manufacturer's certificate of compliance, accompanied by mill test

reports that the material(s) meet the requirements of the specification under which it is furnished.

Aggregates

Aggregates will be accepted on the basis of certificates of compliance and tests reports that show the material(s) meet the quality and grading requirements of the specifications under which it is furnished.

## 1.3 DESIGN AND PERFORMANCE REQUIREMENTS

The Government will maintain the option to sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary to assist the Government in procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Concrete will be sampled in accordance with ASTM C 172. Slump and air content will be determined in accordance with ASTM C 143/C 143M and ASTM C 231, respectively, when cylinders are molded. Compression test specimens will be made, cured, and transported in accordance with ASTM C 31/C 31M. Compression test specimens will be tested in accordance with ASTM C 39/C 39M. Samples for strength tests will be taken not less than once each shift in which concrete is produced. A minimum of three specimens will be made from each sample; two will be tested at 28 days (90 days if pozzolan is used) for acceptance, and one will be tested at 7 days for information.

### 1.3.1 Strength

Acceptance test results will be the average strengths of two specimens tested at 28 days (90 days if pozzolan is used). The strength of the concrete will be considered satisfactory so long as the average of three consecutive acceptance test results equal or exceed the specified compressive strength, f'c, and no individual acceptance test result falls below f'c by more than 500 psi.

### 1.3.2 Concrete Mixture Proportions

Concrete mixture proportions shall be the responsibility of the Contractor. Mixture proportions shall include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic yard of concrete. All materials included in the mixture proportions shall be of the same type and from the same source as will be used on the project. Specified compressive strength f'c shall be 4,000 psi at 28 days (90 days if pozzolan is used). The maximum nominal size coarse aggregate shall be 3/4 inch, in accordance with ACI 318/318R. The air content shall be between 4.5 and 7.5 percent. The slump shall be between 2 and 5 inches. The maximum water cement ratio shall be 0.50.

# PART 2 PRODUCTS

## 2.1 MATERIALS

### 2.1.1 Cementitious Materials

Cementitious materials shall conform to the appropriate specifications listed:

#### 2.1.1.1 Portland Cement

ASTM C 150, Type II.

### 2.1.2 Aggregates

Fine and coarse aggregates shall meet the quality and grading requirements of ASTM C 33 Class Designations 4M or better.

### 2.1.3 Admixtures

Admixtures to be used, when required or approved, shall comply with the appropriate specification listed. Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be retested at the expense of the contractor at the request of the Contracting Officer and shall be rejected if test results are not satisfactory.

#### 2.1.3.1 Air-Entraining Admixture

Air-entraining admixture shall meet the requirements of ASTM C 260.

#### 2.1.3.2 Accelerating Admixture

Calcium chloride shall meet the requirements of ASTM D 98. Other accelerators shall meet the requirements of ASTM C 494/C 494M, Type C or E.

#### 2.1.3.3 Water-Reducing or Retarding Admixture

Water-reducing or retarding admixture shall meet the requirements of ASTM C 494/C 494M, Type A, B, or D.

### 2.1.4 Water

Water for mixing and curing shall be fresh, clean, potable, and free from injurious amounts of oil, acid, salt, or alkali, except that unpotable water may be used if it meets the requirements of COE CRD-C 400.

### 2.1.5 Reinforcing Steel

Reinforcing steel bar shall conform to the requirements of ASTM A 615/A 615M, Grade 60. Welded steel wire fabric shall conform to the requirements of ASTM A 185. Details of reinforcement not shown shall be in accordance with ACI 318/318R, Chapters 7 and 12.

### 2.1.6 Expansion Joint Filler Strips, Premolded

Expansion joint filler strips, premolded shall be sponge rubber conforming to ASTM D 1752, Type I.

2.1.7 Formwork

The design and engineering of the formwork as well as its construction, shall be the responsibility of the Contractor.

2.1.8 Form Coatings

Forms for exposed surfaces shall be coated with a nonstaining form oil, which shall be applied shortly before concrete is placed.

2.1.9 Curing Materials

Curing materials shall conform to the following requirements.

2.1.9.1 Impervious Sheet Materials

Impervious sheet materials, ASTM C 171, type optional, except polyethylene film, if used, shall be white opaque.

2.1.9.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or 2, Class A.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 General

Construction joints shall be prepared to expose coarse aggregate, and the surface shall be clean, damp, and free of laitance. Ramps and walkways, as necessary, shall be constructed to allow safe and expeditious access for concrete and workmen. Snow, ice, standing or flowing water, loose particles, debris, and foreign matter shall have been removed. Earth foundations shall be satisfactorily compacted. Spare vibrators shall be available. The entire preparation shall be accepted by the Government prior to placing.

3.1.2 Embedded Items

Reinforcement shall be secured in place; joints, anchors, and other embedded items shall have been positioned. Internal ties shall be arranged so that when the forms are removed the metal part of the tie will be not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Embedded items shall be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. All equipment needed to place, consolidate, protect, and cure the concrete shall be at the placement site and in good operating condition.

3.1.3 Formwork Installation

Forms shall be properly aligned, adequately supported, and mortar-tight. The form surfaces shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed faces. All exposed joints and edges shall be chamfered, unless otherwise indicated.

### 3.1.4 Production of Concrete

#### 3.1.4.1 Ready-Mixed Concrete

Ready-mixed concrete shall conform to ASTM C 94/C 94M except as otherwise specified.

## 3.2 CONVEYING AND PLACING CONCRETE

Conveying and placing concrete shall conform to the following requirements.

### 3.2.1 General

Concrete placement shall not be permitted when weather conditions prevent proper placement and consolidation without approval. When concrete is mixed and/or transported by a truck mixer, the concrete shall be delivered to the site of the work and discharge shall be completed within 1-1/2 hours or 45 minutes when the placing temperature is 85 degrees F or greater unless a retarding admixture is used. Concrete shall be conveyed from the mixer to the forms as rapidly as practicable by methods which prevent segregation or loss of ingredients. Concrete shall be in place and consolidated within 15 minutes after discharge from the mixer. Concrete shall be deposited as close as possible to its final position in the forms and be so regulated that it may be effectively consolidated in horizontal layers 18 inches or less in thickness with a minimum of lateral movement. The placement shall be carried on at such a rate that the formation of cold joints will be prevented.

### 3.2.2 Consolidation

Each layer of concrete shall be consolidated by rodding, spading, or internal vibrating equipment. Internal vibration shall be systematically accomplished by inserting the vibrator through the fresh concrete in the layer below at a uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator and overlay the adjacent, just-vibrated area by a few inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the layer below, if such a layer exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly at the rate of about 3 inches per second.

### 3.2.3 Cold-Weather Requirements

No concrete placement shall be made when the ambient temperature is below 35 degrees F or if the ambient temperature is below 40 degrees F and falling. Suitable covering and other means as approved shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing and at a temperature above freezing for the remainder of the curing period. Salt, chemicals, or other foreign materials shall not be mixed with the concrete to prevent freezing. Any concrete damaged by freezing shall be removed and replaced at the expense of the contractor.

### 3.2.4 Hot-Weather Requirements

When the rate of evaporation of surface moisture, as determined by use of Figure 1 of ACI 308R, is expected to exceed 0.2 psf per hour, provisions for windbreaks, shading, fog spraying, or covering with a light-colored material shall be made in advance of placement, and such protective

measures shall be taken as quickly as finishing operations will allow.

## 3.3 FORM REMOVAL

Forms shall not be removed before the expiration of 24 hours after concrete placement except where otherwise specifically authorized. Supporting forms and shoring shall not be removed until the concrete has cured for at least 5 days. When conditions on the work are such as to justify the requirement, forms will be required to remain in place for longer periods.

## 3.4 FINISHING

### 3.4.1 General

No finishing or repair will be done when either the concrete or the ambient temperature is below 50 degrees F.

### 3.4.2 Finishing Formed Surfaces

All fins and loose materials shall be removed, and surface defects including tie holes shall be filled. All honeycomb areas and other defects shall be repaired. All unsound concrete shall be removed from areas to be repaired. Surface defects greater than 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry-pack mortar. The prepared area shall be brush-coated with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filled with mortar or concrete. The cement used in mortar or concrete for repairs to all surfaces permanently exposed to view shall be a blend of portland cement and white cement so that the final color when cured will be the same as adjacent concrete.

### 3.4.3 Finishing Unformed Surfaces

All unformed surfaces that are not to be covered by additional concrete or backfill shall be float finished to elevations shown, unless otherwise specified. Surfaces to receive additional concrete or backfill shall be brought to the elevations shown and left as a true and regular surface. Exterior surfaces shall be sloped for drainage unless otherwise shown. Joints shall be carefully made with a jointing tool. Unformed surfaces shall be finished to a tolerance of 3/8 inch for a float finish as determined by a 10 foot straightedge placed on surfaces shown on the plans to be level or having a constant slope. Finishing shall not be performed while there is excess moisture or bleeding water on the surface. No water or cement shall be added to the surface during finishing.

#### 3.4.3.1 Broom Finish

A broom finish shall be applied. The concrete shall be screeded and floated to required finish plane with no coarse aggregate visible. After surface moisture disappears, the surface shall be broomed or brushed with a broom or fiber bristle brush in a direction transverse to that of the main traffic or as directed.

#### 3.4.3.2 Expansion and Contraction Joints

Expansion and contraction joints shall be made in accordance with the details shown or as otherwise specified. Provide 1/2 inch thick

transverse expansion joints where new work abuts an existing concrete. Expansion joints shall be provided at a maximum spacing of 50 feet on center in sidewalks, unless otherwise indicated. Contraction joints shall be provided at a maximum spacing of 5 linear feet in sidewalks , unless otherwise indicated. Contraction joints shall be cut at a minimum of 1 inch deep with a jointing tool after the surface has been finished.

## 3.5 CURING AND PROTECTION

Beginning immediately after placement and continuing for at least 7 days, all concrete shall be cured and protected from premature drying, extremes in temperature, rapid temperature change, freezing, mechanical damage, and exposure to rain or flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the site of the placement prior to the start of concrete placement. Preservation of moisture for concrete surfaces not in contact with forms shall be accomplished by one of the following methods:

a. Continuous sprinkling or ponding.

b. Application of absorptive mats or fabrics kept continuously wet.

c. Application of sand kept continuously wet.

d. Application of impervious sheet material conforming to ASTM C 171.

e. Application of membrane-forming curing compound conforming to ASTM C 309, Type 1-D, on surfaces permanently exposed to view and Type 2 on other surfaces shall be accomplished in accordance with manufacturer's instructions.

The preservation of moisture for concrete surfaces placed against wooden forms shall be accomplished by keeping the forms continuously wet for 7 days. If forms are removed prior to end of the required curing period, other curing methods shall be used for the balance of the curing period. During the period of protection removal, the temperature of the air in contact with the concrete shall not be allowed to drop more than 25 degrees F within a 24 hour period.

## 3.6 TESTS AND INSPECTIONS

### 3.6.1 General

The individuals who sample and test concrete as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

### 3.6.2 Inspection Details and Frequency of Testing

#### 3.6.2.1 Preparations for Placing

Foundation or construction joints, forms, and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor to certify that it is ready to receive concrete.

#### 3.6.2.2 Air Content

Air content shall be checked at least twice during each shift that

concrete is placed. Samples shall be obtained in accordance with ASTM C 172 and tested in accordance with ASTM C 231.

3.6.2.3 Slump

Slump shall be checked once for each truck load of concrete delivered to the job site. Samples shall be obtained in accordance with ASTM C 172 and tested in accordance with ASTM C 143/C 143M.

3.6.2.4 Compressive Strength

Provide one sample set for each 10 cubic yards of concrete placed; however, provide one sample for each abutment wall as a minimum in accordance with ASTM C 39/C 39M.

3.6.3 Action Required

3.6.3.1 Placing

The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators, which are in working order and have competent operators, are available. Placing shall not be continued if any pile is inadequately consolidated.

3.6.3.2 Air Content

Whenever a test result is outside the specification limits, the concrete shall not be delivered to the forms and an adjustment shall be made to the dosage of the air-entrainment admixture.

3.6.3.3 Slump

Whenever a test result is outside the specification limits, the concrete shall not be delivered to the forms and an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the water-cement ratio does not exceed that specified in the submitted concrete mixture proportion.

3.6.4 Reports

The results of all tests and inspections conducted at the project site shall be reported informally at the end of each shift and in writing weekly and shall be delivered within 3 days after the end of each weekly reporting period. See Section 01 45 10 QUALITY CONTROL.

-- End of Section --

# SECTION 04 20 00

# UNIT MASONRY
**11/15**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

| | |
|---|---|
| ACI 216.1 | (2014) Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies |
| ACI SP-66 | (2004) ACI Detailing Manual |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A1008/A1008M | (2015) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened |
| ASTM A1064/A1064M | (2015) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete |
| ASTM A153/A153M | (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware |
| ASTM A167 | (2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip |
| ASTM A185/A185M | (2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete |
| ASTM A615/A615M | (2015a) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement |
| ASTM A641/A641M | (2009a; R 2014) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire |
| ASTM A653/A653M | (2015) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by |

| | |
|---|---|
| | the Hot-Dip Process |
| ASTM A951/A951M | (2011) Standard Specification for Steel Wire for Masonry Joint Reinforcement |
| ASTM A996/A996M | (2015) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement |
| ASTM B370 | (2012) Standard Specification for Copper Sheet and Strip for Building Construction |
| ASTM C1019 | (2014) Standard Test Method for Sampling and Testing Grout |
| ASTM C1384 | (2012a) Standard Specification for Admixtures for Masonry Mortars |
| ASTM C1611/C1611M | (2014) Standard Test Method for Slump Flow of Self-Consolidating Concrete |
| ASTM C207 | (2006; R 2011) Standard Specification for Hydrated Lime for Masonry Purposes |
| ASTM C270 | (2014a) Standard Specification for Mortar for Unit Masonry |
| ASTM C476 | (2010) Standard Specification for Grout for Masonry |
| ASTM C494/C494M | (2013) Standard Specification for Chemical Admixtures for Concrete |
| ASTM C641 | (2009) Staining Materials in Lightweight Concrete Aggregates |
| ASTM C780 | (2015) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry |
| ASTM C90 | (2014) Loadbearing Concrete Masonry Units |
| ASTM D2000 | (2012) Standard Classification System for Rubber Products in Automotive Applications |
| ASTM D2287 | (2012) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds |

THE MASONRY SOCIETY (TMS)

| | |
|---|---|
| TMS MSJC | (2011) Masonry Standard Joint Committee's (MSJC) Book - Building Code Requirements and Specification for Masonry Structures, Containing TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6, and Companion Commentaries |

## 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Cut CMU Drawings;
Reinforcement Detail Drawings;

SD-03 Product Data

Hot Weather Procedures;
Cold Weather Procedures;
Cementitious Materials;

SD-04 Samples

Concrete Masonry Units (CMU);
Admixtures for Masonry Mortar;
Anchors, Ties, and Bar Positioners;
Joint Reinforcement;
Clay Masonry Expansion-Joint Materials;
INSULATION

SD-05 Design Data

Masonry Compressive Strength;
Fire-Rated Concrete Masonry Units
Bracing Calculations;

SD-06 Test Reports

Fire-Rated Concrete Masonry Units
Field Testing of Mortar
Field Testing of Grout

SD-07 Certificates

Concrete Masonry Units (CMU)
Cementitious Materials
Admixtures for Masonry Mortar
Admixtures for Grout
Anchors, Ties, and Bar Positioners
Joint Reinforcement

SD-08 Manufacturer's Instructions

Admixtures for Masonry Mortar
Admixtures for Grout

SD-10 Operation and Maintenance Data

SD-11 Closeout Submittals

## 1.3 QUALITY ASSURANCE

## 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver, store, handle, and protect material to avoid chipping, breakage, and contact with soil or contaminating material. Store and prepare materials in already disturbed areas to minimize project site disturbance and size of project site.

### 1.4.1 Masonry Units

Cover and protect masonry units from precipitation. Conform to handling and storage requirements of TMS MSJC.

a. Not used.

b. Mark prefabricated lintels on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

### 1.4.2 Reinforcement, Anchors, and Ties

Store steel reinforcing bars, coated anchors, ties, and joint reinforcement above the ground. Maintain steel reinforcing bars and uncoated ties free of loose mill scale and loose rust.

### 1.4.3 Cementitious Materials, Sand and Aggregates

Deliver cementitious and other packaged materials in unopened containers, plainly marked and labeled with manufacturers' names and brands. Store cementitious material in dry, weathertight enclosures or completely cover. Handle cementitious materials in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Store sand and aggregates in a manner to prevent contamination and segregation.

## 1.5 PROJECT/SITE CONDITIONS

Conform to TMS MSJC for hot and cold weather masonry erection.

### 1.5.1 Hot Weather Procedures

When ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F and the wind velocity is greater than 8 mph, comply with TMS MSJC Article 1.8 D for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

### 1.5.2 Cold Weather Procedures

When ambient temperature is below 40 degrees F, comply with TMS MSJC Article 1.8 C for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

# PART 2 PRODUCTS

## 2.1 SYSTEM DESCRIPTION

### 2.1.1 Design - Specified Compressive Strength of Masonry

The specified compressive strength of masonry, f'm, is as indicated for each type of masonry.

### 2.1.2 Performance - Verify Masonry Compressive Strength

Verify specified compressive strength of masonry using the "Unit Strength Method" of TMS MSJC. Submit calculations and certifications of unit and mortar strength.

Verify specified compressive strength of masonry using the "Prism Test Method" of TMS MSJC when the "Unit Strength Method" cannot be used. Submit test results.

## 2.2 MANUFACTURED UNITS

### 2.2.1 General Requirements

Do not change the source of materials, which will affect the appearance of the finished work, after the work has started except with Contracting Officer's approval. Submit test reports from an approved independent laboratory. Certify test reports on a previously tested material as the same materials as that proposed for use in this project. Submit certificates of compliance stating that the materials meet the specified requirements.

### 2.2.2 Concrete Units

#### 2.2.2.1 Aggregates

Test lightweight aggregates, and blends of lightweight and heavier aggregates in proportions used in producing the units, for stain-producing iron compounds in accordance with ASTM C641,visual classification method. Do not incorporate aggregates for which the iron stain deposited on the filter paper exceeds the "light stain" classification.

#### 2.2.2.2 Concrete Masonry Units (CMU)

##### 2.2.2.2.1 Size

For most situations, provide units with specified dimension of 7-5/8 inches wide, 7-5/8 inches high, and 15-5/8 inches long. Provide other sizes or shapes where required by existing conditions and to acheive a neat finished appearance.

##### 2.2.2.2.2 Surfaces

Provide units with exposed surfaces that are smooth and of uniform texture.

##### 2.2.2.2.3 Weather Exposure

Provide concrete masonry units with water-repellant admixture added during manufacture where units will be exposed to weather.

2.2.2.2.4 Unit Types

a. Hollow Load-Bearing Units: ASTM C90, lightweight. Provide load-bearing units for exterior walls, foundation walls, load-bearing walls, and shear walls.

b. Hollow Non-Load-Bearing Units: Provide Load-bearing units as specified above.

c. Solid Load-Bearing Units: ASTM C90, lightweight units. Provide solid units as indicated.

2.2.2.2.5 Jamb Units

Provide jamb units of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved.

Provide sash jamb units with a 3/4 by 3/4 inch groove near the center at end of each unit.

2.2.2.3 Fire-Rated Concrete Masonry Units

For indicated fire-rated construction, provide concrete masonry units of minimum equivalent thickness for the fire rating indicated and the corresponding type of aggregates indicated in TABLE I. Units containing more than one of the aggregates listed in TABLE I will be rated by linear interpolation based on the percent by dry-rodded volume of each aggregate used in manufacturing the units.

TABLE I
FIRE-RATED CONCRETE MASONRY UNITS

| Aggregate Type | Minimum Equivalent Thickness for Fire-Resistance Rating, inch | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1/2 hour | 3/4 hour | 1 hour | 1-1/2 hour | 2 hours | 3 hours | 4 hours |
| Calcareous or siliceous gravel (other than limestone) | 2.0 | 2.4 | 2.8 | 3.6 | 4.2 | 5.3 | 6.2 |
| Limestone, cinders, or air-cooled slag | 1.9 | 2.3 | 2.7 | 3.4 | 4.0 | 5.0 | 5.9 |
| Expanded clay, expanded shale, or expanded slate | 1.8 | 2.2 | 2.6 | 3.3 | 3.6 | 4.4 | 5.1 |
| Expanded slag or pumice | 1.5 | 1.9 | 2.1 | 2.7 | 3.2 | 4.0 | 4.7 |

Determine equivalent thickness in accordance with ACI 216.1. Where walls are to receive plaster or be faced with brick, or otherwise form an assembly; include the thickness of plaster or brick or other material in the assembly in determining the equivalent thickness. Submit calculation results.

## 2.3 EQUIPMENT

### 2.3.1 Vibrators

Maintain at least one vibrator on site at all times.

### 2.3.2 Grout Pumps

Pumping through aluminum tubes is not permitted.

## 2.4 MATERIALS

### 2.4.1 Mortar Materials

#### 2.4.1.1 Cementitious Materials

Provide cementitious materials that conform to those permitted by ASTM C270.

#### 2.4.1.2 Hydrated Lime and Alternates

Provide lime that conforms to one of the materials permitted by ASTM C207 for use in combination with portland cement, hydraulic cement, and blended hydraulic cement. Do not use lime in combination with masonry cement or mortar cement.

#### 2.4.1.3 Colored Mortar

Not required.

#### 2.4.1.4 Admixtures for Masonry Mortar

In cold weather, use a non-chloride based accelerating admixture that conforms to ASTM C1384, unless Type III portland cement is used in the mortar.

In showers and kitchens, use mortar that contains a water-repellent admixture that conforms to ASTM C1384. Provide a water-repellent admixture, conforming to ASTM C1384 and of the same brand and manufacturer as the block's integral water-repellent, in the mortar used to place concrete masonry units that have an integral water-repellent admixture.

#### 2.4.1.5 Aggregate and Water

Provide aggregate (sand) and water that conform to materials permitted by ASTM C270.

### 2.4.2 Grout and Ready-Mix Grout Materials

#### 2.4.2.1 Cementitious Materials for Grout

Provide cementitious materials that conform to those permitted by ASTM C476.

#### 2.4.2.2 Admixtures for Grout

Water-reducing admixtures that conform to ASTM C494/C494M Type F or G and viscosity-modifying admixtures that conform to ASTM C494/C494M Type S are permitted for use in grout. Other admixtures require approval by the Contracting Officer.

In cold weather, a non-chloride based accelerating admixture may be used subject to approval by the Contracting Officer; use accelerating admixture that is non-corrosive and conforms to ASTM C494/C494M, Type C.

2.4.2.3 Aggregate and Water

Provide fine and coarse aggregates and water that conform to materials permitted by ASTM C476.

2.5 MORTAR AND GROUT MIXES

2.5.1 Mortar Mix

a. Provide mortar as indicated on drawings.

2.5.2 Grout and Ready Mix Grout Mix

Use grout that conforms to ASTM C476, fine. Use conventional grout with a slump between 8 and 11 inches. Use self-consolidating grout with slump flow of 24 to 30 inches and a visual stability index (VSI) not greater than 1. Provide minimum grout strength of 2000 psi in 28 days, as tested in accordance with ASTM C1019. Do not change proportions and do not use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that grout meets the specified requirements. Use ready-mixed grout that conforms to ASTM C476.

2.6 ACCESSORIES

2.6.1 Grout Barriers

Grout barriers for vertical cores that consist of fine mesh wire, fiberglass, or expanded metal.

2.6.2 Anchors, Ties, and Bar Positioners

2.6.2.1 General

a. Fabricate anchors and ties without drips or crimps. Size anchors and ties to provide a minimum of 5/8 inch mortar cover from each face of masonry.

b. Fabricate steel wire anchors and ties shall from wire conforming to ASTM A1064/A1064M and hot-dip galvanize in accordance with ASTM A153/A153M.

c. Fabricate joint reinforcement in conformance with ASTM A951/A951M. Hot dip galvanize joint reinforcement in exterior walls and in interior walls exposed to moist environment in conformance with ASTM A153/A153M. Galvanize joint reinforcement in other interior walls in conformance with ASTM A641/A641M; coordinate with paragraph JOINT REINFORCEMENT below.

d. Fabricate sheet metal anchors and ties in conformance with ASTM A1008/A1008M. Hot dip galvanize sheet metal anchors and ties in exterior walls and in interior walls exposed to moist environment in compliance with ASTM A153/A153M Class B. Galvanize sheet metal anchors and ties in other interior walls in compliance with ASTM A653/A653M, Coating Designation G60.

e. Submit two anchors, ties and bar positioners of each type used, as samples.

2.6.2.2 Wire Mesh Anchors

Provide wire mesh anchors of 1/4 inch mesh galvanized hardware cloth, conforming to ASTM A185/A185M, with length not less than 12 inches, at intersections of interior non-bearing masonry walls.

2.6.2.3 Wall Ties for Multi-Wythe Masonry Construction

Provide rectangular-shaped wall ties, fabricated of hot-dipped galvanized W2.8 diameter steel wire. Provide rectangular wall ties no less than 4 inches wide.

Provide adjustable type wall ties that consist of two essentially U-shaped elements fabricated of minimum W2.8 diameter steel wire or pintle type ties that are inserted to eyes of horizontal joint reinforcement, hot-dip galvanized. Provide adjustable ties with double pintle legs and allows a maximum offset of 1-1/4 inch between each element of the tie and maximum distance between connecting parts no more than 1/16 inch. Form the pintle and eye elements shall be formed so that both can be in the same plane. Wall ties may also be of a continuous type conforming to paragraph JOINT REINFORCEMENT.

2.6.2.4 Dovetail Anchors

Provide dovetail anchors of 3/16 inch diameter steel wire, triangular shaped, and attached to a 12 gauge or heavier steel dovetail section. Use these anchors to connect the exterior masonry wythe as it passes over the face of concrete columns, beams, or walls. Fill cells immediately above and below these anchors unless solid units are used. Furnish dovetail slots, which are specified to be installed by others, in accordance with Section 03 30 04 CONCRETE.

2.6.2.5 Adjustable Anchors

2.6.2.6 Bar Positioners

Factory-fabricate bar positioners, used to prevent displacement of reinforcing bars during the course of construction, from 9 gauge steel wire or equivalent, and hot-dip galvanized.

2.6.3 Joint Reinforcement

Factory fabricate joint reinforcement in conformance with ASTM A951/A951M, welded construction. Provide ladder type joint reinforcement, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units and with all wires a minimum of 9 gauge - provide thicker if so indicated in Strucutral Drawings. Size joint reinforcement to provide a minimum of 5/8 inch cover from each face. Space crosswires not more than 16 inches. Provide joint reinforcement for straight runs in flat sections not less than 10 feet long. Provide joint reinforcement with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features. Submit one piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

2.6.4 Reinforcing Steel Bars

Reinforcing steel bars and rods shall conform to ASTM A615/A615M or ASTM A996/A996M, Grade 60.

2.6.5 Concrete Masonry Control Joint Keys

Provide control joint keys of a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D2000 M2AA-805 with a minimum durometer hardness of 80 or polyvinyl chloride conforming to ASTM D2287 Type PVC 654-4 with a minimum durometer hardness of 85. Form the control joint key with a solid shear section not less than 5/8 inch thick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch, to fit neatly, but without forcing, in masonry unit jamb sash grooves.

2.6.6 Clay Masonry Expansion-Joint Materials

Provide backer rod and sealant, adequate to accommodate joint compression and extension equal to 50 percent of the width of the joint. Provide the backer rod of compressible rod stock of closed cell polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Provide sealant in conformance with Section 07 92 00 JOINT SEALANTS.

Submit one piece of each type of material used.

2.6.7 Through Wall Flashing and Weeps

2.6.7.1 General

Provide coated copper, copper or stainless steel sheet, self-adhesive rubberized sheet, or reinforced membrane sheet flashing except that flashing indicated to terminate in reglets shall be metal or coated-metal flashing and except that the material shall be one which is not adversely affected by dampproofing material.

2.6.7.2 Coated-Copper Flashing

Provide 7 ounce, electrolytic copper sheet, uniformly coated on both sides with acidproof, alkaliproof, asphalt impregnated kraft paper or polyethylene sheets.

2.6.7.3 Copper or Stainless Steel Flashing

Provide copper sheet, complying with ASTM B370, minimum 16 ounce weight; or stainless steel, ASTM A167, Type 304 or 316, 0.015 inch thick, No. 2D finish. Where indicated, provide with factory-fabricated deformations that mechanically bond flashing against horizontal movement in all directions, where deformations consist of dimples, diagonal corrugations, or a combination of dimples and transverse corrugations.

2.6.7.4 Reinforced Membrane Flashing

Provide polyester film core with a reinforcing fiberglass scrim bonded to one side. Provide membrane that is impervious to moisture, flexible, is not affected by caustic alkalis, and after being exposed for not less than 1/2 hour to a temperature of 32 degrees F, shows no cracking when, at that temperature, it is bent 180 degrees over a 1/16 inch diameter mandrel and

then bent at the same point over the same size mandrel in the opposite direction 360 degrees.

2.6.7.5 Rubberized Flashing

Provide self-adhesive rubberized asphalt sheet flashing consisting of 32-mil thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8-mil thick, high density, cross-laminated polyethylene film to produce an overall thickness of 40 mils. Provide rubberized, asphalt-based mastic and surface conditioner that are each approved by flashing manufacturer for use with flashing material.

2.6.7.6 Weep Ventilators

Provide weep ventilators that are prefabricated from stainless steel or plastic. Provide inserts with grill or louver-type openings designed to allow the passage of moisture from cavities and to prevent the entrance of insects, and with a rectangular closure strip to prevent mortar droppings from clogging the opening. Provide ventilators with compressible flanges to fit in a standard 3/8 inch wide mortar joint and with height equal to the nominal height of the unit..

2.6.7.7 Metal Drip Edge

Provide stainless steel drip edge, 15-mil thick, hemmed edges, with down-turned drip at the outside edge and upturned dam at the inside edge for use with membrane flashings.

2.6.8 RIGID BOARD-TYPE INSULATION

Provide rigid board-type insulation as indicated.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to start of work, verify the applicable conditions as set forth in TMS MSJC, inspection.

3.2 PREPARATION

3.2.1 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.2.2 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.2.3 Concrete Surfaces

Where masonry is to be placed, clean concrete of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to

provide a surface texture with a depth of at least 1/8 inch. Sandblast, if necessary, to remove laitance from pores and to expose the aggregate.

3.2.4 Shelf Angles

Adjust shelf angles as required to keep the masonry level and at the proper elevation.

3.2.5 Bracing

Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by OSHA and local codes and submit bracing calculations, sealed by a registered professional engineer. Do not remove bracing in less than 10 days.

3.3 ERECTION

General

a. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Lay masonry units in a running bond pattern. MATCH EXISTING BUILDING. Lay facing courses level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances is plus or minus 1/2 inch. Adjust each unit to its final position while mortar is still soft and has plastic consistency.

b. Remove and clean units that have been disturbed after the mortar has stiffened, and re-lay with fresh mortar. Keep air spaces, cavities, chases, expansion joints, and spaces to be grouted free from mortar and other debris. Select units to be used in exposed masonry surfaces from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work.

c. When necessary to temporarily discontinue the work, step (rack) back the masonry for joining when work resumes. Toothing may be used only when specifically approved by the Contracting Officer. Before resuming work, remove loose mortar and thoroughly clean the exposed joint. Cover the top of walls subjected to rain or snow with nonstaining waterproof covering or membrane when work is not in process. Extend the covering a minimum of 610 mm 2 feet down on each side of the wall and hold securely in place.

d. Ensure that units being laid and surfaces to receive units are free of water film and frost. Lay solid units in a nonfurrowed full bed of mortar. Bevel mortar for veneer wythes and slope down toward the cavity side. Shove units into place so that the vertical joints are tight. Completely fill vertical joints between solid units with mortar, except where indicated at control, expansion, and isolation joints. Place hollow units so that mortar extends to the depth of the face shell at heads and beds, unless otherwise indicated. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Provide means to prevent mortar from dropping into the space below or clean grout spaces prior to grouting.

d. In multi-wythe construction with collar joints no more than 3/4 inch wide, bring up the inner wythe not more than 16 inches ahead of the outer wythe. Fill collar joints with mortar during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe

by back-buttering each unit as it is laid.

3.3.1 Jointing

Tool mortar joints when the mortar is thumbprint hard. Tool horizontal joints after tooling vertical joints. Brush mortar joints to remove loose and excess mortar.

3.3.1.1 Tooled Joints

Tool mortar joints in exposed exterior and interior masonry surfaces concave, using a jointer that is slightly larger than the joint width so that complete contact is made along the edges of the unit. Perform tooling so that the mortar is compressed and the joint surface is sealed. Use a jointer of sufficient length to obtain a straight and true mortar joint.

3.3.1.2 Flush Joints

Flush cut mortar joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas. Finish flush cut joints by cutting off the mortar flush with the face of the wall. Point joints in unparged masonry walls below grade tight. For architectural units, such as fluted units, completely fill both the head and bed joints and flush cut.

3.3.1.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

3.3.1.4 Joint Widths

a. Not used.

b. Provide 3/8 inch wide mortar joints in concrete masonry, except for prefaced concrete masonry units.

c. Provide 3/8 inch wide mortar joints on unfaced side of prefaced concrete masonry units and not less than 3/16 inch nor more than 1/4 inch wide on prefaced side.

d. Maintain mortar joint widths within tolerances permitted by TMS MSJC

3.3.2 Cutting and Fitting

Use full units of the proper size wherever possible, in lieu of cut units. Locate cut units where they would have the least impact on the architectural aesthetic goals of the facility. Perform cutting and fitting, including that required to accommodate the work of others, by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Before being placed in the work, dry wet-cut units to the same surface-dry appearance as uncut units being laid in the wall. Provide cut edges that are clean, true and sharp.

a. Carefully make openings in the masonry so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry

bed joints. Provide reinforced masonry lintels above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

b. Do not reduce masonry units in size by more than one-third in height and one-half in length. Do not locate cut products at ends of walls, corners, and other openings.

3.3.3 Unfinished Work

Rack back unfinished work for joining with new work. Toothing may be resorted to only when specifically approved by the Contracting Officer. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.3.4 Clay Masonry Expansion Joints

Provide clay masonry expansion joints as indicated. Construct by leaving a gap and filling with a compressible foam pad. Ensure that no mortar or other noncompressible materials are within the joint. Install backer rod and sealant in accordance with Section 07 92 00 JOINT SEALANTS.

3.3.5 Control Joints

Provide control joints in concrete masonry as indicated. Construct by using sash jamb units with control joint key in accordance with the details shown on the Drawings. Form a continuous vertical joint at control joint locations, including through bond beams, by utilizing half blocks in alternating courses on each side of the joint. Interrupt the control joint key in courses containing continuous bond beam reinforcement.

Where mortar was placed in the joint, rake both faces of the control joints to a depth of 3/4 inch. Install backer rod and sealant on both faces in accordance with Section 07 92 00 JOINT SEALANTS.

3.3.6 Partitions

a. Construct partitions continuous from floor to underside of floor or roof deck where shown. Fill openings in firewalls around joists and other structural members as indicated or approved. Where suspended ceilings on both sides of partitions are indicated, the partitions other than those shown to be continuous may be stopped approximately 4 inches above the ceiling level. Construct an isolation joint in the intersection between partitions and structural or exterior walls.

b. Tie interior partitions having 4 inch nominal thickness units to intersecting partitions of 4 inch units, 5 inches into partitions of 6 inch units, and 7 inches into partitions of 8 inch or thicker units. Cells within vertical plane of ties shall be filled solid with grout for full height of partition or solid masonry units may be used. Tie interior partitions over 4 inches thick together with joint reinforcement. Provide joint reinforcement with prefabricated pieces at corners and intersections of partitions.

3.3.7 Anchored Veneer Construction

a. Construct exterior masonry wythes to the thickness indicated on the drawings. Provide a minimum 1 inch air space behind the masonry

veneer. Provide means to ensure that the cavity space and flashings are kept clean of mortar droppings and other loose debris. Maintain chases and raked-out joints free from mortar and debris.

d. For veneer with a masonry backup wythe, lay up both the inner and the outer wythes together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, install through-wall flashings with the exterior wythe, securing the top edge of the flashing with a termination bar and sealant, or protect flashings that are installed with the interior wythe from damage until they are fully enclosed in the wall.

e. Provide anchors (ties) to connect the veneer to its backing in sufficient quantity to comply with the following requirements: maximum vertical spacing of 16 inches, and maximum horizontal spacing of 24 inches. Provide additional anchors around openings larger than 16 inch in either direction. Space anchors around perimeter of opening at a maximum of 24 inches on center. Place anchors within 12 inches of openings. Anchors with drips are not permitted.

f. With solid units, embed anchors in mortar joint and extend into the veneer a minimum of 1-1/2 inch, with at least 5/8 inch mortar cover to the outside face.

g. With hollow units, embed anchors in mortar or grout and extend into the veneer a minimum of 1-1/2 inch, with at least 5/8 inch mortar or grout cover to outside face.

3.3.8 Composite Walls

Tie masonry wythes together with joint reinforcement or with unit wall ties. Embed wall ties at least 1-1/2 inch into mortar of solid units and at least 1/2 inch into the mortar of the outer face shell of hollow units. Provide at least one tie every 2.67 square feet for wire size W1.7 and at least one tie every 4.50 square feet for wire size W2.8. Space ties at a maximum of 36 inches horizontally and 24 inches vertically. Do not cross expansion joints or control joints with ties. Fill collar joints between masonry facing and masonry backup solidly with grout.

3.3.9 Reinforced, Single Wythe Concrete Masonry Units Walls

3.3.9.1 Concrete Masonry Unit Placement

a. Fully bed units used to form piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout in mortar under both face shells and webs. Provide mortar beds under both face shells for other units. Mortar head joints for a distance in from the face of the unit not less than the thickness of the face shell.

b. Solidly grout foundation walls below grade.

c. Stiffen double walls at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of each wall within the double wall. Adequately reinforce walls and partitions for support of wall-hung plumbing fixtures when chair carriers are not specified.

d. Submit drawings showing elevations of walls exposed to view and indicating the location of all cut CMU products.

3.3.9.2 Preparation for Reinforcement

Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be grouted. Remove mortar protrusions extending 1/2 inch or more into cells before placing grout. Position reinforcing bars accurately as indicated before placing grout. Where vertical reinforcement occurs, fill cores solid with grout in accordance with paragraph PLACING GROUT in this Section.

3.3.10 ANCHORAGE

3.3.10.1 Anchorage to Concrete

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.3.10.2 Anchorage to Structural Steel

Masonry shall be anchored to vertical structural steel framing with adjustable steel wire anchors spaced not over 16 inches on centers vertically, and if applicable, not over 24 inches on centers horizontally.

3.3.10.3 Anchorage at Intersecting Walls

Provide wire mesh anchors at maximum 16 inches spacing at intersections of interior non-bearing masonry walls.

3.3.11 Lintels

3.3.11.1 Masonry Lintels

Construct masonry lintels with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated. Extend lintel reinforcement beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Support reinforcing bars in place prior to grouting and locate 1/2 inch above the bottom inside surface of the lintel unit.

3.3.11.2 Precast Concrete and Steel Lintels

Provide precast concrete and steel lintels as shown on the Drawings. Set lintels in a full bed of mortar with faces plumb and true. Provide steel and precast lintels with a minimum bearing length of 8 inches unless otherwise indicated. In partially grouted masonry, provide fully grouted units under the full lintel bearing length, unless otherwise indicated.

3.3.12 Sills and Copings

Set sills and copings in a full bed of mortar with faces plumb and true. Slope sills and copings to drain water. Mechanically anchor copings and sills longer than 4 feet as indicated.

## 3.4 INSTALLATION

### 3.4.1 Bar Reinforcement Installation

#### 3.4.1.1 Preparation

Submit detail drawings showing bar splice locations. Identify bent bars on a bending diagram and reference and locate such bars on the drawings. Show wall dimensions, bar clearances, and wall openings. Utilize bending details that conform to the requirements of ACI SP-66. No approval will be given to the shop drawings until the Contractor certifies that all openings, including those for mechanical and electrical service, are shown. If, during construction, additional masonry openings are required, resubmit the approved shop drawings with the additional openings shown along with the proposed changes. Clearly highlight location of these additional openings. Provide wall elevation drawings with minimum scale of 1/4 inch per foot. Submit drawings including plans, elevations, and details of wall reinforcement; details of reinforcing bars at corners and wall intersections; offsets; tops, bottoms, and ends of walls; control and expansion joints; lintels; and wall openings.

Clean reinforcement of loose, flaky rust, scale, grease, mortar, grout, and other coatings that might destroy or reduce its bond prior to placing grout. Do not use bars with kinks or bends not shown on the approved shop drawings. Place reinforcement prior to grouting. Unless otherwise indicated, extend vertical wall reinforcement to within 2 inches of tops of walls.

#### 3.4.1.2 Positioning Bars

a. Accurately place vertical bars within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inch shall be maintained between the bars and masonry units. Provide minimum clearance between parallel bars of 1/2 inch between the bars and masonry units for coarse grout and a minimum clearance of 1/4 inch between the bars and masonry units for fine grout. Provide minimum clearance between parallel bars of 1 inch or one diameter of the reinforcement, whichever is greater. Vertical reinforcement may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement or by other means to prevent displacement beyond permitted tolerances. As masonry work progresses, secure vertical reinforcement to prevent displacement beyond allowable tolerances.

b. Wire column and pilaster lateral ties in position around the vertical reinforcing bars. Place lateral ties in contact with the vertical reinforcement and do not place in horizontal mortar bed joints.

c. Position horizontal reinforcing bars as indicated. Stagger splices in adjacent horizontal bars, unless otherwise indicated.

d. Form splices by lapping bars as indicated. Do not cut, bend or eliminate reinforcing bars. Foundation dowel bars may be field-bent when permitted by TMS MSJC.

#### 3.4.1.3 Splices of Bar Reinforcement

Lap splice reinforcing bars as indicated. When used, provide welded or mechanical connections that develop at least 125 percent of the specified

yield strength of the reinforcement.

3.4.2 Placing Grout

3.4.2.1 General

Fill cells containing reinforcing bars with grout. Solidly grout hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces. Solidly grout cells under lintel bearings on each side of openings for full height of openings. Solidly grout walls below grade, lintels, and bond beams. Units other than open end units may require grouting each course to preclude voids in the units.

Discard site-mixed grout that is not placed within 1-1/2 hours after water is first added to the batch or when the specified slump is not met without adding water after initial mixing. Discard ready-mixed grout that does not meet the specified slump without adding water other than water that was added at the time of initial discharge. Allow sufficient time between grout lifts to preclude displacement or cracking of face shells of masonry units. Provide a grout shear key between lifts when grouting is delayed and the lower lift loses plasticity. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, tear down the wall and rebuild.

3.4.2.2 Vertical Grout Barriers for Multi-Wythe Composite Walls

In multi-wythe composite walls, provide grout barriers in the collar join not more than 30 feet apart, or as required, to limit the horizontal flow of grout for each pour.

3.4.2.3 Horizontal Grout Barriers

Embed horizontal grout barriers in mortar below cells of hollow units receiving grout.

3.4.2.4 Grout Holes and Cleanouts

3.4.2.4.1 Grout Holes

Provide grouting holes in slabs, spandrel beams, and other in-place overhead construction. Locate holes over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Provide additional openings spaced not more than 16 inches on centers where grouting of hollow unit masonry is indicated. Fom such openings not less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, plug and finish grouting holes to match surrounding surfaces.

3.4.2.4.2 Cleanouts for Hollow Unit Masonry Construction

For hollow masonry units. provide cleanout holes at the bottom of every grout pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet 4 inches. Where all cells are to be grouted, construct cleanout courses using bond beam units in an inverted position to permit cleaning of all cells. Provide cleanout holes at a maximum spacing of 32 inches where all cells are to be filled with grout.

Establish a new series of cleanouts if grouting operations are stopped

for more than 4 hours. Provide cleanouts not less than 3 by 3 inch by cutting openings in one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Do not cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

3.4.2.5 Grout Placement

A grout pour is the total height of masonry to be grouted prior to erection of additional masonry. A grout lift is an increment of grout placement within a grout pour. A grout pour is filled by one or more lifts of grout.

a. Lay masonry to the top of a pour permitted by TMS MSJC Table 7, based on the size of the grout space and the type of grout. Prior to grouting, remove masonry protrusions that extend 1/2 inch or more into cells or spaces to be grouted. Provide grout holes and cleanouts in accordance with paragraph GROUT HOLES AND CLEANOUTS above when the grout pour height exceeds 5 feet 4 inches. Hold reinforcement, bolts, and embedded connections rigidly in position before grouting is started. Do not prewet concrete masonry units.

b. Place grout using a hand bucket, concrete hopper, or grout pump to fill the grout space without segregation of aggregate. Operate grout pumps to produce a continuous stream of grout without air pockets, segregation, or contamination.

c. If the masonry has cured at least 4 hours, grout slump is maintained between 10 to 11 inches, and no intermediate reinforced bond beams are placed between the top and bottom of the pour height, place conventional grout in lifts not exceeding 12 feet 8 inches. For the same curing and slump conditions but with intermediate bond beams, limit conventional grout lift to the bottom of the lowest bond beam that is more than 5 feet 4 inches above the bottom of the lift, but do not exceed 12 feet 8 inches. If masonry has not cured at least 4 hours or grout slump is not maintained between 10 to 11 inches, place conventional grout in lifts not exceeding 5 feet 4 inches.

d. Consolidate conventional grout lift and reconsolidate after initial settlement before placing next lift. For grout pours that are 12 inches or less in height, consolidate and reconsolidate grout by mechanical vibration or puddling. For grout pours that are greater than 12 inches in height, consolidate and reconsolidate grout by mechanical vibration. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation. If previous lift is not permitted to set, dip vibrator into previous lift. Do not insert vibrators into lower lifts that are in a semi-solidified state. If lower lift sets prior to placement of subsequent lift, form a grout key by terminating grout a minimum of 1-1/2 inch below a mortar joint. Vibrate each vertical cell containing reinforcement in partially grouted masonry. Do not form grout keys within beams.

e. If the masonry has cured 4 hours, place self-consolidating grout (SCG) in lifts not exceeding the pour height. If masonry has not cured for at least 4 hours, place SCG in lifts not exceeding 5 feet 4 inches. Do not mechanically consolidate self-consolidating grout. Place

self-consolidating grout in accordance with manufacturer's recommendations.

f. Upon completion of each day's grouting, remove waste materials and debris from the equipment, and dispose of outside the masonry.

3.4.3 Joint Reinforcement Installation

Install joint reinforcement at 16 inches on center unless otherwise indicated. Lap joint reinforcement not less than 6 inches. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement in mortar beds to provide not less than 5/8 inch cover to either face of the unit.

3.4.4 Bond Beams

Reinforce and grout bond beams as indicated and as described in paragraphs above. Install grout barriers under bond beam units to retain the grout as required, unless wall is fully grouted or solid bottom units are used. For high lift grouting in partially grouted masonry, provide grout retaining material on the top of bond beams to prevent upward flow of grout. Ensure that reinforcement is continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated.

3.4.5 Flashing and Weeps

Install through-wall flashing at obstructions in the cavity and where indicated on Drawings. Ensure continuity of the flashing at laps and inside and outside corners by splicing in a manner approved by the flashing manufacturer. Ensure that the top edge of the flashing is sealed by attaching a termination bar and applying compatible sealant at the top edge of the termination bar. Terminate the horizontal leg of the flashing by extending the sheet metal 1/2 inch beyond the outside face of masonry and turning downward with a hemmed drip or terminating the fabric flashing 1/2 inch short of the outside face of masonry and adhering the flashing to a sheet metal drip edge or extending the fabric flashing beyond the outside face of masonry and, when construction is complete, cutting the flashing flush with the face of masonry, whichever is most applicable. Provide sealant below the drip edge of through-wall flashing.

Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior at acceptable locations as indicated. Provide weeps of weep ventilators. Locate weeps not more than 24 inches on centers in mortar joints of the exterior wythe directly on the horizontal leg of through-wall flashing over foundations, bond beams, and any other horizontal interruptions of the cavity. Place weep holes perfectly horizontal or slightly canted downward to encourage water drainage outward and not inward. Other methods may be used for providing weeps when spacing is reduced to 16 inches on center and approved by the Contracting Officer. Maintain weeps free of mortar and other obstructions.

3.5 APPLICATION

3.5.1 Interface with Other Products

3.5.1.1 Built-In Items

Fill spaces around built-in items with mortar. Point openings around

flush-mount electrical outlet boxes in wet locations with mortar. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses. Fully embed anchors, ties and joint reinforcement in the mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout, unless otherwise indicated.

3.5.1.2 Door and Window Frame Joints

On the exposed interior and exterior sides of exterior frames, rake joints between frames and abutting masonry walls to a depth of 3/8 inch.

3.5.1.3 Bearing Plates

Set bearing plates for beams, joists, joist girders and similar structural members to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Provide bedding mortar and non-shrink grout s specified in Section 03 30 04 CONCRETE.

3.5.2 Tolerances

Lay masonry plumb, true to line, with courses level within the tolerances of TMS MSJC, Article 3.3 F.

3.6 FIELD QUALITY CONTROL

Tests

3.6.1 Field Testing of Mortar

Perform mortar testing at the following frequency: 1 times per each 300 square feet of wall installed. For each required mortar test, provide a minimum of three mortar samples. Perform initial mortar testing prior to construction for comparison purposes during construction.

Prepare and test mortar samples for mortar aggregate ratio in accordance with ASTM C780 Appendix A4.

3.6.2 Field Testing of Grout

a. Perform grout testing at the following frequency: 1 times per each 300 square feet of wall installed. For each required grout property to be evaluated, provide a minimum of three specimens.

b. Sample and test conventional and self-conslidating grout for compressive strength and temperature in accordance with ASTM C1019.

c. Evaluate slump in conventional grout in accordance with ASTM C1019.

d. Evaluate slump flow and visual stability index of self-consolidating grout in accordance with ASTM C1611/C1611M.

3.7 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, completely remove mortar and grout daubs and splashings from masonry-unit surfaces that will be exposed or painted. Before completion of the work, rake out defects in joints of masonry to be exposed or painted, fill with mortar, and tool to match existing joints. Immediately

after grout work is completed, remove scum and stains that have percolated through the masonry work using a low pressure stream of water and a stiff bristled brush. Do not clean masonry surfaces, other than removing excess surface mortar, until mortar in joints has hardened. Leave masonry surfaces clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Do not use metal tools and metal brushes for cleaning.

### 3.7.1 Dry-Brushing Concrete Masonry

Dry brush exposed concrete masonry surfaces at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

## PROTECTION

Protect facing materials against staining. Cover top of walls with nonstaining waterproof covering or membrane to protect from moisture intrusion when work is not in progress. Continue covering the top of the unfinished walls until the wall is waterproofed with a complete roof or parapet system. Extend covering a minimum of 2 feet down on each side of the wall and hold securely in place. Before starting or resuming work, clean top surface of masonry in place of loose mortar and foreign material.

-- End of Section --

# SECTION 06 10 00

# ROUGH CARPENTRY
**05/11**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

| | |
|---|---|
| AF&PA T10 | (2001) Wood Frame Construction Manual for One- and Two-Family Dwellings |
| AF&PA T101 | (2005) National Design Specification (NDS) for Wood Construction |

AMERICAN HARDBOARD ASSOCIATION (AHA)

| | |
|---|---|
| AHA A135.4 | (1995; R 2004) Basic Hardboard |

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

| | |
|---|---|
| AITC 111 | (2005) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection |
| AITC TCM | (2004; Errata 2008) Timber Construction Manual, 5th Edition |
| ANSI/AITC A190.1 | (2007) American National Standard, Structural Glued Laminated Timber |

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)

| | |
|---|---|
| ALSC PS 20 | (2010) American Softwood Lumber Standard |

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

| | |
|---|---|
| AREMA Eng Man | (2010) Manual for Railway Engineering |

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

| | |
|---|---|
| AWPA BOOK | (2009) AWPA Book of Standards |
| AWPA M2 | (2007) Standard for Inspection of Treated Wood Products |
| AWPA M6 | (2007) Brands Used on Forest Products |
| AWPA P5 | (2009) Standard for Waterborne Preservatives |

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

| | |
|---|---|
| APA E30 | (2005) Engineered Wood Construction Guide |
| APA E445S | (2001; R 2002) Performance Standards and Qualification Policy for Structural-Use Panels (APA PRP-108) |
| APA EWS R540C | (1995; R 1996) Builder Tips Proper Storage and Handling of Glulam Beams |
| APA EWS T300E | (2005) Technical Note: Glulam Connection Details |
| APA F405L | (1999) Performance Rated Panels |
| APA PS 1 | (1995) Voluntary Product Standard for Construction and Industrial Plywood |
| APA PS 2 | (2004) Voluntary Product Standard for Wood-Based Structural-Use Panels |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME B18.2.1 | (2010) Square and Hex Bolts and Screws (Inch Series) |
| ASME B18.2.2 | (2010) Standard for Square and Hex Nuts |
| ASME B18.5.2.1M | (2006) Metric Round Head Short Square Neck Bolts |
| ASME B18.5.2.2M | (1982; R 2005) Metric Round Head Square Neck Bolts |
| ASME B18.6.1 | (1981; R 2008) Wood Screws (Inch Series) |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A307 | (2010) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength |
| ASTM A653/A653M | (2010) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| ASTM C 1136 | (2010) Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation |
| ASTM D 3498 | (2011) Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems |
| ASTM E 96/E 96M | (2010) Standard Test Methods for Water Vapor Transmission of Materials |
| ASTM F 1667 | (2011) Driven Fasteners: Nails, Spikes, |

and Staples

ASTM F 547 (2006) Nails for Use with Wood and Wood-Base Materials

FM GLOBAL (FM)

FM 4435 (2004) Roof Perimeter Flashing

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2009; Errata First Printing) International Building Code

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules (2007) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules (2006) Standard Grading Rules for Northeastern Lumber

REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)

RIS Grade Use (1998) Redwood Lumber Grades and Uses

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Spec (1986; Supple. No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003 (2002) Standard Grading Rules for Southern Pine Lumber

TRUSS PLATE INSTITUTE (TPI)

TPI 1 (2002) National Design Standard for Metal Plate Connected Wood Truss Construction; Commentary and Appendices

TPI HIB (1991) Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC/NIST PS56 (1973) Structural Glued Laminated Timber

DOC/NIST PS58 (1973) Basic Hardboard (ANSI A135.4)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923 (Rev A; Notice 2) Shield, Expansion (Lag,

| | |
|---|---|
| | Machine and Externally Threaded Wedge Bolt Anchors) |
| CID A-A-1924 | (Rev A; Notice 2) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors |
| CID A-A-1925 | (Rev A; Notice 2) Shield Expansion (Nail Anchors) |
| FS UU-B-790 | (Rev A; Am 1; Notice 1) Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant) |

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

| | |
|---|---|
| WCLIB 17 | (2000) Standard Grading Rules |

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

| | |
|---|---|
| WWPA G-5 | (1998) Western Lumber Grading Rules |

## 1.2 SUBMITTALS

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

SD-02 Shop Drawings

Structural glued laminated members;

Fabricated structural members;

Modifications of structural members;

Drawings of structural laminated members, fabricated wood trusses, engineered wood joists and rafters, and other fabricated structural members indicating materials, shop fabrication, and field erection details; including methods of fastening.

Nailers and Nailing Strips;

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

SD-03 Product Data

Underlayment;

Engineered wood products;
Structural-use;

SD-05 Design Data

Modifications of structural members;

Design analysis and calculations showing design criteria used to

accomplish the applicable analysis.

SD-06 Test Reports

Preservative-treated lumber and plywood

SD-07 Certificates

Certificates of grade

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

Preservative treatment

SD-10 Operation and Maintenance Data

SD-11 Closeout Submittals

## 1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Store wood I-beams and glue-laminated beams and joists on edge. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540C. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

## 1.4 GRADING AND MARKING

### 1.4.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

### 1.4.2 Structural Glued Laminated Timber

Mark each member with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of structural glued laminated timber products. The marking shall indicate compliance with ANSI/AITC A190.1 and shall include all identification information required by ANSI/AITC A190.1. Structurally end-jointed lumber shall also be certified and grade marked in accordance with

ANSI/AITC A190.1.

1.4.3 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA PS 1.Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

1.4.4 Structural-Use

Mark each panel with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the panel. The mark shall indicate end use, span rating, and exposure durability classification.

Oriented Strand Board (OSB) is prohibited.

1.4.5 Preservative-Treated Lumber and Plywood

The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.4.6 Hardboard, Gypsum Board, and Fiberboard

Mark each sheet or bundle to identify the standard under which the material is produced and the producer.

1.5 SIZES AND SURFACING

ALSC PS 20 for dressed sizes of yard and structural lumber. Lumber shall be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products shall be as follows at the time of delivery to the job site:

a. Framing lumber and board, 19 percent maximum

b. Timbers 5 inches and thicker, 25 percent maximum

c. Roof planking, 15 percent maximum

d. Materials other than lumber; moisture content shall be in accordance with standard under which the product is produced

## 1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to AWPA P5. Pressure treatment of wood products shall conform to the requirements of AWPA BOOK Use Category System Standards U1 and T1. Pressure-treated wood products shall not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products shall not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and shall not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards.

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use. 0.60 pcf intended for Ammoniacal Copper Quaternary Compound (ACQ)-treated foundations. 0.80 to 1.00 pcf intended for ACQ-treated pilings. All wood shall be air or kiln dried after treatment. Specific treatments shall be verified by the report of an approved independent inspection agency, or the AWPA Quality Mark on each piece. Do not incise surfaces of lumber that will be exposed. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution. The following items shall be preservative treated:

1. Wood framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.

2. Wood members that are in contact with water.

3. Exterior wood steps, platforms, and railings; and all wood framing of open, roofed structures.

4. Wood sills, soles, plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.

5. Nailers, edge strips, crickets, curbs, and cants for roof decks.

## 1.8 QUALITY ASSURANCE

### 1.8.1 Drawing Requirements

For fabricated structural members, trusses, qlu-lam members, indicate materials, details of construction, methods of fastening, and erection details. Include reference to design criteria used and manufacturers design calculations. Submit drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.

### 1.8.2 Data Required

Submit calculations and drawings for all proposed modifications of

structural members. Do not proceed with modifications until the submittal has been approved.

1.8.3 Certificates of Grade

Submit certificates attesting that products meet the grade requirements specified in lieu of grade markings where appearance is important and grade marks will deface material.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Engineered Wood Products

Products shall contain no added urea-formaldehyde if exposed to interior spaces.

2.2 LUMBER

2.2.1 Structural Lumber

Except where a specific grade is indicated or specified, any of the species and grades listed in AF&PA T101 that have allowable unit stresses in pounds per square inch (psi) not less than 1200 Fb, with 1,200,000E. Use for joists, rafters, headers, trusses, beams (except collar beams), columns, posts, stair stringers, girders, and all other members indicated to be stress rated. Design of members and fastenings shall conform to AITC TCM. Other stress graded or dimensioned items such as blocking, carriages, and studs shall be standard or No. 2 grade except that studs may be Stud grade.

2.2.2 Framing Lumber

Framing lumber such as studs, plates, caps, collar beams, cant strips, bucks, sleepers, nailing strips, and nailers and board lumber such as subflooring and wall and roof sheathing shall be one of the species listed in the table below. Minimum grade of species shall be as listed. Finger-jointed lumber may be used in the same applications as solid lumber of an equivalent species and grade, provided the finger-jointed lumber meets all the requirements of the certification and the quality control programs of the rules writing agency having jurisdiction and all applicable requirements of DOC/NIST PS56.

Table of Grades for Framing and Board Lumber

| Grading Rules | Species | Framing | Board Lumber |
|---|---|---|---|
| WWPA G-5 standard grading rules | Aspen<br>Douglas Fir-Larch<br>Douglas Fir South<br>Engelmann Spruce -Lodgepole Pine<br>Engelmann Spruce<br>Hem-Fir<br>Idaho White Pine<br>Lodgepole Pine<br>Mountain Hemlock<br>Mountain Hemlock | All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter) | All Species: No. 3 Common |

Table of Grades for Framing and Board Lumber

| Grading Rules | Species | Framing | Board Lumber |
|---|---|---|---|
| | -Hem-Fir<br>Ponderosa Pine<br>-Sugar Pine<br>Ponderosa Pine<br>-Lodgepole Pine<br>Subalpine Fir<br>White Woods<br>Western Woods<br>Western Cedars<br>Western Hemlock | | |
| WCLIB 17<br>standard grading rules | Douglas Fir-Larch<br>Hem-Fir<br>Mountain Hemlock<br>Sitka Spruce<br>Western Cedars<br>Western Hemlock | All Species:<br>Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter) | All Species:<br>Standard |
| SPIB 1003<br>standard grading rules | Southern Pine | Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter) | No. 2 Boards |
| SCMA Spec<br>standard specifications | Cypress | No. 2 Common | No. 2 Common |
| NELMA Grading Rules<br>standard grading rules | Balsam Fir<br>Eastern Hemlock<br>-Tamarack<br>Eastern Spruce<br>Eastern White Pine<br>Northern Pine<br>Northern Pine<br>Cedar | All Species:<br>Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter) | All Species:<br>No. 3 Common except Standard for Eastern White and Northern Pine |
| RIS Grade Use<br>standard specifications | Redwood | All Species:<br>Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter) | Construction Heart |
| NHLA Rules<br>rules for the measurement and inspection | Cypress | No. 2 Dimension | No. 2 Common |

Table of Grades for Framing and Board Lumber

| Grading Rules of hardwood and cypress lumber | Species | Framing | Board Lumber |
|---|---|---|---|

2.2.3 Structural Glued Laminated Timber

ANSI/AITC A190.1, allowable working stress values for loads of normal duration in pounds per square inch (psi) as necessary to support floor loads as stated:

Fabricated with wet-use adhesives. Beams shall use glue-laminated lumber. Posts and studs shall use laminated-strand lumber. Joists shall use laminated-veneer lumber or dimensional lumber as indicated in drawings. Members shall be Industrial Appearance Grade, sealed with a penetrating sealer, and wrapped as standard with the manufacturer and approved. Members shall be complete with hardware for joining laminated members and for their connection to other construction.

2.3 PLYWOOD AND STRUCTURAL-USE PANELS

APA PS 1, APA PS 2, APA E445S, and APA F405L respectively.

2.3.1 Subflooring

2.3.1.1 Plywood

C-D Grade, Exposure 1 durability classification, Span rating as necessary for application where indicated.

2.3.1.2 Structural-Use Panels

Sheathing grade with durability equivalent to Exposure 1, Span Rating of as required for application where indicated.

2.3.2 Combination Subfloor-Underlayment

2.3.2.1 Plywood

Underlayment Grade, Exposure 1. Minimum thickness shall be whichever is thicker, that as listed below or as indicated in project drawings.

| Support Spacing | Underlayment Minimum Thickness |
|---|---|
| 16 inches | 1/2 inch for Group 1 species<br>19/32 inch for Group 2 and 3 species<br>23/32 inch for Group 4 species |
| 24 inches | 23/32 inch for Group 1 species<br>7/8 inch for Group 2 and 3 species<br>one inch for Group 4 species |

2.3.2.2 Structural-Use Panel

Combination subfloor-underlayment grade with durability equivalent to

Exterior plywood, Span Rating of 16 or greater.

2.3.3 Structural-Use Panels

Sheathing grade with durability equivalent to Exposure 1, Span Rating of 16/0 or greater. APA Rated Sheathing.

2.3.4 Roof Sheathing

2.3.4.1 Plywood

C-D Grade, Exposure 1, with an Identification Index of not less than 24/0. Particle board is prohibited.

2.3.4.2 Structural-Use Panel

Sheathing grade with durability equivalent to Exposure 1, Span Rating of 24/0 or greater.

2.4 UNDERLAYMENT

Underlayment shall conform to one of the following:

2.4.1 Hardboard

AHA A135.4 service class, sanded one side, 1/4 inch thick, 4 feet wide.

2.4.2 Plywood

Plywood shall conform to APA PS 1, underlayment grade with exterior glue, or C-C (Plugged) exterior grade 11/32 inch thick, 4 feet wide.

2.4.3 Oriented Strand Board

Prohibited from use.

2.5 OTHER MATERIALS

2.5.1 Hardboard Underlayment

DOC/NIST PS58, service class, sanded on one side, 1/4 inch thick 4 feet wide.

2.5.2 Building Paper

FS UU-B-790, Type I, Grade D, Style 1.

2.5.3 Miscellaneous Wood Members

2.5.3.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

| Member | Size (inch) |
|---|---|
| Bridging | 1 x 3 or 1 x 4 for use between members |

| Member | Size (inch) |
|---|---|
| | 2 x 12 and smaller; 2 x 4 for use between members larger than 2 x 12. |
| Corner bracing | 1 x 4. |
| Furring | 1 x 2. |
| Grounds | Plaster thickness by 1-1/2. |
| Nailing strips | 1 x 3 or 1 x 4 when used as shingle base or interior finish, otherwise 2 inch stock. |

2.5.3.2 Wood Bumpers

AREMA Eng Man, Industrial grade cross ties

2.5.3.3 Sill Plates

Sill plates shall be standard or number 2 grade.

2.5.3.4 Blocking

Blocking shall be standard or number 2 grade.

2.5.3.5 Rough Bucks and Frames

Rough bucks and frames shall be straight standard or number 2 grade.

2.6 ROUGH HARDWARE

Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials shall be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs shall be zinc-coated. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather shall be copper alloy.

2.6.1 Bolts, Nuts, Studs, and Rivets

ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M and ASME B18.2.2.

2.6.2 Anchor Bolts

ASTM A307, size as indicated, complete with nuts and washers.

2.6.3 Expansion Shields

CID A-A-1923, CID A-A-1924, and CID A-A-1925. Except as shown otherwise, maximum size of devices shall be 3/8 inch.

2.6.4 Lag Screws and Lag Bolts

ASME B18.2.1.

2.6.5 Wood Screws

ASME B18.6.1.

2.6.6 Nails

ASTM F 547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T10. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T101. Reasonable judgment backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

2.6.7 Wire Nails

ASTM F 1667.

2.6.8 Timber Connectors

Unless otherwise specified, timber connectors shall be in accordance with TPI 1, APA EWS T300E or AITC TCM.

2.6.9 Clip Angles

Steel, 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.6.10 Joist Hangers

Steel or iron, zinc coated, sized to fit the supported member, of sufficient strength to develop the full strength of the supported member in accordance with ICC IBC, and furnished complete with any special nails required.

2.6.11 Tie Straps

For joists supported by the lower flange of steel beams, provide 1/8 by 1-1/2 inch steel strap, 2 feet long, except as indicated otherwise.

2.6.12 Joist Anchors

For joists supported by masonry walls, provide anchors 3/16 by 1 1/2 inch steel tee or strap, bent and of length to provide 4 inches embedment into wall and 12 inches along joist except as indicated otherwise. For joists parallel to masonry or concrete walls, provide anchors 1/4 by 1-1/4 inch minimum cross-sectional area, steel strap, length as necessary to extend

over top of first three joists and into wall 4 inches, and with wall end of bend or pin type, except as indicated otherwise.

2.6.13 Door Buck Anchors

Metal anchors, 1/8 by 1-1/4 inch steel, 12 inches long, with ends bent 2 inches. Anchors shall be screwed to the backs of bucks and built into masonry or concrete. Locate 8 inches above sills and below heads and not more than 24 inches intermediately between. Anchorage of bucks to steel framing shall be as necessary to suit the conditions.

2.6.14 Metal Bridging

Where not indicated or specified otherwise, No. 16 U.S. Standard gage, cadmium-plated or zinc-coated.

2.6.15 Toothed Rings and Shear Plates

AF&PA T101.

2.6.16 Beam Anchors

Steel U-shaped strap anchors 1/4 inch thick by 1-1/2 inches wide, except as indicated otherwise.

2.6.17 Metal Framing Anchors

Construct anchors to the configuration shown using hot dip zinc-coated steel conforming to ASTM A653/A653M, G90. Steel shall be not lighter than 18 gage. Special nails supplied by the manufacturer shall be used for all nailing.

2.6.18 Panel Edge Clips

Extruded aluminum or galvanized steel, H-shaped clips to prevent differential deflection of roof sheathing.

2.7 AIR INFILTRATION BARRIER

Air infiltration barrier shall be building paper meeting the requirements of ASTM C 1136, Type IV, style optional or a tear and puncture resistant olefin building wrap (polyethylene or polypropylene) with a moisture vapor transmission rate of 125g per square meter per 24 hours in accordance with ASTM E 96/E 96M, Desiccant Method at 23 degrees C or with a moisture vapor transmission rate of 670g per square meter per 24 hours in accordance with ASTM E 96/E 96M, Water Method at 23 degrees C.

PART 3 EXECUTION

3.1 INSTALLATION

Conform to AF&PA T10 unless otherwise indicated or specified. Select lumber sizes to minimize waste. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Frame members for the passage of pipes, conduits, and ducts. Do not cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of

specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spiking and nailing not indicated or specified otherwise shall be in accordance with the Nailing Schedule contained in ICC IBC; perform bolting in an approved manner. Spikes, nails, and bolts shall be drawn up tight. Use slate or steel shims when leveling joists, beams, and girders on masonry or concrete. Do not use shimming on wood or metal bearings. When joists, beams, and girders are placed on masonry or concrete, a wood base plate shall be positioned and leveled with grout. The joist, beam, or girder shall then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket shall be formed into the wall. The joist, beam, or girder shall then be placed into the pocket and leveled with a steel shim.

### 3.1.1 Sills

Set sills level and square and wedge with steel or slate shims; point or grout with non-shrinking cement mortar to provide continuous and solid bearing. Anchor sills to the foundations as indicated. Where sizes and spacing of anchor bolts are not indicated, provide not less than 5/8 inch diameter bolts at all corners and splices and space at a maximum of 6 feet o.c. between corner bolts. Provide at least two bolts for each sill member. Lap and splice sills at corners and bolt through the laps or butt the ends and through-bolt not more than 6 inches from the ends. Provide bolts with plate washers and nuts. Bolts in exterior walls shall be zinc-coated.

#### 3.1.1.1 Anchors in Masonry

Except where indicated otherwise, Embed anchor bolts not less than 15 inches in masonry unit walls and provide each with a nut and a 2 inch diameter washer at bottom end. Fully grout bolts with mortar.

#### 3.1.1.2 Anchors in Concrete

Except where indicated otherwise, Embed anchor bolts not less than 8 inches in poured concrete walls and provide each with a nut and a 2 inch diameter washer at bottom end. A bent end may be substituted for the nut and washer; bend shall be not less than 90 degrees. Powder-actuated fasteners spaced 3 feet o.c. may be provided in lieu of bolts for single thickness plates on concrete.

### 3.1.2 Beams and Girders

Set beams and girders level and in alignment and anchor to bearing walls, piers, or supports with U-shaped steel strap anchors. Embed anchors in concrete or masonry at each bearing and through-bolt to the beams or girders with not less than two bolts. Provide bolts not less than 1/2 inch in diameter and with plate washers under heads and nuts. Install beams and girders not indicated otherwise with 8 inch minimum end bearing on walls or supports. Install beams and girders into walls with 1/2 inch clearance at the top, end, and sides or standard steel wall-bearing boxes. Provide joints and splices over bearings only and bolt or spike together.

### 3.1.3 Roof Framing or Rafters

Tops of supports or rafters shall form a true plane. Valley, ridge, and

hip members shall be of depth equal to cut on rafters where practicable, but in no case less than depth of rafters and nominally 2 inches thick. Rafters shall have full and solid bearing on plates. Valleys, hips, and ridges shall be straight and true intersections of roof planes. Necessary crickets and watersheds shall be formed. Rafters, except hip and valley rafters, shall be spiked to wall plate and to ceiling joists with no less than three 8-penny nails or bolted by angles. Rafters shall be toe-nailed to ridge, valley, or hip members with at least three 8-penny nails. Rafters shall be braced to prevent movement until permanent bracing, decking or sheathing is installed. Hip and valley rafters shall be secured to wall plates by clip angles. Openings in roof shall be framed with headers and trimmers. Unless otherwise indicated, headers carrying more than two rafters and trimmers supporting headers carrying more than one rafter shall be double. Hip rafters longer than the available lumber shall be butt jointed and scabbed. Valley rafters longer than the available lumber shall be double, with pieces lapped not less than 4 feet and well spiked together. Trussed rafters shall be installed in accordance with TPI HIB. Engineered wood joists shall be installed in accordance with distributor's instructions.

### 3.1.4 Joists

Provide joists of the sizes and spacing indicated, accurately and in alignment, and of uniform width. Joists shall have full bearing on sills, plates, beams, girders, and trusses; provide laps over bearing only and spike. Where joists are of insufficient length to produce a 12 inch lap, butt joists over bearing and provide wood scabs 2 nominal inches thick by depth of joists by 24 inches long or metal straps 1/4 by 1 1/2 inch by not less than 18 inches long nailed to each joist with not less than four 10-penny nails, or approved sheet metal connectors installed in accordance with the manufacturer's recommendations. Provide joists built into masonry with a beveled fire cut so that the top of the joist does not enter the wall more than one inch or standard steel wall bearing boxes. Provide metal hangers for joists framing into the side of headers, beams, or girders. The minimum joist end bearing shall be 4 inches, and joists built into concrete or masonry shall have a 1/2 inch minimum clearance at the top, end, and sides. For joists approved to be bored for the passage of pipes or conduits, bore through the neutral axis of the joist. Provide steel joist hangers of proper size and type to receive the ends of all framed joists.

#### 3.1.4.1 Floor (Ceiling) Framing

Except where otherwise indicated joists shall have bearings not less than 4 inches on concrete or masonry and 1-1/2 inches on wood or metal. Joists, trimmers, headers, and beams framing into carrying members at the same relative levels shall be carried on joist hangers. Joists shall be lapped and spiked together at bearings or butted end-to-end with scab ties at joint and spiked to plates. Openings in floors shall be framed with headers and trimmers. Headers carrying more than two tail joists and trimmers supporting headers carrying more than one tail joist shall be doubled, unless otherwise indicated. Joists built into masonry shall be provided with a beveled fire cut so that the top of the joist does not enter the wall more than 1 inch or standard steel wall bearing boxes. Engineered wood joists shall be installed in accordance with distributor's instructions.

3.1.4.2 Doubled Joists

Provide under bearing walls and partitions running parallel with the floor joists, around stairways, chimneys, fireplaces, and at other openings where joists are cut and framed. Double, space for clearance, block apart 4 feet on center, rigidly frame, and spike together joists under partitions that are to receive ducts, pipes, and conduits.

3.1.4.3 Tie Straps

For joists supported by the lower flange of steel beams, provide straps at every fourth joist and the corresponding fourth joist on the opposite side. Tie joists across the top of the steel beam with a steel strap. Form straps to lie flat across the top of the beam and twist at the ends to provide flat contact with the side of each joist. Nail each strap at each end with three 10-penny nails spaced 2 inches o.c.

3.1.4.4 Joist Anchors

Provide anchors for each fourth joist supported by a masonry wall. Build wall end of anchors into the wall. Nail anchor to the joist with three 10-penny nails spaced 2 inches o.c. Anchor the first three joists parallel to concrete or masonry walls at bridging points, but not less than 8 feet o.c. from end walls. Let anchors into the tops of each joist and spike to the top of joist with one 10-penny nail. Extend anchors at least 4 inches into the wall.

3.1.5 Bridging

Provide bridging for floor and ceiling joists and for roof rafters having slopes of less than 1/3. Locate bridging as indicated and as specified herein. Provide bridging for spans greater than 6 feet, but do not exceed 8 feet maximum spacing between rows of bridging. Install rows of bridging uniformly. Provide metal or wood cross-bridging, except where solid bridging is indicated. Do not nail the bottom end of cross-bridging until the subfloor has been laid.

3.1.5.1 Wood Cross-Bridging

Provide wood cross-bridging not less than 2 by 3 nominal size. Nail wood cross-bridging at each end with three 8-penny nails for 2 by thick material.

3.1.5.2 Metal Cross-Bridging

Shall be the manufacturer's standard product, not less than 16 gage before forming and coating. Metal bridging shall be the compression type, lodged into or nailed to the wide faces of opposite joists at points diagonally across from each other near the bottoms and tops of joists.

3.1.6 Subflooring

3.1.6.1 Plywood and Structural-Use Panels

Apply best side up with the grain of outer plies or the long dimension at right angles to joists. Stagger end joints and locate over the centerline of joists. Support panel edges by nominal 2 by 4 members framed between joists so the edge joints of subfloor occur over the centerline of blocking. Allow 1/8 inch spacing at panel ends and 1/4 inch at panel

edges. Panels shall be continuous over two or more spans. Nail panels 6 inches o.c. at supported edges and 10 inches o.c. over intermediate bearing. Nails shall be 8-penny common or 6-penny threaded. Provide at least 1/2 inch clearance between subflooring and masonry or concrete walls. Subflooring may be installed with adhesive conforming to ASTM D 3498 and nails spaced at 12 inches on center unless otherwise shown.

3.1.6.2 Combination Subfloor-Underlayment

Apply with the grain of the face plies or the long dimension at right angles to joists. Panels shall be continuous over two or more spans. Stagger end joints of adjacent panels. Panel edges shall be T&G or supported by 2 by 4 members framed between joists so the edge joints of subfloor-underlayment occur over the centerline of blocking. Provide end joints of panels over the centerline of joists. Allow 1/8 inch spacing between panel edge and end joints. Nail panels 6 inches o.c. at ends and edges and 10 inches o.c. along intermediate bearings unless they are glue-nailed in accordance with APA E30. Nails shall be 8-penny coated common or 6-penny threaded. Provide at least 1/2 inch clearance between subfloor-underlayment and masonry or concrete walls. Lightly sand all joints to receive resilient flooring.

3.1.6.3 Wood

Subflooring shall be applied diagonally with end joints made over supports. Each board shall bear on at least three supports and shall be nailed at each support using two nails for boards 6 inches and less in width and three nails for boards more than 6 inches in width.

3.1.6.4 Depressed Subfloors

Provide depressed subfloors to receive ceramic and quarry tile floors. Nail cleats or ledgers of one by four material to the sides of joists to support the flooring material. Place the cleats at a depth below the top of the joists sufficient to allow the installation of the subflooring below the tops of joists. Snugly fit subflooring as specified herein between joists.

3.1.7 Underlayment

Install underlayment over subfloor just prior to laying of resilient flooring and protect from water and physical damage. Underlayment shall be plywood. Stagger end joints of underlayment with respect to each other, and stagger all joints with respect to paralleling panel joints in subfloor. Space panels 1/16 inch apart at ends and 1/8 inch apart at edges and at least 1/2 inch from concrete or masonry walls. Nail panels 6 inches o.c. along edges and 6 inches o.c. each way throughout panel, but not closer than 3/8 inch to panel edges. Nails shall be 4-penny annular ring or screw type and shall be countersunk 1/16 inch. Lightly sand all joints to receive resilient flooring.

3.1.8 Columns and Posts

Set columns and posts, plumb, in alignment, and with full and uniform bearing. Do not embed the bottom and bearing surfaces of posts or columns in concrete or set in direct contact with concrete slabs on grade. Provide post and beam construction with wood bolsters or steel post caps in such a manner that the post above will tier directly over the one below;

fabricate the assembly in a rigid and substantial manner using bolts or lag screws.

### 3.1.9 Wall Framing

#### 3.1.9.1 Studs

Select studs for straightness and set plumb, true, and in alignment. In walls and partitions more than eight feet tall, provide horizontal bridging at not more than 8 feet o.c. using nominal 2 inch material of the same width as the studs; install the bridging flat. Sizes and spacing of studs shall be as indicated, but not greater than 16 inches on center. Double studs at jambs and heads of openings and triple at corners to form corner posts. Frame corner posts to receive sheathing, lath, and interior finish. Truss over openings exceeding 4 feet in width or use a header of sufficient depth. Toe-nail studs to sills or sole plates with four 8-penny nails or fasten with metal nailing clips or connectors. Anchor studs abutting concrete or masonry walls thereto near the top and bottom and at midheight of each story using expansion bolts or powder-actuated drive studs.

#### 3.1.9.2 Plates

Use plates for walls and partitions of the same width as the studs to form continuous horizontal ties. Splice single plates; stagger the ends of double plates. Double top plates in walls and bearing partitions, built up of two nominal 2 inch thick members. Top plates for nonbearing partitions shall be single or double plates of the same size as the studs. Nail lower members of double top plates and single top plates to each stud and corner post with two 16-penny nails. Nail the upper members of double plates to the lower members with 10-penny nails, two near each end, and stagger 16 inches o.c. intermediately between. Nail sole plates on wood construction through the subfloor to each joist and header; stagger nails. Anchor sole plates on concrete with expansion bolts, one near each end and at not more than 6 feet o.c., or with powder-actuated fasteners, one near each end and at not more than 3 feet o.c. Provide plates cut for the passage of pipes or ducts with a steel angle as a tie for the plate and bearing for joist.

#### 3.1.9.3 Firestops

Provide firestops for wood framed walls and partitions and for furred spaces of concrete or masonry walls at each floor level and at the ceiling line in the top story. Where firestops are not automatically provided by the framing system used, they shall be formed of closely fitted wood blocks of nominal 2 inch thick material of the same width as the studs and joists.

#### 3.1.9.4 Diagonal Bracing

Provide diagonal bracing at all external corners and internal angles and at maximum 40 foot centers in stud walls, except that bracing may be omitted where diagonally applied wood sheathing, plywood or structural-use panel sheathing, 4 by 8 foot fiberboard sheathing, or gypsum board sheathing is used. Bracing shall be of 1 by 6 material, let into the exterior face of studs. Extend bracing from top plates to sill at an angle of approximately 45 degrees and double nail at each stud. When openings occur near corners, provide diagonal knee braces extending from the corner post above headers to top plates and from below window sills to

the main sill. Nail bracing at each bearing with two 8-penny nails.

3.1.10 Building Paper

Provide building paper where indicated. Apply paper shingle fashion, horizontally, beginning at the bottom of the wall. Lap edges 4 inches, and nail with one inch, zinc-coated roofing nails, spaced 12 inches o.c. and driven through tin discs.

3.1.11 Ceiling Joists

Size as indicated and set accurately and in alignment. Toe-nail joists to all plates with not less than three 10-penny nails. Frame openings in ceilings with headers and trimmers.

3.1.12 Trusses

Metal plate connected wood trusses shall be handled, erected, and braced in accordance with TPI HIB and as indicated.

3.1.13 Structural Glued Laminated Timber Members

Brace members before erection. Align members and complete all connections before removal of bracing. Unwrap individually wrapped members only after adequate protection by a roof or other cover has been provided. Treat scratches and abrasions of factory applied sealer with two brush coats of the same sealer used at the factory.

3.1.14 Plywood and Structural-Use Panel Roof Sheathing

Install with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the centerlines of supports. Allow 1/8 inch spacing at panel ends and 1/4 inch at panel edges. Nail panels with 8-penny common nails or 6-penny annular rings or screw-type nails spaced 6 inches o.c. at supported edges and 12 inches o.c. at intermediate bearings. Do not use staples in roof sheathing. Where the support spacing exceeds the maximum span for an unsupported edge, provide adequate blocking, tongue-and-groove edges, or panel edge clips, in accordance with APA E30.

3.1.15 Stair Framing

Cut carriages to exact shape required to receive treads and risers, with risers of uniform height and treads of uniform width. Provide trimmers, nailers, and blocking as required to support finish materials.

3.2 MISCELLANEOUS

3.2.1 Wood Roof Nailers, Edge Strips, Crickets, Curbs, and Cants

Provide sizes and configurations indicated or specified and anchored securely to continuous construction.

3.2.1.1 Roof Edge Strips and Nailers

Provide at perimeter of roof, around openings through roof, and where roofs abut walls, curbs, and other vertical surfaces. Except where indicated otherwise, nailers shall be 6 inches wide and the same thickness as the insulation. Anchor nailers securely to underlying construction.

Anchor perimeter nailers in accordance with FM 4435. Strips shall be grooved for edge venting; install at walls, curbs, and other vertical surfaces with a 1/4 to 1/2 inch air space.

3.2.1.2 Crickets, Cants, and Curbs

Provide wood saddles or crickets, cant strips, curbs for scuttles and ventilators, and at expansion joints, as indicated, specified, or necessary and of lumber.

3.2.2 Rough Wood Bucks

Size as 2 inch nominal thickness. Set wood bucks true and plumb. Anchor bucks to concrete or masonry with steel straps extending into the wall 8 inches minimum. Place anchors near the top and bottom of the buck and space uniformly at 2 foot maximum intervals.

3.2.3 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

3.2.4 Wood Grounds

Provide for fastening wood trim, finish materials, and other items to plastered walls and ceilings. Install grounds in proper alignment and true with an 8 foot straightedge.

3.2.5 Wood Furring

Provide where shown and as necessary for facing materials specified. Except as shown otherwise, furring strips shall be nominal one by 3, continuous, and spaced 16 inches o.c. Erect furring vertically or horizontally as necessary. Nail furring strips to masonry. Do not use wood plugs. Provide furring strips around openings, behind bases, and at angles and corners. Furring shall be plumb, rigid, and level and shall be shimmed as necessary to provide a true, even plane with surfaces suitable to receive the finish required. Form furring for offsets and breaks in walls or ceilings on 1 by 4 wood strips spaced 16 inches o.c.

3.2.6 Wood Bumpers

Dress to the sizes indicated, and bevel edges. Bore, countersink, and bolt bumpers in place.

3.2.7 Temporary Closures

Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed. Cover windows and other unprotected openings with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas as directed.

3.2.8 Wood Sleepers

Run wood sleepers in lengths as long as practicable and stagger end joints in adjacent rows. Sleepers for gymnasium floors are specified in Section entitled "GHardwood Strip Flooring Systems."

### 3.2.9 Bridging

Wood bridging shall have ends accurately bevel-cut to afford firm contact and shall be nailed at each end with two nails. Metal bridging shall be installed as recommended by the manufacturer. The lower ends of bridging shall be driven up tight and secured after subflooring or roof sheathing has been laid and partition framing installed.

### 3.2.10 Corner Bracing

Corner bracing shall be installed when required by type of sheathing used or when siding, other than panel siding, is applied directly to studs. Corner bracing shall be let into the exterior surfaces of the studs at an angle of approximately 45 degrees, shall extend completely over wall plates, and shall be secured at each bearing with two nails.

### 3.2.11 Sill Plates

Sill plates shall be set level and square and anchor bolted at not more than 6 feet on centers and not more than 12 inches from end of each piece. A minimum of two anchors shall be used for each piece.

## 3.3 INSTALLATION OF TIMBER CONNECTORS

Installation of timber connectors shall conform to applicable requirements of AF&PA T101.

## 3.4 ERECTION TOLERANCES

a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, shall be within the following limits:

   (1) Layout of walls and partitions: 1/4 inch from intended position;

   (2) Plates and runners: 1/4 inch in 8 feet from a straight line;

   (3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

   (4) Face of framing members: 1/4 inch in 8 feet from a true plane.

b. Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive shall be within the following limits:

   (1) Layout of walls and partitions: 1/4 inch from intended position;

   (2) Plates and runners: 1/8 inch in 8 feet from a straight line;

   (3) Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

   (4) Face of framing members: 1/8 in 8 feet from a true plane.

## 3.5 WASTE MANAGEMENT

In accordance with the Waste Management Plan and as specified. Separate and reuse scrap sheet materials larger than 2 square feet, framing members larger than 24 inches, and multiple offcuts of any size larger

than 24 inches. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.

Separate treated, stained, painted, and contaminated wood and place in designated area for hazardous materials. Dispose of according to local regulations. Do not leave any wood, shavings, sawdust, or other wood waste buried in fill or on the ground. Prevent sawdust and wood shavings from entering the storm drainage system. Do not burn scrap lumber that has been pressure treated, or lumber that is less than one year old.

-- End of Section --

# SECTION 06 20 00

# FINISH CARPENTRY

**08/08**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)

| | |
|---|---|
| ALSC PS 20 | (2010) American Softwood Lumber Standard |

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

| | |
|---|---|
| AWPA M2 | (2007) Standard for Inspection of Treated Wood Products |
| AWPA M4 | (2002) Standard for the Care of Preservative-Treated Wood Products |
| AWPA P5 | (2009) Standard for Waterborne Preservatives |

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

| | |
|---|---|
| APA PS 1 | (1995) Voluntary Product Standard for Construction and Industrial Plywood |

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

| | |
|---|---|
| AWI Qual Stds | (8th Edition) AWI Quality Standards |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME B18.2.1 | (2010) Square and Hex Bolts and Screws (Inch Series) |
| ASME B18.2.2 | (2010) Standard for Square and Hex Nuts |
| ASME B18.6.1 | (1981; R 2008) Wood Screws (Inch Series) |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM F 547 | (2006) Nails for Use with Wood and Wood-Base Materials |

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

| | |
|---|---|
| ANSI/BHMA A156.9 | (2010) Cabinet Hardware |

HARDWOOD PLYWOOD AND VENEER ASSOCIATION (HPVA)

| | |
|---|---|
| HPVA HP-1 | (2009) American National Standard for Hardwood and Decorative Plywood |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| ANSI/NEMA LD 3 | (2005) Standard for High-Pressure Decorative Laminates |

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

| | |
|---|---|
| NHLA Rules | (2007) Rules for the Measurement & Inspection of Hardwood & Cypress |

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

| | |
|---|---|
| NELMA Grading Rules | (2006) Standard Grading Rules for Northeastern Lumber |

REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)

| | |
|---|---|
| RIS Grade Use | (1998) Redwood Lumber Grades and Uses |

SOUTHERN PINE INSPECTION BUREAU (SPIB)

| | |
|---|---|
| SPIB 1003 | (2002) Standard Grading Rules for Southern Pine Lumber |

U.S. DEPARTMENT OF COMMERCE (DOC)

| | |
|---|---|
| DOC/NIST PS58 | (1973) Basic Hardboard (ANSI A135.4) |

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

| | |
|---|---|
| WCLIB 17 | (2000) Standard Grading Rules |

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

| | |
|---|---|
| WWPA G-5 | (1998) Western Lumber Grading Rules |

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

| | |
|---|---|
| WDMA I.S. 4 | (2009) Water-Repellent Preservative Non-Pressure Treatment for Millwork |

WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION (WMMPA)

| | |
|---|---|
| WMMPA WM 6 | (1987) Industry Standard for Non-Pressure Treating of Wood Millwork |

## 1.2 SUBMITTALS

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

SD-02 Shop Drawings

Detail Drawings

SD-03 Product Data

Manufacturer's printed data, showing texture, density, catalog cuts, and installation instructions.

Manufacturer's printed data indicating the usage of engineered or recycled wood products, and environmentally safe preservatives.

SD-04 Samples

Samples shall be of sufficient size to show patterns, color ranges, and types, as applicable, of the material proposed to be used.

SD-07 Certificates

Certificates of grade

Certificates of compliance

## 1.3 DETAIL DRAWINGS

The Contractor shall submit detail drawings showing fabricated items and special mill and woodwork items. Drawings shall indicate materials and details of construction, methods of fastening, erection, and installation.

## 1.4 CERTIFICATES

Provide certificates of grade from the grading agency on graded but unmarked lumber or plywood attesting that materials meet the grade requirements specified herein.

Provide certificates of compliance unless materials bear certification markings or statements.

## 1.5 DELIVERY, STORAGE, AND HANDLING

Deliver lumber, plywood, trim, and millwork to job site in an undamaged condition. Stack materials to ensure ventilation and drainage. Protect against dampness before and after delivery. Store materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity. Do not store products in building until wet trade materials are dry.

## 1.6 QUALITY ASSURANCE

### 1.6.1 Lumber

Identify each piece or each bundle of lumber, millwork, and trim by the grade mark of a recognized association or independent inspection agency that is certified by the Board of Review, American Lumber Standards Committee, to grade the species.

### 1.6.2 Plywood

Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over

quality of the plywood. Mark shall identify plywood by species group or span rating, and shall show exposure durability classification, grade, and compliance with APA PS 1.

1.6.3 Hardboard

Materials shall bear a marking or statement identifying the producer and the applicable standard.

1.6.4 Pressure-Treated Lumber and Plywood

Each treated piece shall be inspected in accordance with AWPA M2.

1.6.5 Nonpressure-Treated Woodwork and Millwork

Mark, stamp, or label, indicating compliance with WDMA I.S. 4.

1.6.6 Fire-Retardant Treated Lumber

Each piece to bear Underwriters Laboratories label or the label of another nationally recognized independent testing laboratory.

PART 2 PRODUCTS

2.1 WOOD

2.1.1 Sizes and Patterns of Wood Products

Yard and board lumber sizes shall conform to ALSC PS 20. Provide shaped lumber and millwork in the patterns indicated and standard patterns of the association covering the species. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the applicable standard.

2.1.2 Trim, Finish, and Frames

Provide species and grades listed for materials to be paint finished. Provide materials that are to be stain, natural, or transparent finished one grade higher than that listed. Provide species indicated for materials to be transparent finished. Run trim, except window stools and aprons with hollow backs.

TABLE OF GRADES FOR WOOD TO RECEIVE PAINT FINISH

| Grading Rules | Species | Exterior and Interior Trim, Finish, and Frames |
|---|---|---|
| WWPA G-5 grading rules | Aspen<br>Douglas Fir-Larch<br>Douglas Fir-South<br>Engelmann Spruce -Lodgepole Pine<br>Engelmann Spruce<br>Hem-Fir<br>Idaho White Pine<br>Lodgepole Pine<br>Mountain Hemlock<br>Mountain Hemlock -Hem-Fir | All Species: C & Btr. Select (Choice & Btr Idaho White Pine) or Superior Finish. Western Red Cedar may be graded C & Btr. Select or A & Btr. per Special Western Red Cedar Rules. |

TABLE OF GRADES FOR WOOD TO RECEIVE PAINT FINISH

| Grading Rules | Species | Exterior and Interior Trim, Finish, and Frames |
|---|---|---|
| | Ponderosa Pine-<br>Sugar Pine<br>(Ponderosa Pine<br>-Lodgepole Pine)<br>White Woods<br>(Western Woods)<br>Western Cedars<br>Western Hemlock | |
| WCLIB 17<br>standard grading rules | Douglas Fir-Larch<br>Hem-Fir<br>Mountain Hemlock<br>Sitka Spruce<br>Western Cedars<br>Western Hemlock | All Species: C & Btr VG, except A for Western Red Cedar |
| SPIB 1003<br>grading rules | Southern Pine | C & Btr |
| NHLA Rules | Cypress | C-Select |
| NELMA Grading Rules<br>standard grading rules | Balsam Fir<br>Eastern Hemlock-<br>Tamarack<br>Eastern Spruce<br>Eastern White Pine<br>Norway Pine<br>Northern Pine<br>Northern White Cedar | All Species: C-Select except C & Btr for Eastern White Pine and Norway Pine |
| RIS Grade Use<br>standard specifications | Redwood | Clear<br>Clear All Heart |
| NHLA Rules<br>rules | Cypress | B Finish |
| | Red Gum<br>Soft Elm<br>Birch | Select or Btr<br>(for interior use only) |

2.1.3 Utility Shelving

Utility shelving shall be a suitable species equal to or exceeding requirements of No. 3 Common white fir under WWPA G-5, 1 inch thick; or plywood, interior type, Grade A-B, 1/2 inch thick, any species group.

2.1.4 Softwood Plywood

APA PS 1, thicknesses as indicated.

a. Plywood for Soffits: Exterior type, B-B medium density overlay.

b. Plywood for Shelving: Interior type, A-B Grade, any species group.

c. Plywood for Countertops: Exterior type, A-C Grade.

2.1.5 Hardwood Plywood

HPVA HP-1, Type II (Interior) Good (1) Grade, of thickness indicated.

2.1.6 Hardboard

DOC/NIST PS58, standard type, 1/4 inch thick.

2.1.7 Particleboard

Prohibited.

2.1.8 Stairs

Treads 1-1/4 inches thickness, clear red or white oak. Risers 1 inch nominal finish lumber.

2.1.9 Shoe Mold

Clear red or white oak, 1/2 by 5/8 inch unless otherwise indicated.

2.1.10 Wood Seats

Clear maple, oak, or other suitable hardwood, not less than 1-5/8 inches thick, with rounded edges. Provide stainless steel stanchions or brackets as indicated.

2.2 COUNTER TOPS

Provide laminated counter tops and solid surface counter tops as indicated in drawings.

2.2.1 Laminated Plastic

ANSI/NEMA LD 3.

2.2.1.1 Countertop Finish

Grade GP 50 or PF 42, satin finish. Color and pattern shall be as indicated with Finsih Schedule in drawings.

2.2.1.2 Backing Sheet

BK 20.

2.2.2 Solid Surface

Provide solid polymer material that is a homogeneous filled solid polymer; not coated, laminated or of a composite construction; meeting IAPMO Z124.3 and IAPMO Z124.6 requirements. Material shall have minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch shall be repairable by sanding or polishing. Material thickness shall be as indicated on the drawings. In no case shall material be less than 1/2 inch in thickness. Submit a minimum 4 by 4 inch sample of each color and pattern for approval. Samples shall indicate full range of color and pattern variation. Approved samples shall be retained as a

standard for this work. Submit test report results from an independent testing laboratory attesting that the submitted solid polymer material meets or exceeds each of the specified performance requirements.

## 2.3 MOISTURE CONTENT OF WOOD PRODUCTS

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products at time of delivery to the job site, and when installed, shall be as follows:

a. Interior Paneling: 12 percent.

b. Interior Finish Lumber, Trim, and Millwork 1-1/4 Inches Nominal or Less in Thickness: 12 percent on 85 percent of the pieces and 15 percent on remainder.

c. Exterior Treated and Untreated Finish Lumber and Trim 4 inches Nominal or Less in Thickness: 19 percent.

d. Exterior Wood Siding: 15 percent.

e. Moisture content of other materials shall be in accordance with the applicable standards.

## 2.4 PRESERVATIVE TREATMENT OF WOOD PRODUCTS

### 2.4.1 Nonpressure Treatment

Treat woodwork and millwork, such as exterior trim, door trim, and window trim, in accordance with WDMA I.S. 4, with either 2 percent copper napthenate, 3 percent zinc napthenate, or 1.8 percent copper-8-quinolinolate. Provide a liberal brushcoat of preservative treatment to field cuts and holes.

### 2.4.2 Pressure Treatment

Lumber and plywood used on the exterior of buildings or in contact with masonry or concrete shall be treated with water-borne preservative listed in AWPA P5 as applicable, and inspected in accordance with AWPA M2. Identify treatment on each piece of material by the quality mark of an agency accredited by the Board of Review of the American Lumber Standards Committee. Plywood shall be treated to a reflection level as follows:

Exterior wood molding and millwork within 18 inches of soil, in contact with water or concrete shall be preservative-treated in accordance with WMMPA WM 6. Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil.

## 2.5 HARDWARE

Provide sizes, types, and spacings of manufactured building materials recommended by the product manufacturer except as otherwise indicated or specified.

### 2.5.1 Wood Screws

ASME B18.6.1.

2.5.2 Bolts, Nuts, Lag Screws, and Studs

ASME B18.2.1 and ASME B18.2.2.

2.5.3 Nails

Nails shall be the size and type best suited for the purpose and shall conform to ASTM F 547. Nails shall be hot-dip galvanized or aluminum when used on exterior work. For siding, length of nails shall be sufficient to extend 1-1/2 inches into supports, including wood sheathing over framing. Screws for use where nailing is impractical shall be size best suited for purpose.

2.5.4 Adjustable Shelf Standards

ANSI/BHMA A156.9, with shelf rests.

2.5.5 Vertical Slotted Shelf Standards

ANSI/BHMA A156.9, with shelf brackets.

2.5.6 Closet Hanger Rods

Chromium-plated steel rods, not less than 1 inch diameter by 18 gage. Rods may be adjustable with integral mounting brackets if smaller tube is 1 inch by 18 gage. Provide intermediate support bracket for rods more than 48 inches long.

2.6 FABRICATION

2.6.1 Quality Standards (QS)

The terms "Premium," "Custom," and "Economy" refer to the quality grades defined in AWI Qual Stds. Items not specified to be of a specific grade shall be Custom grade. The AWI QS is superseded by all contract document requirements indicated or stated herein.

2.6.2 Utility Shelving

Utility shelving shall be a suitable species equal to or exceeding requirements of No. 3 Common white fir under WWPA G-5, 1 inch thick; or plywood, interior type, Grade A-B, 1/2 inch thick, any species group.

2.6.3 Countertops - Laminated Plastic

Fabricate with lumber and a core of exterior plywood, glued and screwed to form an integral unit. Bond laminated plastic under pressure to exposed surfaces, using type of glue recommended by plastic manufacturer, and bond a backing sheet under pressure to underside of countertop. Countertop unit shall be post-formed type with no-drip nose, cove moulding, and Style A back splash, and covered with ANSI/NEMA LD 3, Grade PF 42 plastic. Back splash shall be not less than 3-1/2 inches nor more than 4-1/2 inches high.

2.6.4 Countertops - Solid Surface

Components shall be factory or shop fabricated to sizes and shapes indicated, to the greatest extent practical, in accordance with approved

Shop Drawings and manufacturer's requirements. Provide factory cutouts for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii shall be routed to template, with edges smooth. Defective and inaccurate work will be rejected. Submit product data indicating product description, fabrication information, and compliance with specified performance requirements for solid polymer, joint adhesive, sealants, and heat reflective tape. Both the manufacturer of materials and the fabricator shall submit a detailed description of operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

Fabricate backsplashes and end splashes from 1/2 inch thick solid surfacing material to be 4 inches high and in accordance with shape as indicated on the drawings. Backsplashes and end splashes shall be provided for all counter tops and vanity tops. Backsplashes shall be shop fabricated.

One-piece vanity top and bowl fabrications shall be a standard pre-fabricated product provided by the solid polymer manufacturer. Units where indicated shall include a vanity top with integral sink bowl and backsplash.

2.6.5 Cabinets

Wall and base cabinets and vanity cabinets shall be of the same construction and appearances. Fabricate with solid ends and frame fronts, or with frames all around. Frames shall be solid hardwood not less than 3/4 by 1-1/2 inches. Ends, bottom, back, partitions, and doors shall be hardwood plywood. Mortise and tenon, dovetail, or dowel and glue joints to produce a rigid unit. Cover exposed edges of plywood with hardwood strips. Doors, frames, and solid exposed ends shall be 3/4 inch thick; bottom, partitions, and framed ends 1/2 inch minimum; shelves 5/8 inch minimum; back 1/4 inch minimum.

2.6.5.1 Cabinet Hardware

ANSI/BHMA A156.9. Provide cabinet hardware including two self-closing hinges for each door, two side-mounted metal drawer slides for each drawer and pulls for all doors and drawers as follows. Hardware exposed to view shall be bright chromium plated. All cabinet hardware shall comply with the following requirements:

a. Provide concealed Euro-Style, back mounted hinges with opening to 165 degrees with self-closing feature at less than 90 degrees to its closed position.

b. Drawer slides shall have a static rating capacity of 100 lbs. The slides shall have a self closing/stay-closed action, zinc or epoxy coated steel finish, ball bearing rollers, and positive stop with lift out design.

c. Drawer pulls shall be wire type pulls with center-to-center dimension not less than3-1/2 inches and cross sectional diameter of 5/16 inch. The handle projection shall be not less than 1-5/16 inches.

d. Drawer catch shall be heavy duty magnetic catch.

e. Provide locks on drawers and cabinets where indicated in drawings.

2.6.5.2 Finish

Wood surfaces: Provide a natural factory finish on wood surfaces after fabrication. Finish shall be fabricator's standard natural finish, except that it shall be equivalent to one coat of sealer and one coat of spar varnish on all surfaces and a second coat of spar varnish on surfaces exposed to view. Sand lightly and wipe clean between coats.

Laminated surfaces: Shall be selected from manufacturers' standard available selections. Selections shall include faux wood grains, solid colors, and multi-spec "matrix" colors. See Finish Schedule in drawings for color and pattern.

Solid surface products: Exposed finished surfaces and edges shall receive a uniform appearance. Exposed surface finish shall be semigloss; gloss rating of 25-50. See Finish Schedule in drawings for color and pattern.

2.6.6 Workbenches

Fabricate as indicated. Dovetail and glue drawer corners. Fasten frames with suitable wood screws or bolts. Sand exposed surfaces smooth, and ease exposed edges. Provide two side-mounted, metal, ball-bearing drawer slides for each door.

2.6.7 Casework With Transparent Finish (CTF)

2.6.7.1 AWI Quality Grade (CTF)

Custom grade.

2.6.7.2 Construction (CTF)

Details shall conform to reveal overlay design.

2.6.7.3 Exposed Parts

Red Oak specie.

2.6.7.4 Semi-Exposed Parts

As specified in the AWI Qual Stds for the grade selected.

2.6.8 Casework With High Pressure Laminate Finish (CHPL)

2.6.8.1 AWI Quality Grade (CHPL)

Custom grade.

2.6.8.2 Construction (CHPL)

Details shall conform to reveal overlay design.

2.6.8.3 Exposed Surfaces

High pressure laminate.

#### 2.6.8.4 Semi-Exposed Surfaces

As specified in the AWI Qual Stds for the grade selected.

## PART 3 EXECUTION

### 3.1 FINISH WORK

Provide sizes, materials, and designs as indicated and as specified. Apply primer to finish work before installing. Where practicable, shop assemble and finish items of built-up millwork. Joints shall be tight and constructed in a manner to conceal shrinkage. Miter trim and moldings at exterior angles and cope at interior angles and at returns. Material shall show no warp after installation. Install millwork and trim in maximum practical lengths. Fasten finish work with finish nails. Provide blind nailing where practicable. Set face nails for putty stopping.

#### 3.1.1 Exterior Finish Work

Machine-sand exposed flat members and square edges. Machine-finish semi-exposed surfaces. Construct joints to exclude water. In addition to nailing, glue joints of built-up items with waterproof glue as necessary for weather-resistant construction. Provide well distributed end joints in built-up members. Provide shoulder joints in flat work. Hold backs of wide-faced miters together with metal rings and waterproof glue. Fascias and other flat members, unless otherwise indicated, shall be 3/4 inch thick. Provide door and window trim in single lengths. Provide braced, blocked, and rigidly anchored cornices for support and protection of vertical joints. Install soffits in largest practical size. Joints of plywood shall occur over center lines of supports. Fasten soffits with aluminum or stainless steel nails. Back prime all concealed surfaces of exterior trim.

#### 3.1.2 Interior Finish Work

After installation, sand exposed surfaces smooth. Provide window and door trim in single lengths.

#### 3.1.3 Door Frames

Set plumb and square. Provide solid blocking at not more than 16 inches o.c. for each jamb. Position blocking to occur behind hinges and lock strikes. Double wedge frames and fasten with finishing nails. Set nails for putty stopping.

#### 3.1.4 Window Stools and Aprons

Provide stools with rabbet over window sill. Provide aprons with returns cut accurately to profile of member.

#### 3.1.5 Bases

Flat member with a molded top. Fasten base to framing or to grounds. Nail shoe mold to the base. Set shoe mold or one-piece wood base after finish flooring is in place.

#### 3.1.6 Finish Stair Work

Fit, nail, screw, bolt, and glue stair work together to form a strong

rigid structure without squeaks or vibrations. Anchor newels and posts securely to rough stair framing. Cut newels, posts, and drops accurately around floor construction to make tight fit. Install balusters into treads and landings with glue. Install railing with straight runs following slope of stairs and with smooth curve turns. Return railing profile at ends and secure joints with bolts and nuts. Secure railing to posts and newels with concealed anchors. Support wall rails on metal brackets spaced near ends and not over 5 feet o.c.

## 3.2 SHELVING

1 inch nominal thick wood shelf material or 3/4 or 23/32 inch thick plywood shelf material supported substantially with end and intermediate supports and arranged to prevent buckling and sagging. Hook strips shall be 1 by 4 inches nominal and cleats 1 by 2 inches nominal. Provide cleats except where hook strips are specified or indicated. Where adjustable shelving is indicated, provide standards and brackets or shelf rests for each shelf. Anchor standards to wall at not more than 2 feet o.c.

### 3.2.1 Linen Closets

Unless indicated otherwise, linen closets shall have a counter shelf 20 inches wide located 36 inches above the floor, a lower shelf approximately 18 inches wide and 18 inches above the floor, and three upper shelves 11-1/4 inches wide located 14 inches above the counter shelf and 14 inches apart.

### 3.2.2 Storage & Janitor's Rooms

Provide storage rooms with shelves of size and arrangement as indicated, at a minimum provide 11-1/4 inches wide, bottom shelf 18 inches above the floor, top shelf 18 inches below the ceiling, and intermediate shelves approximately 18 inches apart.

### 3.2.3 Room Closets

Provide two shelves 11-1/4 inches wide. Support lower shelf by hook strips at back and ends, and provide full-length wood or metal clothes hanger rods unless indicated otherwise.

## 3.3 CLOTHES HANGER RODS

Provide clothes hanger rods where indicated and in closets having hook strips. Set rods parallel with front edges of shelves and support by sockets at each end and by intermediate brackets spaced not more than 4 feet o.c.

## 3.4 MISCELLANEOUS

### 3.4.1 Counters

Construct as indicated. Conceal fastenings where practicable, fit counter neatly, install in a rigid and substantial manner, and scribe to adjoining surfaces. Provide counter sections in longest lengths practicable; keep joints in tops to a minimum; and where joints are necessary, provide tight hairline joints drawn up with concealed-type heavy pull-up bolts. Glue joints with water-resistant glue and, in addition, make rigid and substantial with screws, bolts, or other approved fastenings.

Provide solid surface counter top at toilet room lavatories.

Provide laminated plastic counter top at break room, circulation desk, and conference room casework.

### 3.4.2 Cabinets

Install level, plumb, and tight against adjacent walls. Secure cabinets to walls with concealed toggle bolts, and secure top to cabinet with concealed screws. Make cut-outs for fixtures to templates supplied by fixture manufacturer. Carefully locate cut-outs for pipes so that edges of holes will be covered by escutcheons.

### 3.4.3 Workbenches

Construct as indicated. Install level, plumb, and tight against adjacent construction. Fasten to walls with screws or toggle bolts and to floors with expansion bolts.

### 3.4.4 Wood Seats

Support seats as indicated. Secure seats to supports with screws or bolts as required; countersink heads of and fill holes with hardwood filler, finished flush with tops of seats.

### 3.4.5 Wood Bumpers

Bore, countersink, and bolt in place where indicated.

### 3.4.6 Catwalks in Attic Spaces

Lay boards with 1 inch spaces between. Stagger end joints, with each joint on a support.

## 3.5 MOLDING AND INTERIOR TRIM

Molding and interior trim shall be installed straight, plumb, level and with closely fitted joints. Exposed surfaces shall be machine sanded at the mill. Molded work shall be coped at returns and interior angles and mitered at external corners. Intersections of flatwork shall be shouldered to ease any inherent changes in plane. Window and door trim shall be provided in single lengths. Blind nailing shall be used to the extent practicable, and face nailing shall be set and stopped with a nonstaining putty to match the finish applied. Screws shall be used for attachment to metal; setting and stopping of screws shall be of the same quality as required where nails are used.

-- End of Section --

# SECTION 07 22 00

# ROOF AND DECK INSULATION

**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 C 1177/C 1177M | (2008) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing |
| ASTM C 1289 | (2008) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board |
| ASTM E 84 | (2008a) Standard Test Method for Surface Burning Characteristics of Building Materials |

FM GLOBAL (FM)

| | |
|---|---|
| FM P7825 | (2005) Approval Guide |
| FM P7825c | (2005) Approval Guide Building Materials |
| FM P9513 | (2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001), 1-28 (2002), 1-29 (2002), 1-28R/1-29R (1998), 1-30 (2000), 1-31 (2000), 1-32 (2000), 1-33 (2000), 1-34 (2001), 1-49 (2000), 1-52 (2000), 1-54 (2001) |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL Bld Mat Dir | (2008) Building Materials Directory |

### 1.2 SUBMITTALS

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

SD-02 Shop Drawings

Wood nailers

Tapered roof insulation system;

Taper cants and crickets

SD-03 Product Data

Fasteners

Insulation;

Include minimum thickness of insulation for steel and concrete decks and fastener pattern for insulation on steel decks.

SD-06 Test Reports

Flame spread and smoke developed ratings

Submit in accordance with ASTM E 84.

SD-07 Certificates

Installer qualifications

SD-08 Manufacturer's Instructions

Nails and fasteners

Roof insulation, including field of roof and perimeter attachment requirements.

## 1.3 MANUFACTURER'S CERTIFICATE

Submit certificate from the insulation manufacturer attesting that the installer has the proper qualifications for installing tapered roof insulation systems.

Certificate attesting that the expanded perlite or polyisocyanurate insulation contains recovered material and showing estimated percent of recovered material. Certificates of compliance for felt materials.

## 1.4 QUALITY ASSURANCE

### 1.4.1 Insulation on Roof Deck

Roof insulation shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E 84. Insulation bearing the UL label and listed in the UL Bld Mat Dir as meeting the flame spread and smoke developed ratings will be accepted in lieu of copies of test reports. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the type used for this project and the construction is listed as fire-classified in the UL Bld Mat Dir or listed as Class I roof deck construction in the FM P7825. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

## 1.5 DELIVERY, STORAGE, AND HANDLING

### 1.5.1 Delivery

Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

a. Name of manufacturer;

b. Brand designation;

c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification; and

Deliver materials in sufficient quantity to allow continuity of the work.

1.5.2 Storage and Handling

Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Replace damaged material with new material.

1.6 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

1.7 PROTECTION OF PROPERTY

1.7.1 Special Protection

Provide special protection approved by the insulation manufacturer, or avoid heavy traffic on completed work when ambient temperature is above 80 degrees F.

PART 2 PRODUCTS

2.1 INSULATION

2.1.1 Insulation Types

Roof insulation shall be one or an assembly of the following materials and compatible with attachment methods for the specified insulation and roof membrane:

a. Polyisocyanurate Board: ASTM C 1289 Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength shall be 20 pounds per square inch (psi). Provide a layer of 1/2 inch high density wood fiber board board placed over top surface of polyisocyanurate, embedded in solid asphalt mopping with joints of glass mat gypsum board staggered in both directions with respect to polyisocyanurate board below.

2.1.2 Recovered Materials

Provide thermal insulation materials containing recycled materials to the extent practical. The required minimum recycled material content for the listed materials are:

Polyisocyanurate: 9 percent recovered material

2.1.3 Insulation Thickness

As necessary to provide a thermal resistance (R value) of 30 or more. Thickness shall be based on the "R" value for aged insulation. Insulation minimum thickness shall be 5".

2.1.4 Tapered Roof Insulation

Tapered roof insulation shall be factory tapered to a slope of not less than 1/8 inch per foot for locations where required for proper roof drainage. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified slope and thermal conductance. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

2.1.5 Cants and Tapered Edge Strips

Provide preformed cants and tapered edge strips of the same material as the roof insulation; or, when roof insulation material is unavailable, provide pressure-preservative treated wood cants and edge strips as recommended by the roofing manufacturer, unless otherwise indicated. Face of cant strips shall have incline of 45 degrees and vertical height of 4 inches. Taper edge strips at a rate of one to 1 1/2 inch per foot down to approximately 1/8 inch thick.

2.2 PROTECTION BOARD

For use as a protection board for hot-mopped, torched-down, or adhesively-applied roofing membrane over roof insulation provide 1/2 inch glass mat gypsum board.

2.2.1 Glass Mat Gypsum Roof Board

ASTM C 1177/C 1177M, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E 84, 500 psi, Class A, non-combustible, 1/2 inch thick, 4 by 8 feet board size.

2.3 SHEATHING PAPER FOR WOOD DECKS

Rosin-sized building paper or unsaturated felt weighing not less than 35 pounds per 100 square feet.

2.4 FASTENERS

Flush-driven through flat round or hexagonal steel or plastic plates. Steel plates shall be zinc-coated, flat round not less than 1 3/8 inch diameter or hexagonal not less than 28 gage. Plastic plates shall be high-density, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fastener head shall recess fully into the plastic plate after it is driven. Plates shall be formed to prevent dishing. Do not use bell-or cup-shaped plates. Fasteners shall conform to insulation manufacturer's recommendations except that holding power, when driven, shall be not less than 120 pounds each. Fasteners for steel or concrete decks shall conform to FM P7825c for Class I roof deck construction, and shall be spaced to withstand an uplift pressure of 90

pounds per square foot.

2.4.1 Fasteners for Plywood Decks

Annular ring shank, square head, one-piece composite nails long enough to penetrate into plywood decks approximately 1/2 inch but not protrude through underside of decking.

2.5 WOOD NAILERS

Pressure-preservative-treated.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Surfaces shall be clean, smooth, and dry. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work.

The Contracting Officer will inspect and approve the surfaces immediately before starting installation.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

a. Install wood nailers the same thickness as insulation at eaves, edges, curbs, walls, and roof openings for securing cant strips, gravel stops, and flashing flanges.

b. Examine wood decks to ascertain that deck boards have been properly nailed and that exposed nail heads have been set.

c. Cover wood decks with a layer of rosin-sized building paper or unsaturated felt. Lap sides and ends not less than 4 inches. Nail sufficiently to prevent tearing or buckling during installation. Building paper shall also serve as vapor barrier.

3.1.3 Vapor Retarder on Wood Decks

For vapor retarder consisting of one layer of asphalt base sheet, lap each sheet 4 inches over the preceding sheet. Provide end laps not less than 4 inches and stagger laps a minimum of 12 inches. Cement side and end laps together with solid mopping of asphalt or heavy coat of asphalt roof cement. Nail side laps at 6 inch intervals. Apply asphalt mopping at rate of 20 to 35 lbs per 100 square feet. Install two rows of nails approximately 11 inches apart down longitudinal center of each sheet, with nails staggered at 18 inches O.C.

3.2 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of felts for the built-up roofing, and end joints of each course are staggered with

those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.

3.2.1 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners as recommended by manufacturer.

3.2.2 Special Precautions for Installation of Foam Insulation

3.2.2.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, install 1/2 inch thick glass mat gypsum roof board over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

3.2.3 Cant Strips

Where indicated, provide cant strips at intersections of roof with walls, parapets, and curbs extending above roof. Wood cant strips shall bear on and be anchored to wood blocking. Fit cant strips flush against vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install in an approved adhesive.

3.2.4 Tapered Edge Strips

Where indicated, provide edge strips in the right angle formed by junction of roof and wood nailing strips that extend above level of roof. Install edge strips flush against vertical surfaces of wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, install in an approved adhesive.

3.3 PROTECTION

3.3.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with the finished roofing specified in 07 52 00 on same day. Do not permit phased construction. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight. Exposed edges of the insulation shall be protected by cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs shall be 2 layers of bituminous-saturated felt set in plastic bituminous cement set in roof cement. Fill all profile voids in cut-offs to prevent entrapping of moisture into the area below the membrane. Cutoffs shall be removed when work is resumed.

3.3.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

## 3.4 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed roof insulation with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

b. Verification of certification, listing or label compliance with FM P9513.

c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.

e. Inspection of mechanical fasteners; type, number, length, and spacing.

f. Coordination with other materials, cants, sleepers, and nailing strips.

g. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

h. Installation of cutoffs and proper joining of work on subsequent days.

i. Continuation of complete roofing system installation to cover insulation installed same day.

-- End of Section --

# SECTION 07 42 13

# METAL WALL PANELS
**05/11**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

| | |
|---|---|
| AAMA 501.1 | (2005) Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure |
| AAMA 800 | (2010) Voluntary Specifications and Test Methods for Sealants |

AMERICAN IRON AND STEEL INSTITUTE (AISI)

| | |
|---|---|
| AISI S100 | (2012) North American Specification for the Design of Cold-Formed Steel Structural Members |
| AISI SG03-3 | (2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set |

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

| | |
|---|---|
| ASCE 7 | (2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A1008/A1008M | (2015) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened |
| ASTM A123/A123M | (2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| ASTM A36/A36M | (2014) Standard Specification for Carbon Structural Steel |
| ASTM A653/A653M | (2015) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| ASTM A755/A755M | (2015) Standard Specification for Steel |

| | |
|---|---|
| | Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products |
| ASTM A924/A924M | (2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process |
| ASTM B117 | (2011) Standard Practice for Operating Salt Spray (Fog) Apparatus |
| ASTM C920 | (2014a) Standard Specification for Elastomeric Joint Sealants |
| ASTM D1056 | (2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber |
| ASTM D1308 | (2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes |
| ASTM D1654 | (2008) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments |
| ASTM D1667 | (2005; R 2011) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell) |
| ASTM D2244 | (2015a) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates |
| ASTM D2247 | (2011) Testing Water Resistance of Coatings in 100% Relative Humidity |
| ASTM D2794 | (1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) |
| ASTM D3359 | (2009; E 2010; R 2010) Measuring Adhesion by Tape Test |
| ASTM D3363 | (2005; E 2011; R 2011; E 2012) Film Hardness by Pencil Test |
| ASTM D4214 | (2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films |
| ASTM D4587 | (2011) Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings |
| ASTM D522/D522M | (2014) Mandrel Bend Test of Attached Organic Coatings |
| ASTM D523 | (2014) Standard Test Method for Specular Gloss |

| | |
|---|---|
| ASTM D5894 | (2010) Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet) |
| ASTM D610 | (2008; R 2012) Evaluating Degree of Rusting on Painted Steel Surfaces |
| ASTM D714 | (2002; R 2009) Evaluating Degree of Blistering of Paints |
| ASTM D822 | (2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings |
| ASTM D968 | (2015) Abrasion Resistance of Organic Coatings by Falling Abrasive |
| ASTM E1592 | (2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference |
| ASTM E283 | (2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen |
| ASTM E331 | (2000; R 2009) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference |
| ASTM E72 | (2015) Conducting Strength Tests of Panels for Building Construction |
| ASTM E84 | (2015a) Standard Test Method for Surface Burning Characteristics of Building Materials |
| ASTM G152 | (2013) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials |
| ASTM G153 | (2013) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials |

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

| | |
|---|---|
| MBMA MBSM | (2002) Metal Building Systems Manual |

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

| | |
|---|---|
| NAAMM AMP 500 | (2006) Metal Finishes Manual |

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

| | |
|---|---|
| SMACNA 1793 | (2012) Architectural Sheet Metal Manual, 7th Edition |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL Bld Mat Dir | (2012) Building Materials Directory |

## 1.2 DEFINITIONS

Metal Wall Panel: Metal wall panels, attachment system components and accessories necessary for a complete weather-tight wall system.

## 1.3 DESCRIPTION OF WALL PANEL SYSTEM

Factory color finished, metal wall panel system with exposed fastener attachment. Panel profile must be smooth face, ribbed panel as shown on drawings(PBU or PBR configuration).

### 1.3.1 Metal Wall Panel General Performance

Comply with performance requirements, conforming to AISI S100, without failure due to defective manufacture, fabrication, installation, or other defects in construction. Wall panels and accessory components must conform to the following standards:

ASTM A1008/A1008M
ASTM A123/A123M
ASTM A36/A36M

ASTM A755/A755M for metallic coated steel sheet for exterior coil pre-painted applications.
ASTM A924/A924M for metallic coated steel sheet

UL Bld Mat Dir

### 1.3.2 Structural Performance

Maximum calculated fiber stress must not exceed the allowable value in the AISI or AA manuals; a one third overstress for wind is allowed. Midspan deflection under maximum design loads is limited to L/180. Contract drawings show the design wind loads and the extent and general assembly details of the metal siding. Contractor must provide design for members and connections not shown on the drawings. Siding panels and accessories must be the products of the same manufacturer.

Provide metal wall panel assemblies complying with the load and stress requirements in accordance with ASTM E1592. Wind Load force due to wind action governs the design for panels.

Wall systems and attachments are to resist the wind loads as determined by ASTM E72 and ASCE 7 in the geographic area where the construction will take place, in pounds per square foot. Submit five copies of wind load tests to the Contracting Officer.

1.3.3 Air Infiltration

Air leakage must conform to the limits through the wall assembly area when tested according to ASTM E283.

1.3.4 Water Penetration Under Static Pressure

No water penetration when tested according to ASTM E331.

1.3.5 Water Penetration Under Dynamic Pressure

No evidence of water leakage when tested according to AAMA 501.1.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Documentation for the following items:

Qualification of Manufacturer;
Qualification of Installation Contractor;
Sample Warranty;

SD-02 Shop Drawings

Installation Drawings ;

SD-03 Product Data

Submit Manufacturer's data indicating percentage of recycle material in wall panels.

Submit Manufacturer's catalog data for the following items:

Wall Panels ;

Factory Color Finish
Closure Materials
Pressure Sensitive Tape
Sealants and Caulking
Galvanizing Repair Paint
Enamel Repair Paint
Accessories

SD-04 Samples

Submit as required each of the following samples:

Wall Panels, 12 inches long by actual panel width;
Fasteners;
Metal Closure Strips, 10 inches long of each type;

Color chart and chips ;

Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures and patterns

available for wall panels with factory applied finishes.

SD-05 Design Data

Wind load design analysis ;

As applicable, submit the following wind load design analysis data, to include, but not limited to:

wind speed
exposure category,co-efficient,importance factor
type of facility
negative pressures for each zone
methods and requirements of attachment

SD-06 Test Reports

Submit test reports for the following in accordance with the referenced articles in this section.

Leakage Tests;
Wind Load Tests;
Coating Tests;
Chalking Tests;

SD-07 Certificates

Submit certificates for the following items showing conformance with referenced standards contained in this section:

Coil Stock;
Fasteners;
Galvanizing Repair Paint;
Enamel Repair Paint;

SD-08 Manufacturer's Instructions

Include detailed application instructions and standard manufacturer drawings altered as required by these specifications.

Installation of Wall panels;

SD-09 Manufacturer's Field Reports

Submit 3 bound copies of the Manufacturer's Field Reports;

SD-11 Closeout Submittals

Warranty;
Maintenance Instructions;

20 year "No Dollar Limit" warranty for labor and material

## 1.5 QUALITY ASSURANCE

### 1.5.1 Pre-Installation Conference

Upon notification of submittal receipt and approval by the Contracting Officer; and prior to the commencement of the work, the Contractor must

attend a pre-installation conference to review the following:

a. Drawings and Specifications.

b. Qualification of Installer.

c. Sustainable acquisition

d. Approved Warranty

e. Sample wall panels, 12 inches long by actual panel width

f. Sample metal closure strips, 10 inches long of each type

g. Color charts and chips

h. Coatings and base metal tests, chalking tests

i. Construction schedule, availability of materials, Installer's personnel, equipment and facilities required to progress with the work without delay.

j. Methods and procedures related to installation of wall panels, including manufacturer's written instructions. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

k. Support conditions for compliance with requirements, including alignment between and attachment to structural members.

l. Flashing, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.

m. Governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.

n. Temporary protection requirements for metal wall panel assembly during and after installation.

o. Wall panel observation and repair procedures after metal wall panel installation. Provide detailed written instructions including copies of Material Safety Data Sheets for maintenance and repair materials, and manufacturer's maintenance instructions.

#### 1.5.1.1 Installation Drawings

Installation shop drawings for wall panels, flashing, accessories, and anchorage systems must indicate completely dimensioned structural frame and erection layouts, openings in the wall, special framing details, and construction details at corners, building intersections and flashing, location and type of mastic and metal filler strips.

#### 1.5.1.2 Wind Load Design Analysis

Wind design analysis must include wall plan delineating dimensions and attachment patterns for each zone. Wind design analysis must be prepared and sealed by Licensed Project Engineer in the geographic area where the construction will take place.

1.5.2 Manufacturer's Technical Representative

The representative must have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and installations in the geographical area where construction will take place.

1.5.3 Qualification of Manufacturer

Certify that metal wall panel system manufacturer has a minimum of five (5) years experience in manufacturing metal wall system and accessory products.

Manufacturer must also provide engineering services by an authorized engineer; currently licensed in the geographical area where construction will take place, having a minimum of four (4) years experience as an engineer knowledgeable in wind load design analysis, protocols and procedures per MBMA MBSM, "Metal Building Systems Manual"; ASCE 7, and ASTM E1592.

Provide certified engineering calculations, using the products submitted, for Wind load requirements in accordance with ASCE 7.

1.5.3.1 Manufacturer's Certificates

Also provide the following certifications from the manufacturer:

Coil Stock
Fasteners
Galvanizing Repair Paint
Enamel Repair Paint

Submit certification from coil stock manufacturer or supplier that the machinery used will form the provided coil stock without warping, waviness, or rippling that is not a part of the panel profile, and without damage, abrasion or marring of the finish coating.

Provide evidence that products used within this specification are manufactured in the United States.

1.5.4 Certified Qualification of Installation Contractor

The installation contractor must be approved and certified by the metal wall panel manufacturer prior to beginning the installation of the metal wall panel system. Subcontracting by Certified Contractor for the metal wall panel work is not permitted.

1.5.5 Single Source

Obtain each type of metal wall panels, clips, closure materials and other accessories from the standard products of the single source from a single manufacturer to operate as a complete system for the intended use.

1.5.6 Manufacturer's Maintenance Instructions

Provide manufacturer's detailed written instructions including copies of Material Safety Data Sheets for maintenance and repair materials.

## 1.6 DELIVERY, HANDLING, AND STORAGE

Deliver and protect package components, sheets, metal wall panels, and other manufactured items to prevent damage or deformation during transportation and handling.

Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

Stack and store metal wall panels horizontally on platforms or pallets, covered with suitable weather-tight and ventilated covering to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

Retain strippable protective covering on metal wall panel until actual installation.

## 1.7 PROJECT CONDITIONS

### 1.7.1 Field Measurements

Verify locations of wall framing and opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

### 1.7.2 Weather Limitations

Proceed with installation preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into wall system or building.

## 1.8 WARRANTY

Warranty must conform to the Sample Warranty as reviewed and approved by the Contracting Officer.

### 1.8.1 20 Year "No Dollar Limit" Warranty for Labor and Material

Furnish manufacturer's no-dollar-limit warranty for the metal wall panel system. The warranty period is to be no less than twenty (20) years from the date of Government acceptance of the work. The warranty is to be issued directly to the Government. The warranty is to provide that if within the warranty period the metal wall panel system shows evidence of corrosion, perforation, rupture or excess weathering due to deterioration of the wall panel system resulting from defective materials and correction of the defective workmanship is to be the responsibility of the metal wall panel system manufacturer. Repairs that become necessary because of defective materials and workmanship while metal wall panel system is under warranty are to be performed within 24 hours after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within 24 hours of notification will constitute grounds for having emergency repairs performed by others and not void the warranty.

# PART 2 PRODUCTS

## 2.1 FABRICATION

Unless approved otherwise, fabricate and finish metal wall panels and

accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated and specified performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel. Fabricate metal wall panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weather-tight and minimize noise from movements within panel assembly.

2.1.1 Sheet Metal Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 that apply to the design, dimensions, metal, and other characteristics of item indicated:

a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

b. End Seams: fabricate nonmoving end seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

c. Sealed Joints: form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA 1793.

d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

e. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA 1793 or by metal wall panel manufacturer for application, but not less than thickness of metal being secured.

2.2 PANEL MATERIALS

2.2.1 Steel Sheet

Roll-form steel wall panels to the specified profile, with fy= 50 ksi, 22 gauge and depth as indicated. Material must be plumb and true, and within the tolerances listed:

a. Galvanized Steel Sheet conforming to ASTM A653/A653M and AISI SG03-3.

c. Individual panels must be continuous length to cover the entire length of any unbroken wall area with no joints or seams and formed without warping, waviness, or ripples that are not part of the panel profile and free of damage to the finish coating system.

d. Provide panels with thermal expansion and contraction consistent with the type of system specified.

1. Profile and coverage to be a minimum height and width from manufacturer's standard for the indicated wall area.

2a. Profile to be a 1-1/4 inch high rib at 12 inches o.c. with small stiffening ribs, 38 inch overall width with 36 inch coverage and

exposed fasteners.

Or

2b. Profile to be a 3/4 inch high rib at 6 inches o.c., 38 inch overall width with 36 inch coverage and exposed fasteners.

3. Smooth Surface Texture.

2.2.2 Factory Color Finish

Comply with NAAMM AMP 500 for recommendations for applying and designating finishes. Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

All panels are to receive a factory-applied polyvinylidene fluoride Kynar 500/Hylar 5000 finish consisting of a baked-on top-coat with a manufacturer's recommended prime coat conforming to the following:

2.2.2.1 Metal Preparation

Carefully prepare all metal surface for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with acid rinse, and thorough drying.

2.2.2.2 Prime Coating

Apply a base coat of epoxy paint, specifically formulated to interact with the top-coat, to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. Prime coat must be oven cured prior to application of finish coat.

2.2.2.3 Exterior Finish Coating

Roll coat the finish coating over the primer by roll coating to dry film thickness of 0.80 plus 5 mils (3.80 plus 0.50 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 plus 0.10 mils (4.00 plus 0.10 mils for Vinyl Plastisol). Oven-cure finish coat.

2.2.2.4 Interior Finish Coating

Apply a wash-coat on the reverse side over the primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry film thickness of 0.50 plus 0.10 mils. Oven-cured the wash coat.

2.2.2.5 Color

Provide exterior finish color as selected by the Contracting Officer from the manufacturer's standard color chart.

2.2.2.6 Physical Properties

Coating must conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

| | |
|---|---|
| General: | ASTM D5894 and ASTM D4587 |
| Abrasion: | ASTM D968 |
| Adhesion: | ASTM D3359 |
| Chalking: | ASTM D4214 |
| Chemical Pollution: | ASTM D1308 |
| Color Change and Conformity: | ASTM D2244 |
| Creepage: | ASTM D1654 |
| Cyclic Corrosion Test: | ASTM D5894 |
| Flame Spread: | ASTM E84 |
| Flexibility: | ASTM D522/D522M |
| Formability: | ASTM D522/D522M |
| Gloss at 60 and 85 degrees: | ASTM D523 |
| Humidity: | ASTM D2247 and ASTM D714 |
| Oxidation: | ASTM D610 |
| Pencil Hardness: | ASTM D3363 |
| Reverse Impact: | ASTM D2794 |
| Salt Spray: | ASTM B117 |
| Weatherometer: | ASTM G152, ASTM G153 and ASTM D822 |

## 2.3 MISCELLANEOUS METAL FRAMING

Cold-formed metallic-coated steel sheet conforming to ASTM A653/A653M.

### 2.3.1 Fasteners for Miscellaneous Metal Framing

Type, material, corrosion resistance, size and sufficient length to penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to supporting members and substrates in accordance with the wall panel manufacturer's and ASCE 7 requirements.

## 2.4 FASTENERS

### 2.4.1 General

#### 2.4.1.1 Exposed Fasteners

Provide corrosion resistant fasteners for wall panels, made of coated 305 - series corrosion resisting stainless steel and of a type and size recommended by the manufacturer to meet the performance requirements and design loads.

Fasteners for accessories must be the manufacturer's standard. Provide an integral metal washer matching the color of attached material with compressible sealing EPDM gasket approximately 3/32 inch thick.

#### 2.4.1.2 Hidden Fasteners

Provide corrosion resistant fasteners recommended by the manufacturer to meet the performance requirements and design loads.

#### 2.4.1.3 Screws

Screws to be corrosion resistant coated 305 - series stainless steel, and being the type and size recommended by the manufacturer to meet the performance requirements.

#### 2.4.1.4 Rivets

Rivets to be closed-end type, corrosion resistant stainless steel where watertight connections are required.

#### 2.4.1.5 Attachment Clips

Fabricate clips from steel hot-dipped galvanized in accordance with ASTM A653/A653M, Z275 G 90 or Series 300 stainless steel. Size, shape, thickness and capacity as required meeting the insulation thickness and design load criteria specified.

## 2.5 ACCESSORIES

### 2.5.1 General

All accessories must be compatible with the metal wall panels. Sheet metal flashing, trim, metal closure strips, caps and similar metal accessories must not be less than the minimum thickness specified for the wall panels. Exposed metal accessories/finishes to match the panels furnished, except as otherwise indicated. Molded foam rib, ridge and other closure strips must be non-absorbent closed-cell or solid-cell synthetic rubber or pre-molded neoprene to match configuration of the panels.

### 2.5.2 Rubber Closure Strips

Provide closed-cell, expanded cellular rubber conforming to ASTM D1056 and ASTM D1667; extruded or molded to the configuration of the specified wall panel and in lengths supplied by the wall panel manufacturer.

### 2.5.3 Metal Closure Strips

Provide factory fabricated steel closure strips to be the same gauge and

thickness, color, finish and profile of the specified wall panel.

2.5.4 Joint Sealants

2.5.4.1 Sealants and Caulking

Provide approved gun type sealants for use in hand- or air-pressure caulking guns at temperatures above 4 degrees C (or frost-free application at temperatures above 10 degrees F with minimum solid content of 85 percent of the total volume. Sealants must dry with a tough, durable surface skin which permit remaining soft and pliable underneath, providing a weather-tight joint. No migratory staining is permitted on painted or unpainted metal, stone, glass, vinyl, or wood.

Prime all joints receiving sealants with a compatible one-component or two-component primer as recommended by the wall panel manufacturer.

2.5.4.2 Shop-Applied

Sealant for shop-applied caulking must be non-curing butyl compliant with AAMA 800 to ensure the sealant's plasticity at the time of field erection.

2.5.4.3 Field-Applied

Sealant for field-applied caulking must be an approved gun grade, non-sag one component polysulfide or two-component polyurethane with an initial maximum Shore A durometer hardness of 25, and conforming to ASTM C920, Type II. Color to match panel colors.

2.5.4.4 Pressure Sensitive Tape

Provide pressure sensitive tape sealant, 100 percent solid with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the wall panel manufacturer.

2.6 SHEET METAL FLASHING AND TRIM

2.6.1 Fabrication

Shop fabricate sheet metal flashing and trim where practicable to comply with recommendations in SMACNA 1793 that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

2.7 REPAIR OF FINISH PROTECTION

Repair paint for color finish enameled wall panel must be compatible paint of the same formula and color as the specified finish furnished by the wall panel manufacturer. Provide 4 pints of repair paint matching the specified wall panels.

# PART 3 EXECUTION

## 3.1 EXAMINATION

Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of the Work.

Examine primary and secondary wall framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal wall panel manufacturer, UL, ASTM, ASCE 7 and as required for the geographical area where construction will take place.

Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

Submit to the Contracting Officer a written report, endorsed by Installer, listing conditions detrimental to performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment. Miscellaneous framing installation, including sub-purlins, girts, angles, furring, and other miscellaneous wall panel support members and anchorage must be according to metal wall panel manufacturer's written instructions.

## 3.3 WALL PANEL INSTALLATION

Provide full length metal wall panels, from sill to eave as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement in accordance with MBMA MBSM.

Erect wall panel system in accordance with the approved erection drawings, the printed instructions and safety precautions of the manufacturer.

Sheets are not to be subjected to overloading, abuse, or undue impact. Bent, chipped, or defective sheets shall not be applied.

Sheets must be erected true and plumb and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with the indicated eave, and sill.

Work is to allow for thermal movement of the wall panel, movement of the building structure, and to provide permanent freedom from noise due to wind pressure.

Field cutting metal wall panels by torch is not permitted.

### 3.3.1 Steel Wall Panels

Use stainless-steel fasteners for exterior surfaces and galvanized steel fasteners for interior surfaces.

### 3.3.2 Anchor Clips

Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

### 3.3.3 Metal Protection

Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

### 3.3.4 Joint Sealers

Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

## 3.4 FASTENER INSTALLATION

Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

## 3.5 FLASHING, TRIM AND CLOSURE INSTALLATION

### 3.5.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams to form permanently watertight and weather resistant.

Install sheet metal work is to form weather-tight construction without waves, warps, buckles, fastening stresses or distortion, and allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades is to be performed by sheet metal mechanics.

### 3.5.2 Metal Flashing

Install exposed metal flashing at building corners, sills and eaves, junctions between metal siding and walling. Exposed metal flashing must be the same material, color, and finish as the specified metal wall panel.

Fasten flashing at a minimum of 8 inches on center, except where flashing is held in place by the same screws that secure covering sheets.

Flashing is to be furnished in at least 8 foot lengths. Exposed flashing is to have 1 inch locked and blind-soldered end joints, and expansion

joints at intervals of not more than 16 feet.

Exposed flashing and flashing subject to rain penetration to be bedded in the specified joint sealant.

Isolate flashing which is in contact with dissimilar metals by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Form drips to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

### 3.5.3 Closures

Install metal closure strips at open ends of corrugated or ribbed pattern walls, and at intersection of wall and wall unless open ends are concealed with formed eave flashing; and in other required areas.

Install mastic closure strips at intersection of the wall with metal walling; top and bottom of metal siding; heads of wall openings; and in other required locations.

## 3.6 WORKMANSHIP

Make lines, arises, and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight.

## 3.7 ACCEPTANCE PROVISIONS

### 3.7.1 Erection Tolerances

Erect metal wall panels straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions.

### 3.7.2 Leakage Tests

Finished application of metal wall panels are to be subject to inspection and test for leakage by request of the Contracting Officer, Architect/Engineer. Conduct inspection and tests at no cost to the Government.

Inspection and testing is to be made promptly after erection to permit correction of defects and the removal and replacement of defective materials.

### 3.7.3 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials. Finished repaired surfaces must be uniform and free from variations of color and surface texture.

Repaired metal surfaces that are not acceptable to the project requirements and/or Contracting Officer are to be immediately removed and replaced with new material.

### 3.7.4 Paint-Finish Metal Siding

Paint-finish metal siding will be tested for color stability by the Contracting Officer during the manufacturer's specified guarantee period.

Panels that indicate color changes, fading, or surface degradation, determined by visual examination, must be removed and replaced with new panels at no expense to the Government.

New panels will be subject to the specified tests for an additional year from the date of their installation.

## 3.8 FIELD QUALITY CONTROL

### 3.8.1 Construction Monitoring

Make visual inspections as necessary to ensure compliance with specified requirements. Additionally, verify the following:

a. Materials comply with the specified requirements.

b. All materials are properly stored, handled and protected from damage. Damaged materials are removed from the site.

c. Framing and substrates are in acceptable condition, in compliance with specification, prior to application of wall panels.

d. Panels are installed without buckles, ripples, or waves and in uniform alignment and modulus.

e. Side laps are formed, sealed, fastened or seam locked as required.

f. The proper number, type, and spacing of attachment clips and fasteners are installed.

g. Installer adheres to specified and detailed application parameters.

h. Associated flashing and sheet metal are installed in a timely manner in accord with the specified requirements.

Provide five bound copies of Manufacturer's Field Reports to the Contracting Officer two weeks prior to project close-out.

## 3.9 CLEAN-UP AND DISPOSAL

Clean all exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from work area. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean.

Exposed metal surfaces must be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating.

Collect and place scrap/waste materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site; transport demolished materials from government property and legally dispose of them.

-- End of Section --

# SECTION 07 52 00

# MODIFIED BITUMINOUS MEMBRANE ROOFING
**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 within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

| | |
|---|---|
| ANSI/SPRI ES-1 | (2003) Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems |

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

| | |
|---|---|
| ASCE 7 | (2010; Change 2010; Change 2011; Errata 2011; Change 2011) Minimum Design Loads for Buildings and Other Structures |

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

| | |
|---|---|
| ASSE/SAFE A10.24 | (2006) Roofing - Safety Requirements of Low-Sloped Roofs |

ASPHALT ROOFING MANUFACTURER'S ASSOCIATION (ARMA)

| | |
|---|---|
| ARMA 410BUR88 | (2001) Manual of Roof Maintenance and Repair |
| ARMA 460LSR97 | (2002) NRCA/MRCA Repair Manual for Low Slope Membrane Roof Systems |
| ARMA PMBRG98 | (1998) Quality Control Guideline for the Application of Polymer Modified Bitumen Roofing |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM C1153 | (2010) Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging |
| ASTM D2170/D2170M | (2010) Kinematic Viscosity of Asphalts (Bitumens) |
| ASTM D312 | (2000; R 2006) Standard Specification for Asphalt Used in Roofing |
| ASTM D4073 | (2006) Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes |
| ASTM D41/D41M | (2011) Asphalt Primer Used in Roofing, |

| | |
|---|---|
| | Dampproofing, and Waterproofing |
| ASTM D4263 | (1983; R 2005) Indicating Moisture in Concrete by the Plastic Sheet Method |
| ASTM D4402 | (2006) Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer |
| ASTM D4586 | (2007) Asphalt Roof Cement, Asbestos-Free |
| ASTM D5147/D5147M | (2011a) Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material |
| ASTM E108 | (2011) Fire Tests of Roof Coverings |

INTERNATIONAL CODE COUNCIL (ICC)

| | |
|---|---|
| ICC IBC | (2009; Errata First Printing) International Building Code |

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

| | |
|---|---|
| ANSI/ISEA Z87.1 | (2010) Occupational and Educational Personal Eye and Face Protection Devices |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 241 | (2009) Standard for Safeguarding Construction,Alteration, and Demolition Operations |
| NFPA 58 | (2011; Errata 2 2011) Liquefied Petroleum Gas Code |

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

| | |
|---|---|
| NRCA Details | (2003) NRCA Roof Perimeter Flashing Systems Construction Details for Class 1 Roof Construction |
| NRCA RoofMan | (2012) The NRCA Roofing Manual |

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

| | |
|---|---|
| SMACNA 1793 | (2003) Architectural Sheet Metal Manual, 6th Edition |

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

| | |
|---|---|
| 29 CFR 1910 | Occupational Safety and Health Standards |
| 29 CFR 1910.12 | Construction Work |
| 29 CFR 1926 | Safety and Health Regulations for Construction |

29 CFR 1926.16 Rules of Construction

UNDERWRITERS LABORATORIES (UL)

UL 790 (2004; Reprint Oct 2008) Standard Test Methods for Fire Tests of Roof Coverings

UL RMSD (2011) Roofing Materials and Systems Directory

## 1.2 DESCRIPTION OF ROOF MEMBRANE SYSTEM

Minimum two-ply SBS modified bitumen roof membrane consisting of modified bitumen base sheet and cap sheet. Modified bitumen roof membrane must be set in hot nodified asphalt.

Base Ply: SBS modified base sheet with a fiberglass scrim in hot Type III asphalt.

Cap Ply: SBS-SIS modified mineral surface cap sheet.

All work must follow the NRCA RoofMan guidelines and standards stated within this Section.

## 1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roof plan: drawing depicting wind loads and boundaries of enhanced perimeter and corner attachments of roof system components, as applicable

SD-03 Product Data

Modified Bitumen Sheets

Asphalt

Primer

Modified Bitumen Roof Cement

Pre-Manufactured Accessories

Fasteners And Plates

Sample Warranty certificate

Include in data written acceptance by the roof membrane manufacturer of the products and accessories provided. Products must be as listed in the applicable wind uplift and fire rating classification listings, unless approved otherwise by the Contracting Officer.

SD-05 Design Data

Wind Uplift Calculations

Provide Engineering calculations, signed, sealed, and dated by a qualified Engineer validating the wind resistance per ASCE 7, ASTM D4073, and ANSI/SPRI ES-1 of non-rated roof system.

SD-07 Certificates

Provide evidence that products used within this specification are manufactured in the United States.

Qualification of Manufacturer

Certify that the manufacturer of the modified bitumen membrane meets requirements specified under paragraph entitled "Qualification of Manufacturer."

Qualification of Applicator

Certify that the applicator meets requirements specified under paragraph entitled "Qualification of Applicator."

Qualification of Engineer of Record

Certify that the Engineer of Record is fully qualified, competent, and currently licensed to practice in the project jurisdiction.

Bill of Lading

Submit bill of lading when labels of asphalt containers do not bear the flash point (FP), finished blowing temperature (FBT), and equiviscous temperature (EVT).

Wind Uplift Resistance FM 90/ 130 MPH classification, as applicable

Fire Resistance classification: A

Submit the roof system assembly wind uplift and fire rating classification listings.

Wind Uplift Resistance

SD-08 Manufacturer's Instructions

Modified Bitumen Membrane Application

Flashing

Temperature Limitations for Asphalt

Torches

Base Sheet attachment

Primer

Fasteners

Coating Application

Cold Weather Installation

Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Include membrane manufacturer requirements for nailers and backnailing of roof membrane on steep slopes. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

SD-11 Closeout Submittals

Warranty

Information Card

Instructions To Government Personnel

Include copies of Material Safety Data Sheets for maintenance/repair materials.

Submit 30 year "No-Dollar-Limit" warranty for labor and materials including metal edge system in accordance with ANSI/SPRI ES-1 requirments.

## 1.4 QUALITY ASSURANCE

### 1.4.1 Qualification of Manufacturer

Modified bitumen sheet roofing system manufacturer must have a minimum of twenty (20) years experience in manufacturing modified bitumen roofing products.

### 1.4.2 Qualification of Applicator

Roofing system applicator must be approved, authorized, or licensed in writing by the modified bitumen sheet roofing system manufacturer and have a minimum of five (5) years experience as an approved, authorized, or licensed applicator with that manufacturer and be approved at a level capable of providing the specified warranty. The applicator must supply the names, locations and client contact information of five projects of similar size and scope that the applicator has constructed using the manufacturer's roofing products submitted for this project within the previous three years.

### 1.4.3 Qualifications of Photovoltaics (PV) Rooftop Applicator

Not used.

### 1.4.4 Qualification of Engineer of Record

Engineer of Record must be currently licensed within the jurisdiction of the project.

Engineer of Record must be approved, authorized, and currently licensed by the state of North Carolina, and have a minimum of five (5) years

experience as an approved Engineer for manufacturers of similar roof systems. Engineer of Record must supply the names and locations of five projects of similar size and scope for which he has provided engineering calculations using the manufacturer's products submitted for this project within the previous three years. Engineer of Record must provide certified engineering calculations for:

Wind uplift requirements in accordance with Local and State codes and in accordance with specifications.

ASCE 7, in accordance with International Building Code.

Seismic requirements per local and state building codes

Seismic requirements per ICC IBC Chapter 16, Section 1608.3

Snow load requirements per ICC IBC Chapter 16 Section 1608.3 and Section 7 of ASCE 7

1.4.5 Fire Resistance

Complete roof covering assembly must:

a. Be Class A rated in accordance with ASTM E108, FM 4470, or UL 790; and

b. Be listed as part of Fire-Classified roof deck construction in UL RMSD, or Class I roof deck construction in FM APP GUIDE.

FM or UL approved components of the roof covering assembly must bear the appropriate FM or UL label.

1.4.6 Wind Uplift Resistance

The complete roof system assembly shall be rated and installed to resist wind loads as indicated and calculated in accordance with ASCE 7 and validated by uplift resistance testing in accordance with Factory Mutual (FM) test procedures. Non-rated systems must not be installed, except as approved by the Contracting Officer. Submit licensed engineer's and substantiating data to validate any non-rated roof system. Base Wind Uplift Calculations measurements on a design wind speed of 130 mph in accordance with ASCE 7, Wind Uplift Resistance FM 90/ 130 MPH and/or other applicable building code requirements.

1.4.7 Preroofing Conference

After approval of submittals and before performing roofing and insulation system installation work, hold a preroofing conference to review the following:

a. Drawings, including Roof Plan, specifications and submittals related to the roof work

Field inspection and verification of all existing conditions, including all fire safety issues, existing structure, and existing materials, including concealed combustibles, which may require additional protection during installation.

b. Roof system components installation

c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roof structure, and roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representatives to roof manufacturer

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing

e. Quality control, (ARMA PMBRG98) plan for the roof system installation

f. Safety requirements

Coordinate preroofing conference scheduling with the Contracting Officer. The conference must be attended by the Contractor, the Contracting Officer's designated personnel, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, designated safety personnel trained to enforce and comply with ASSE/SAFE A10.24, Fire Marshall, and representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

## 1.5 DELIVERY, STORAGE, AND HANDLING

### 1.5.1 Delivery

Deliver materials in manufacturers' original unopened containers and rolls with labels intact and legible. Mark and remove wet or damaged materials from the site. Where materials are covered by a referenced specification, the container must bear the specification number, type, and class, as applicable. Labels or bill of lading for roofing asphalt must indicate asphalt type, FP, FBT, and EVT, that is, the temperature at which the viscosity is either 125 centistokes when tested in accordance with ASTM D2170/D2170M or 75 centipoise when tested in accordance with ASTM D4402. Deliver materials in sufficient quantity to allow work to proceed without interruption.

### 1.5.2 Storage

Protect materials against moisture absorption and contamination or other damage. Avoid crushing or crinkling of roll materials. Store roll materials on end on clean raised platforms or pallets one level high in dry locations with adequate ventilation, such as an enclosed building or closed trailer. Do not store roll materials in buildings under construction until concrete, mortar, and plaster work is finished and dry. Maintain roll materials at temperatures above 50 degrees F for 24 hours immediately before application. Do not store materials outdoors unless approved by the Contracting Officer. Completely cover felts stored outdoors, on and off roof, with waterproof canvas protective covering. Do not use polyethylene sheet as a covering. Tie covering securely to pallets to make completely weatherproof. Provide sufficient ventilation to prevent condensation. Do not store more materials on roof than can be installed the same day and remove unused materials at end of each days work. Distribute materials temporarily stored on roof to stay within live load limits of the roof construction.

Maintain a minimum distance of 35 foot for all stored flammable materials, including materials covered with shrink wraps, craft paper and/or tarps from all torch/welding applications.

Immediately remove wet, contaminated or otherwise damaged or unsuitable materials from the site. Damaged materials may be marked by the Contracting Officer.

### 1.5.3 Handling

Prevent damage to edges and ends of roll materials. Do not install damaged materials in the work. Select and operate material handling equipment to prevent damage to materials or applied roofing.

## 1.6 ENVIRONMENTAL REQUIREMENTS

Do not install roofing system when air temperature is below 40 degrees F, during any form of precipitation, including fog, or when there is ice, frost, moisture, or any other visible dampness on the roof deck. Follow manufacturer's printed instructions for Cold Weather Installation.

## 1.7 HOT-MOPPED ASPHALT APPLIED MODIFIED BITUMEN MEMBRANE SAFETY

### 1.7.1 Property Protection

Take all precautions necessary to prevent ignition of combustible materials during hot-mopped asphalt application of roofing. Immediately call the fire department if a fire commences. Review all fire safety procedures as outlined at the pre-roofing conference.

Install materials using the techniques recommended by CERTA NRCA/MRCA Certified Roofing Torch Applicator Program available from the National Roofing Contractors Association (NRCA) and the Midwest Roofing Contractors Association (MRCA) as endorsed by the Asphalt Roofing Manufacturers Association (ARMA) and the United Union of Roofers, Waterproofers and Allied Workers. Application procedures must comply with NFPA 241, OSHA 29 CFR 1910 and 29 CFR 1910.12, 29 CFR 1926.16, 29 CFR 1926 Subpart F., UL Fire Resistance Directory Volume No. 1,and NRCA R&W Manual.

Do not store flammable liquids on the roof.

Provide a minimum of two 2.65 gallon containers of water and two fully charged minimum 20 pound CO2 20 pound ABC (dry chemical) fire extinguishers in separate, easily accessible locations on the roof and within 10 foot of each hot-mopped kettle at all times.

No Asphalt/Tar Kettles are allowed on roofs. Locate kettles and supply LP-Gas Cylinders safely and secured per NFPA 241 outside of the building's perimeter a minimum of 20 foot from the structure and any combustible materials.

Maintain a minimum separation of 20 foot between LP-Gas Cylinders and kettle. Provide protective fire retardant blanket barrier or shield between any building structure to a minimum height of 8 foot and a clear surround distance of 4 foot if operations force placement of kettle within a distance of 20 foot. Do not obstruct or place kettles or Cylinder storage within 10 foot of exits, means of egress, gates, roadways, entrances. Locate kettles downwind and away from any building air intakes.

Provide a minimum of two portable fully charged 20 pound CO2 or 20 pound ABC (dry chemical) fire extinguishers no closer than 5 foot and no further than 25 foot of horizontal travel distance from each kettle at all times while kettle is in operation, in easily accessible and identifiable locations. Also provide a minimum of two multipurpose 2-A:20-B:C portable fire extinguishers on the roof being covered or repaired.

Comply with the following safety procedures:

a. Fuel containers, burners, and related appurtenances of roofing equipment in which liquefied petroleum gas is used for heating must comply with the requirements of NFPA 58.

b. Fuel containers having capacities greater than one pound must be located a minimum of 10 foot clear distance from the burner flame.

c. All LP-Gas Cylinders must be clearly labeled "Flammable Gas", and secured to prevent accidental tip-over.

d. Check all pressure regulators and hoses prior to use for proper functioning and integrity.

e. Turn off fuel supply at LP Gas Cylinder when kettle is not in use.

f. Equip all kettles with a functioning temperature measuring device to ensure no heating in excess of 50 degrees F below the flash point.

g. Provide covers, lid, or top which are close fitting, constructed of minimum No.14 manufacturer's gauge steel, and can be gravity closed on all kettles.

h. Clean all roofing mops and rags free of excess asphalt and store safely away from all combustible materials. Store discarded roofing mops and rags in a non-combustible container and remove from site each day.

i. Position all pump lines handling hot asphalt securely and equip all pump lines with a shut-off valve on each with a coupler which may be opened when lines are full. Do not subject pump lines to pressures in excess of safe and recommended NRCA and ARMA working pressures. Station an operator near the equipment to cut off flow and care for other emergencies while conducting heating, pumping and application operations.

j. Asphalt/tar bucket used by roofers or workers in similar trades must be constructed of minimum No. 24 gauge or heavier sheet steel and have a metal bail of no less than 1/4 inch diameter material. The bail is to be fastened to offset ears or equivalent which have been riveted, welded, or otherwise safely and securely attached to the bucket. Soldered bail sockets are prohibited. Position workers and other employees to avoid being struck by bucket or other roofing materials, which may accidentally fall while being hoisted, lowered, or used in the roofing operation. Provide safety barriers and caution signs at all skylights or other roof holes.

k. Do not use flammable liquids with a flash point below 100 degrees F (gasoline and similar products) for cleaning purposes.

Do not use solid fuel or Class I liquids as fuel for roofing asphalt/tar kettles. Provide a minimum of one employee fully knowledgeable of kettle operations and hazards to maintain constant surveillance during kettle operation within a minimum distance of 25 foot of the kettle.

Check all fire extinguishers prior to commencement of work, and upon completion of the day's work, to ensure fullness and operability.

Project supervisor must make daily inspections with the facility manager of all conditions and operations which could present hazards during hot-mopped applications and issue directives to address all such concerns and items of the work and existing conditions.

Identify and protect all combustible roof components, possible fire traps, and hidden hazards. Seal off voids or openings in the substrate with non-combustible materials prior to installing hot-mopped applied materials in the area. Install protective fire retardant blankets and shields at building walls, eaves, parapets and equipments curbs constructed of combustible materials within 3 foot radius of the area of hot-mopped kettle prior to commencement of the work.

When working around intakes and openings, temporarily disconnect and block to prevent fumes from kettle from being drawn into the opening. Provide non-combustible shielding or flame guard protection where gaps or voids occur in the construction in area of torch work.

### 1.7.2 Fire Watch

All personnel on the roof during hot-mopped application must be properly trained to use a fire extinguisher. Provide a fire watch for a minimum of 30 minutes after completion of hot-mopped kettle operations at the end of each work shift. Maintain the fire watch for additional time required to ensure no potential ignition conditions exist. Utilize heat sensing meters to scan for hot spots in the work.

Do not torch in areas of poor and/or no visibility (curbs, corners, eaves, expansions joints, flashing, other voids and small penetrations) which could allow a torch flame to ignite combustible material(s) hidden from view or within the underside of the roof deck or building interior. Use cold finish applications in these areas whenever possible and per manufacturer's printed instructions, NRCA 4002, MRCA R&NW manual for "cold adhered" materials.

Do not leave the rooftop unattended during breaks in work during a work shift. Walk and scan all areas of application checking for hot spots, fumes, or smoldering, especially at wall and curb areas, prior to departure at the end of each work shift. Ensure any and all suspect conditions are eliminated prior to leaving the site each work shift.

### 1.7.3 Open Flame Application (Torch) Equipment and Personnel Safety

Only NRCA/MRCA CERTA certified roofing applicators are allowed to operate any torching equipment. Verify that all such applicators maintain and are currently carrying a valid Certified Roofing Torch Applicator (CERTA) card.

All crew members must be trained in preventive measures for indirect and direct dangers and hazards associated with roofing work, which include, but are not limited to the following:

a. Heat Stress: Wear light colored clothing, a hat for ultra-violet protection, and other eye protective devices. Drink sufficient quantities of non-alcoholic, non-caffeine liquids. Stage shifts for crew members to allow for breaks from heat and sun exposure without interfering with work progress.

b. First Aid for Burns: Immediately call for an ambulance. Contact local Occupational Health Services (OHS).

All crew members must wear correct personal protective equipment (PPE), including. but not limited to the following items:

a. Long-sleeved shirts buttoned at the collar and cuffs,and must be made of non-flammable materials. Polyester materials are not allowed.

b. Work boots covering ankles with rubber or composite soles.

c. Long pants without cuffs to extend over the top of the work boots, and must be made of non-flammable materials. No polyester allowed.

d. Heavy leather gloves and/or flame retardant gauntlets which must be worn during all handling of a torch, whether operating or not.

e. OSHA and ANSI/ISEA Z87.1 approved face shields, goggles and/or safety glasses to be worn during torching and any other applicable roofing functions.

f. OSHA and ANSI approved hard hats.

### 1.7.4 Wind Conditions

Use side shields with all torching operations when winds are occurring to prevent flame distortion of end burners. Use torch machine equipment with bottom shield plate to prevent flame spread on to roof deck and substrate. When high wind gusts are present, notify the safety officer and cease all use of torching equipment until wind conditions lower and authorization from the safety officer to proceed is received.

## 1.8 SEQUENCING

Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counter flashing, per NRCA Details, and are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials. Application of roofing must immediately follow application of insulation as a continuous operation. Coordinate roofing operations with insulation work so that all roof insulation applied each day is covered with roof membrane installation the same day.

## 1.9 WARRANTY

Provide roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to standard membrane manufacturer warranty as required to comply with the specified requirements. Minimum manufacturer warranty shall have no dollar limit, cover full system water-tightness, and shall have a minimum duration of 30 years.

1.9.1 Roof Membrane Manufacturer Warranty

The roof manufacturer must manufacture the modified roof system, coating system and edge metal to be warranted for installation and workmanship, 30-year no dollar limit. **There will be one sole source warranty for roof system (30 Years) including the edge metal (ANSI SPRI ES-1 CODE) the coating system (10 year finish warranty).** A signed letter from the president of the manufacturer stating the roof membrane, edge metal and coatings are products of the manufacturer shall accompany the roof submittal package. No relabeled products from third party manufacturers are acceptable.

Furnish the roof membrane manufacturer's 30 year no dollar limit roof system material and installation workmanship warranty, including flashing, metal and insulation in compliance with ASTM C 1289, and accessories necessary for a watertight roof system construction. Provide warranty directly to the Government and commence warranty effective date at time of Government's acceptance of the roof work. The warranty must state that:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, blisters, splits, tears, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work are the responsibility of the roof membrane manufacturer.

b. When the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others does not void the warranty.

c. Damage to the roofing system caused by sustained winds having a velocity of 130 mph or less is covered by the warranty.

d. Upon completion of installation, and acceptance by the Contracting Officer, Architect, Construction Manager and Roofing System Engineer of Record, the manufacturer must supply the appropriate warranty to the Owner.

e. Installer must submit a minimum two year warranty to the membrane manufacturer from the date of acceptance, with a copy to the Contracting Officer, Architect, Construction Manager and Roofing System Engineer of Record.

1.9.2 Roofing System Installer Warranty

The roof system installer must warrant for a period of two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The roof system installer is responsible for correction of defective workmanship and replacement of damaged or affected materials. The roof system installer is responsible for all costs

associated with the repair or replacement work.

1.9.3 Continuance of Warranty

Repair or replacement work, ARMA 410BUR88, ARMA 460LSR97 that becomes necessary within the warranty period and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

1.10 CONFORMANCE AND COMPATIBILITY

The entire roofing and flashing system must be in accordance with specified and indicated requirements, including fire and wind resistance (ANSI/SPRI ES-1) requirements. Work not specifically addressed and any deviation from specified requirements must be in general accordance with recommendations of the NRCA Roofing and Waterproofing Manual, membrane manufacturer published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

1.11 ELIMINATION, PREVENTION OF FALL HAZARDS

1.11.1 Fall Protection

Premanent fall protection measures are not required. Provide fall protection as necessary for workers or others on the roof during installation.

PART 2 PRODUCTS

2.1 MODIFIED BITUMEN SHEETS AND FIBERGLASS FELT MATERIALS

Furnish a combination of specified materials that comprise the modified bitumen manufacturer's standard system of the number and type of plies specified. Materials provided must be suitable for the service and climatic conditions of the installation. Modified bitumen sheets must be watertight and visually free of pinholes, particles of foreign matter, non-dispersed raw material, factory splices, or other conditions that might affect serviceability. Polymer modifier must comply with ARMA PMBRG98 and be uniformly dispersed throughout the sheet. Edges of sheet must be straight and flat.

Install SBS modified base sheet with a fiberglass scrim in hot Type III asphalt to meet or exceed the following performance criteria:

**ASTM 6163, Type III Grade S**
**Minimum Thickness 80 Mils**
**Tensile Strength (ASTM D5147)**
**2 in/min. @ 73.4 +/- 3.6°F MD 100 lbf/in CMD 100 lbf/in**
**Tear Strength (ASTM D5147)**
**2 in/min. @ 73.4 +/- 3.6°F MD 1700 lbf/in CMD 110 lbf/in**
**Elongation at Maximum Tensile (ASTM D5147)**
**2 in/min. @ 73.4 +/- 3.6°F MD 16% CMD 16%**
**Low Temperature Flexibility (ASTM D5147): Passes -20°F**

Install a SBS-SIS modified mineral surface cap sheet with the following characteristics. The cap sheet must contain a stitched composite polyester/

fiberglass scrim. Glued composite scrims are unacceptable.

**ASTM D6162, Type III Grade G**
**Minimum Thickness 170 Mils**
**Tensile Strength (ASTM D5147)**
**2 in/min @ 73.4 +/- 3.6 deg. F MD 1000 1bf/in CMD 1000 1bf/in**
**Tear Strength (ASTM D5147)**
**2 in/min @ 73.4 +/- 3.6 deg. F MD 17001bf/in CMD 1800 1bf/in**
**Elongation at Maximum Tensile (ASTM D5147)**
**2 in/min @ 73.4 +/- 3.6 deg. F MD 16.0% CMD 16.0%**
**Low Temperature Flexibility (ASTM D 5147): Passes -20 deg. F**

## 2.2 BASE FLASHING MEMBRANE

Membrane manufacturer's standard, minimum two-ply modified bitumen membrane flashing system compatible with the roof membrane specified and as recommended in membrane manufacturer's published literature. Flashing membranes must meet or exceed the properties of the material standards specified for the modified bitumen base and cap sheet, except that flashing membrane thickness must be as recommended by the membrane manufacturer.

All flashings are to be set in Type III hot asphalt and consist of one layer of tri-laminate base sheet and finish flashing the same as the mineral cap. Perform three course repairs on all laps and aluminize. The tri-laminate base sheet shall have the following characteristics.

Double coated Polyester-Fiberglass-Polyester scrim with the following minimum performance requirements according to ATTM D5147. The sheet is to contain a minimum of 29% recycled content and be manufactured by the Membrane Roof Manufacturer.

Tensile Strength (ASTM D5147)
2 in/min @ 73.4 +/- 3.6 deg. F MD 315 1bf/in CMD 315 1bf/in
Tear Strength (ASTM D5147)
2 in/min @ 73.4 +/- 3.6 deg. F MD 550 1bf/in CMD 550 1bf/in
Elongation at Maximum Tensile (ASTM D5147)
2 in/min @ 73.4 +/- 3.6 deg. F MD 5% CMD 5%
50 mm/min @ 23 +/- 3 deg. C MD 5% CMD 5%

## 2.3 ASPHALT

ASTM D312, Type III or IV, in accordance with modified bitumen membrane manufacturer requirements and compatible with the slope conditions of the installation.

Provide with the followigng characteristics:

Elongation @ 77 degree F (ASTM D412) 750% Min.

Softening point (ASTM D36) 203 degree F - 221 degree F.

## 2.4 MEMBRANE SURFACING

Provide modified bitumen roof membrane cap sheet with factory-applied granule surfacing of light color. Coat the entire roof surface with white, reflective coating system to meet or exceed the following:

a) Base Coat - White Elastomeric Roof Coating: Energy Star, CRRC, Title 24

approved white acrylic roof coating ASTM E 903, C 1549 Reflectance 81%, SRI (Solar Reflective Index) 101.

b) Top Coat - White Kynar Aquatec Roof Coating: Energy Star, CRRC, Title 24 approved white water based, fluoropolymer-acrylic resin roof coating. ASTM C 1549 Reflectance 90%, SRI (Solar Reflective Index) 113. The top coat may contain no less than 70% Kynar Resin.

Both the base coat and top coat must be products of the roof membrane manufacturer with the proper paperwork to accompany submittals.

## 2.5 PRIMER

ASTM D41/D41M, or other primer compatible with the application and as approved in writing by the modified bitumen membrane manufacturer.

## 2.6 MODIFIED BITUMEN ROOF CEMENT

ASTM D4586, Type II for vertical surfaces, Type I for horizontal surfaces, compatible with the modified bitumen roof membrane and as recommended by the modified bitumen membrane manufacturer.

## 2.7 CANT AND TAPERED EDGE STRIPS

Provide standard cants and tapered edge strips of perlite conforming to ASTM C728 the same material as the roof insulation or when roof insulation material is not available, provide pressure preservative treated wood, wood fiberboard, or rigid perlite board cants and edge strips as recommended by the manufacturer. Cant strips must be minimum 1-1/2 inch thick and provide for minimum 5 inch face and 3-1/2 inch vertical height when installed at 45 degree face angle 4 inch vertical height with 45 degree cant angle, except where clearance restricts height to lesser dimension. Taper edge strips at a rate of one to 1-1/2 inch per foot to a minimum of 1/8 inch of thickness. Provide kiln-dried preservative-treated wood cants at base of wood nailers set on edge and wood curbing and where otherwise indicated. Secure wood with stainless steel screw fasteners.

## 2.8 FASTENERS AND PLATES

Provide coated, corrosion-resistant fasteners as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470 and FM APP GUIDE for Class I roof deck construction and the wind uplift resistance specified. For fastening of membrane or felts to wood materials, provide fasteners driven through 1 inch diameter metal discs, or one piece composite fasteners with heads not less than 1 inch in diameter or 1 inch square with rounded or 45 degree tapered corners.

### 2.8.1 Masonry or Concrete Walls and Vertical Surfaces

Use hardened steel nails or screws with flat heads, diamond shaped points, and mechanically deformed shanks not less than 1 inch long for securing felts, modified bitumen sheets, metal items, and accessories to masonry or concrete walls and vertical surfaces. Use power-driven fastenersonly when approved in writing by the Contracting Officer.

### 2.8.2 Metal Plates

Provide flat corrosion-resistant round stress plates as recommended by the

modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470; not less than 2 inch in diameter. Form discs to prevent dishing or cupping.

## 2.9 PRE-MANUFACTURED ACCESSORIES

Pre-manufactured accessories must be manufacturer's standard for intended purpose, comply with applicable specification section, compatible with the membrane roof system and approved for use by the modified bitumen membrane manufacturer.

### 2.9.1 Pre-fabricated Curbs

Provide 20 gauge AZ55 galvalume curbs with minimum 4 inch flange for attachment to roof nailers. Curbs must be minimum height of 10 inch above the finished roof membrane surface.

## 2.10 ROOF INSULATION BELOW MODIFIED BITUMEN MEMBRANE SYSTEM

Insulation must be compatible with the roof membrane, approved by the membrane manufacturer and meeting all the requirements of ASTM C552.

### 2.10.1 Insulation Type

Roof insulation shall be one or an assembly of the following materials and compatible with attachment methods and roof membrane:

Polyisocyanurate Board: ASTM C 1289

Type II, Class I, Grade 3, 25 psi minimum.

Fibrous felt or glass mat membrane both sides.

Minimum compressive strength shall be 25 pounds per square inch (psi).

Tapered as required for proper slope for water drainage as indicated in drawings.

Provide a layer of 1/2 inch glass mat gypsum board placed over top surface of polyisocyanurate, embedded in solid asphalt mopping with joints of glass mat gypsum board staggered in both directions with respect to polyisocyanurate board below.

If system is mechanically fastened: Provide flush-driven fasteners through flat round or hexagonal steel or plastic plates. Provide zinc-coated steel plates, flat round not less than 35 mm 1 3/8 inch diameter, hexagonal not less than 0.4 mm 28 gage. Provide high-density plastic plates, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 75 mm 3 inches in diameter. Fully recess fastener head into plastic plate after it is driven. Form plates to prevent dishing. Do not use bell or cup shaped plates. Provide fasteners in accordance with insulation manufacturer's recommendations for holding power when driven, to withstand 130 MPH wind.

### 2.10.2 Insulation Thickness

As necessary to provide a thermal resistance (R value) of 30 or more. Thickness shall be based on the "R" value for aged insulation and shall be

5 inches thick minimum.

2.10.3 Tapered Roof Insulation

Tapered roof insulation shall be factory tapered to slopes as indicated for the locations where required for proper roof drainage. Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified slope and thermal conductance. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

2.10.4 Vapor Barrier (Concrete Decks only)

Two plies of Type IV fiberglass plies set in hot Type III asphalt.

2.10.5 Cover Board (Recovery Board)

Cement Roof Board manufactured to conform to ASTM C1325.

Nominal thickness: 1/2 in.

Nominal weight: 2.4 lbs/SF.

Flexural strength (parallel) per ASTM C947: > 750 psi.

Compressive strengths: > 1000 psi.

Flute spanability per ASTM E661: 12 in.

Permeance per ASTM E96: 5.84 perms.

R Value per ASTM E831: 0.39 .SF.h/BTU.

Water Absorption per ASTM C473: < 0.07% MAX.

Mold resistance per ASTM D3273: 10.0

Minimum bending radius: 6 ft.

2.11 ALUMINUM

ANSI-SPRI ES-1.

ASTM B209M ASTM B209 anodized color form alloy and temper appropriate for use.

Alclad 3003 or Alclad 3004, or Alclad 3005, clad on one side.

Finish: Baked-on factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated.

Finish coating dry-film thickness: 0.020 to 0.033 mm 0.8 to 1.3 mils

Color: Match existing building.

## 2.12 Edge Metal/Flashing/Gutters/Downspouts/Fascia/Coping

Material: Aluminum, see above.

Use only aluminum manufactured for the purpose of flashing.

Sheet metal products shall be provided by the roofing system manufacturer and shall be compatible with the roofing and other materials where installed.

All exposed sheet metal gutters, including hangers, downspouts, gravel stops, and fascias; CAP, valley, steeped, base, and eave flashing, expansion joints, coping, and related accessories must be of the same material.

Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory -fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide all accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied.

Aluminum alloy sheet and plate: ASTM B209M anodized color form alloy, and temper appropriate for use. ALCLAD 3003, ALCLAD 3004, ALCLAD 3005, clad on both sides.

Exposed exterior finish: Baked-on, factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Provide finish coating dry-film coating dry-film thickness of 0.020 to 0.033 min. 0.8 to 1.3 mills.

Color as selected from standard colors. Color shall be in compliance with BEAP standards; color to be selected by Contracting Officer.

Aluminum alloy, extruded bars, rods, shapes, and tubes: ASTM B221M and ASTM B221.

Fasteners: Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials (ASTM A480/A480M, type 302 or 304, 2D finish, fully annealed).

Minimum thickness of 0.010" for: Base course; wall opening heads and sills; through wall and spandrel; cap and base flashing; vertical and horizontal surfaces; roof edges, ridges, and hips; crickets, valleys, or gutters; chimney pans; and ledge flashing.

Minimum thickness of 0.032" for: coping widths up to 12".

Minimum thickness of 0.040" for: coping widths above 12".

Minimum thickness of 0.032" for: soffits.

## 2.13 Adhesive

Hot Type III SBS Modified asphalt

## PART 3 EXECUTION

### 3.1 EXAMINATION

Ensure that the following conditions exist prior to application of the roofing materials:

a. Drains, curbs, cants, control joints,expansion joints,perimeter walls, roof penetrating components,and equipment supports are in place.

b. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation. Joints in the substrate are sealed to prevent dripping of bitumen into building or down exterior walls.

c. The plane of the substrate does not vary more than 1/4 inch within an area 10 by 10 foot when checked with a 10 foot straight edge placed anywhere on the substrate.

d. Substrate is sloped as indicated to provide positive drainage.

e. Walls and vertical surfaces are constructed to receive counter flashing, and will permit mechanical fastening of the base flashing materials.

f. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing at minimum height of 8 inch above finished roofing surface.

g. Protect all combustible materials and surfaces which may contain concealed combustible or flammable materials. All fire extinguishing equipment has been placed as specified.

h. Verify all Fire Watch personnel assignments.

i. Treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures.

j. Cants are securely fastened in place in the angles formed by walls and other vertical surfaces. The angle of the cant is 45 degrees and the height of the vertical leg is not less than 3-1/2 inch.

k. Exposed screw heads in wood substrates must be properly set. Warped and split boards have been replaced. There are no cracks or end joints 1/4 inch in width or greater. Knot holes are covered with sheet metal and nailed in place.

l. Insulation boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is being roofed over on the same day the insulation is installed.

m. Damaged and spalling areas of concrete roof deck surface have been properly patched and repaird.

n. Joints between precast concrete deck units are grouted, leveled, and stripped in with felt or bituminous stripping membrane set in bituminous cement prior to applying other roofing materials over the

area.

o. Roof deck and framing are sloped as indicated to provide positive drainage.

## 3.2 PREPARATION

### 3.2.1 Protection of Property

#### 3.2.1.1 Protective Coverings

Install protective coverings at paving and building walls adjacent to hoists, tankers, and kettles prior to starting the work. Lap protective coverings not less than 6 inch, secure against wind, and vent to prevent collection of moisture on covered surfaces. Keep protective coverings in place for the duration of the roofing work.

#### 3.2.1.2 Bitumen Stops

Provide felt bitumen stops or other means to prevent bitumen drippage at roof edges, openings, and vertical projections before hot mopped application of the roofing membrane.

### 3.2.2 Equipment

#### 3.2.2.1 Mechanical Application Devices

Mount mechanical application devices on pneumatic-tired wheels. Use devices designed and maintained to operate without damaging the insulation, roofing membrane, or structural components.

#### 3.2.2.2 Flame-Heated Equipment

Do not place flame-heated equipment on roof. Provide and maintain a fire extinguisher adjacent to flame-heated equipment and on the roof.

#### 3.2.2.3 Open Flame Application Equipment

Torches and other open flame equipment must be specifically designated for use in application of modified bitumen materials and approved by the modified bitumen sheet manufacturer. Open flame equipment must not be ignited (burning) when left unattended. Provide and maintain a fire extinguisher adjacent to open flame equipment on the roof. Specific requirements for fire watches and burn permits exist. These requirements will be reviewed at the preroofing conference.

#### 3.2.2.4 Electric-Heated Equipment

Provide adequate electrical service as required by manufacturer of electrical equipment to ensure against damage to equipment and property and to ensure proper application of roofing materials.

### 3.2.3 Heating of Asphalt

Break up solid asphalt on a surface free of dirt and debris. Heat asphalt in kettle designed to prevent contact of flame with surfaces in contact with the asphalt. Kettles must have visible working thermometer and thermostatic controls set to the temperature limits specified herein. Keep controls in working order and calibrated. Use immersion thermometer,

accurate within a tolerance of plus or minus 1.8 degrees F, to check temperatures of the asphalt frequently. When temperatures exceed maximums specified, remove asphalt from the site. Do no permit cutting back, adulterating, or fluxing of asphalt.

3.2.3.1 Temperature Limitations for Asphalt

Heat and apply asphalt at the temperatures specified below unless specified otherwise by manufacturer's printed application instructions. Use thermometer to check temperature during heating and application. Have kettle attended constantly during heating process to ensure specified temperatures are maintained. Do not heat asphalt above its finished blowing temperature (FBT). Do not heat asphalt between 500 and 525 degrees F for longer than four consecutive hours. Do not heat asphalt to the flash point (FP). Apply asphalt and embed membrane sheets when temperature of asphalt is within plus or minus 25 degrees F of the equiviscous temperature (EVT) but not less than 400 degrees F. Before heating and application of asphalt refer to the asphalt manufacturer's label or bill of lading for FP, FBT, and EVT of the asphalt used.

3.2.4 Priming of Surfaces

Prime all surfaces to be in contact with adhered membrane materials. Apply primer at the rate of 0.75 gallon per 100 sq. ft. or as recommended by modified bitumen sheet manufacturer's printed instructions to promote adhesion of membrane materials. Allow primer to dry prior to application of membrane materials to primed surface. Avoid flammable primer material conditions in torch applied membrane applications.

3.2.4.1 Priming of Concrete and Masonry Surfaces

After surface dryness requirements have been met, coat concrete and masonry surfaces which are to receive membrane materials uniformly with primer.

3.2.4.2 Priming of Metal Surfaces

Prime flanges of metal components to be embedded into the roof system prior to setting in bituminous materials or stripping into roofing system.

3.2.5 Membrane Preparation

Unroll modified bitumen membrane materials and allow to relax a minimum of 30 minutes prior to installation. In cold weather, adhere to membrane manufacturer's additional recommendations for pre-installation membrane handling and preparation. Inspect for damage, pinholes, particles of foreign matter, non-dispersed raw material, factory splices, or other conditions that might affect serviceability. Edges of seams must be straight and flat so that they may be seamed to one another without forming fish mouths or wrinkles. Discard damaged or defective materials.

3.2.6 Substrate Preparation

Apply membrane to clean, dry surfaces only. Don not apply membrane to surfaces that have been wet by rain or frozen precipitation within the previous 12 hours. Provide cleaning and artificial drying with heated blowers or torches as necessary to ensure clean, dry surface prior to membrane application.

## 3.3 APPLICATION

Apply roofing materials as specified herein unless approved otherwise by the Contracting Officer. Keep roofing materials dry before and during application. Complete application of roofing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day. Maintain specified temperatures for asphalt. Provide temporary roofing and flashing as necessary to stop water prior to application of permanent roofing system.

### 3.3.1 Phased Membrane Construction

Phased application of membrane plies is prohibited unless otherwise approved by the Contracting Officer and supported by the membrane manufacturer's written application instructions. If cap sheet installation is delayed, thoroughly clean the applied membrane material surface and dry immediately prior to cap sheet installation. Priming of the applied membrane surface may be required at the discretion of the Contracting Officer or manufacturer's representative prior to cap sheet installation.

### 3.3.2 Temporary Roofing and Flashing

Provide watertight temporary roofing and flashing where considerable work by other trades, such as installing cooling towers,antennas,pipes, ducts, is to be performed on the roof or where construction scheduling or weather conditions require protection of the building's interior before permanent roofing system can be installed. Do not install temporary roofing over permanently installed insulation. Provide rigid pads for traffic over temporary roofing.

#### 3.3.2.1 Removal

Completely remove temporary roofing and flashing before continuing with application of the permanent roofing system.

### 3.3.3 Application Method

#### 3.3.3.1 Insulation

Apply mopped down vapor barrier and install insulation and protection board as a fully-adhered system in accordance with manufacturer's written requirements.

Apply insulation in layers with staggered joints when total required thickness of insulation exceeds 1 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of felts for the built-up roofing, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.

#### 3.3.3.2 Hot Asphalt Application of Modified Bitumen Membrane

Apply membrane immediately following application of hot asphalt. Apply hot asphalt within 6 foot of roll. Do not work ahead with asphalt. Asphalt must be completely fluid, with mop temperatures within the asphalt's EVT range, but not less than 400 degrees F, at the instant

membrane comes into contact with asphalt. Application of bitumen between layers must be such as to provide full, continuous, uniform coverage and complete contact of hot asphalt with the sheet above and below. Embed sheets in asphalt. As sheets are being rolled into hot asphalt, immediately and thoroughly apply uniform positive pressure by squeegee, roll, or broom to ensure full adhesion and lap seal, eliminate trapped air and to provide tight, smooth laminations. Avoid excessive extrusion of asphalt at lap areas. Control asphalt bleed out to approximately 25.4 mm 1 inch maximum.

### 3.3.4 Modified Bitumen Base Sheet

Fully adhere base sheets in accordance with membrane manufacturer's printed instructions. Ensure laps areas of base sheet are fully sealed. Roll and broom in the base sheet to ensure full contact with the hot asphalt application. Apply sheets in a continuous operation. Apply sheets with side laps at a minimum of 2 inch unless greater side lap is recommended by the manufacturer's standard written application instructions. Provide end laps of not less than 6 inch and staggered a minimum of 36 inch. Apply sheets at right angles to the roof slope so that the direction of water flow is over and not against the laps parallel to the roof slope so that plies of sheets extend from eave line on one side of the barrel-type roof and 18 inch over the center line of the crown of the roof. Apply sheets on the other side in the same manner, resulting in twice the normal amount of roofing sheets and asphalt at the crown. Extend base sheets approximately 2 inch above the top of cant strips at vertical surfaces and to the top of cant strips elsewhere. Trim base sheet to a neat fit around vent pipes, roof drains, and other projections through the roof. Application must be free of ridges, wrinkles, and buckles.

### 3.3.5 Modified Bitumen Membrane Application

Ensure proper sheet alignment prior to installation. Apply membrane layers perpendicular to slope of roof in shingle fashion to shed water, including application on areas of tapered insulation that change slope direction. Apply membrane layers parallel to slope of roof. Bucking or backwater laps are prohibited. Fully adhere membrane sheets to underlying substrate materials. Provide minimum 3 inch side laps and minimum 6 inch end laps and as otherwise required by membrane manufacturer. Stagger end laps minimum 36 inch. Offset side laps between membrane layers a minimum of 12 inch. Offset end laps between membrane layers a minimum of 36 inch. Install all membrane layers the same workday, unless supported otherwise by roof membrane manufacturer application instructions and approved by the Contracting Officer. Provide tight smooth laminations of each membrane layer without wrinkles, ridges, buckles, kinks, fishmouths, or voids. Ensure full membrane adhesion and full lap seals. Rework to seal any open laps prior to application of subsequent membrane layers. The completed membrane application must be free of surface abrasions, air pockets, blisters, ridges, wrinkles, buckles, kinks, fishmouths, voids, or open seams.

#### 3.3.5.1 Cap Sheet Installation

Underlying applied membrane must be inspected and repaired free of damage, holes, puncture, gouges, abrasions, and any other defects, and free of moisture, loose materials, debris, sediments, dust, and any other conditions required by the membrane manufacturer prior to cap sheet installation. Do not apply cap sheet if rain or frozen precipitation has

occurred within the previous 24 hours. Align cap membrane and apply by the specified method with the proper side and end lap widths. Set cap sheet in hot asphalt as recommended by the modified bitumen membrane manufacturer. Cut at a 45 degree angle across selvage edge of cap membrane to be overlapped in end lap areas prior to applying overlapping cap membrane. Apply matching granules in any areas of bitumen adhesive bleed out while the asphalt is still hot. Minimize traffic on newly installed cap sheet membrane.

### 3.3.6 Membrane Flashing

Apply two-ply modified bitumen strip flashing and sheet flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes, and other vertical surfaces, and where necessary to make the work watertight. Apply membrane flashing in accordance with the roof membrane manufacturers printed instructions and as specified. Cut at a 45 degree angle across terminating end lap area of cap membrane prior to applying adjacent overlapping cap membrane. Press flashing into place to ensure full adhesion and avoid bridging. Ensure full lap seal in all lap areas. Mechanically fasten top edge of modified bituminous base flashing 150 mm (6 inches) on center through minimum 1 inch diameter tin caps with fasteners of sufficient length to embed minimum one inch into attachment substrate. Apply matching granules in any areas of asphalt adhesive bleed out while the asphalt is still hot, Apply membrane liner over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs, parapet walls, expansion joints and as otherwise indicated to serve as waterproof lining under sheet metal flashing components. Metal flashing per SMACNA 1793 guidelines and as recommended by manufacturer and as required for warranty. Do not set metal flashing in hot asphalt. ENSURE ALL VERTICAL LAPS ARE THREE COURSED WITH THE MANUFACTURER'S FLASHING CEMENT and FIBERGLASS MESH.

#### 3.3.6.1 Membrane Strip Flashing

Set primed flanges of metal flashing in full bed of modified bituminous cement material and securely fasten through to attachment substrate. Strip-in with membrane flashing so that strip extends not less than 4 inch beyond outer edge of flange. Where multiple membrane stripping plies are installed, extend each additional stripping ply minimum 4 inch beyond edge of previous ply.

#### 3.3.6.2 Membrane Flashing at Roof Drain

Not applicable.

#### 3.3.6.3 Pre-fabricated Curbs

Securely anchor prefabricated curbs to nailer or other base substrate and flash with modified bitumen membrane.

#### 3.3.6.4 Set-On Accessories

Where pipe or conduit blocking, supports and similar roof accessories are set on the membrane, adhere walkpad material to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.

#### 3.3.6.5 Lightning Protection

Flash and attach lightning protection system components - if any - to the roof membrane in a manner acceptable to the roof membrane manufacturer.

### 3.3.7 Field Applied Coating

After completion of roof membrane and flashing installation, and correction of tears, gouges, and other deficiencies in the installed work, apply specified membrane suface coating.

#### 3.3.7.1 Coating Application

Apply white elastomeric roof coating and white kynar top coat to membrane and flashing in accordance with specifications and coating material manufacturer's recommendations.

### 3.3.8 Correction of Deficiencies

Where any form of deficiency is found, additional measures will be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions must be performed as directed by the Contracting Officer.

### 3.3.9 Clean Up

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

## 3.4 CORRECTION OF DEFICIENCIES

Where any form of deficiency is found, additional measures must be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions must be as directed by the Contracting Officer.

## 3.5 PROTECTION OF APPLIED ROOFING

At the end of the day's work and when precipitation is imminent, protect applied modified bitumen roofing system from water intrusion.

### 3.5.1 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of modified bitumen roofing system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

### 3.5.2 Temporary Flashing for Permanent Roofing

Provide temporary flashing at drains, curbs, walls and other penetrations and terminations of roofing sheets until permanent flashing can be applied. Remove temporary flashing before applying permanent flashing.

### 3.5.3 Temporary Walkways, Runways, and Platforms

Do not permit storing, walking, wheeling, and trucking directly on applied

roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

## 3.6 FIELD QUALITY CONTROL

Perform field tests in the presence of the Contracting Officer. Notify the Contracting Officer one day before performing tests.

### 3.6.1 Test for Surface Dryness

Before application of membrane sheets and starting work on the area to be roofed, perform test for surface dryness in accordance with the following:

a. Foaming: When poured on the surface to which membrane materials are to be applied, one pint of asphalt when heated in the range of 350 to 400 degrees F, must not foam upon contact.

b. Strippability: On cementitious substrate surfaces, after asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from the surface, do not consider the surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been tested by the method above and found dry.

c. Prior to installing any roof system on a concrete deck, conduct a test per ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

### 3.6.2 Construction Monitoring

During progress of the roof work, Contractor must make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

a. Materials comply with the specified requirements.

b. Materials are not installed in adverse weather conditions.

All materials are properly stored, handled and protected from moisture or other damages.

c. Equipment is in working order. Metering devices are accurate.

d. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials.

(1) Nailers and blocking are provided where and as needed.

Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.

(2) The proper number, type, and spacing of fasteners are installed.

Membrane heating, hot mopping, or adhesive application is provided

uniformly and as necessary to ensure full adhesion of roll materials. Asphalt is heated and applied within the specified temperature range.

The proper number and types of plies are installed, with the specified overlaps.

Applied membrane surface is inspected, cleaned, dry, and repaired as necessary prior to cap sheet installation.

(3) Lap areas of all plies are completely sealed.

Membrane is fully adhered without ridges, wrinkles, kinks, fishmouths, or other voids or delaminations.

Installer adheres to specified and detailed application parameters.

Associated flashing and sheet metal are installed in a timely manner in accord with the specified requirements.

Temporary protection measures are in place at the end of each work shift.

3.6.2.1 Manufacturer's Inspections

When a project is in progress, the roofing and coating system manufacturer will provide the following:

1. Keep the owner informed as to the progress and quality of the work as observed. Report any deficiencies and what corrective action was taken to correct them. The inspection reports must include dates and photographic evidence. These reports must be turned in on a weekly basis to the Owner and/or Architect.
2. Provide photographic job site inspections a minimum of 3 days per week.
3. Report to the Contracting Officer and Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
4. Confirm after completion that the manufacturer's inspector has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.
5. The roofing manufacturer must inspect the roof on an annual basis and submit an annual inspection report to Public Works at Camp Lejeune until warranty period ends.
6. The manufacturer's inspector must be a full time employee of the roof and coating manufacturer with a minimum of 5 years experience inspecting the specified roof system. A signed letter from the president of the manufacturer company attesting to the full time employ and tenure of the roof and coating inspector shall accompany submittals.

3.6.3 Samples of Roofing

Take samples per ASTM D5147/D5147M, sized 4-inch by 40-inch cut across width of modified bitumen sheets as directed by the Contracting Officer. Cut samples will be examined by the Contracting Officer for specified number of plies, proper lap width, complete lap seal, full uniform adhesive compound application and adhesion, full bond between plies, harmful foreign materials, presence of moisture, and wet insulation. Where cuts are not retained by the Contracting Officer or disposed, set cut strip back in cut area in bed of modified bitumen cement. Repair area of

cut with new minimum two-ply modified bitumen membrane patch.

### 3.6.4 Roof Drain Test

After completing roofing, but prior to Government acceptance, perform the following test for watertight integrity. Plug roof drains and fill with water to edge of drain sump for 8 hours. Do not plug secondary overflow drains at the same time as adjacent primary drain. To ensure some drainage from roof, do not test all drains at same time. Measure water at beginning and end of the test period. When precipitation occurs during test period, repeat test. When water level falls, remove water, thoroughly dry, and inspect installation; repair or replace roofing at drain to provide for a properly installed watertight flashing seal. Repeat test until there is no water leakage.

## 3.7 INFRARED INSPECTION

Eight months after completion of the roofing system, the Contractor must inspect the roof surface using infrared (IR) scanning as specified in ASTM C1153. Where the IR inspection indicates moisture intrusion, wet insulation and damaged or deficient materials or construction must be replaced in a manner to provide watertight construction and maintain the specified roof system warranties.

## 3.8 INSTRUCTIONS TO GOVERNMENT PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the modified bitumen membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair, and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations.

## 3.9 INFORMATION CARD

For each roof, furnish a typewritten information card for facility Records and a card laminated in plastic and framed for interior display at roof access point, and a photoengraved 0.039 inch thick aluminum card for exterior display. Card must be 8 1/2 by 11 inch minimum. Information card must identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. The card must be a minimum size of 8 1/2 by 11 inch. Install laminated card at roof hatch access location as directed by the Contracting Officer, install aluminum card on roof top on the face of ventilation penthouse where it is clearly visible from roof area at roof hatch, and provide a paper copy to the Contracting Officer.

-- End of Section --

# SECTION 07 60 00

# FLASHING, SHEET METAL AND ROOF HATCH
**08/08**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

| | |
|---|---|
| ANSI/SPRI RD-1 | (2004) Standard for Retrofit Roof Drains |

AMERICAN WELDING SOCIETY (AWS)

| | |
|---|---|
| AWS D1.2/D1.2M | (2008) Structural Welding Code - Aluminum |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A 167 | (1999; R 2004) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip |
| ASTM B 209 | (2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate |
| ASTM B 221 | (2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes |
| ASTM B 32 | (2008) Standard Specification for Solder Metal |
| ASTM D 1784 | (2008) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds |
| ASTM D 226 | (2006) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing |
| ASTM D 41 | (2005) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing |
| ASTM D 4586 | (2007) Asphalt Roof Cement, Asbestos-Free |

### 1.2 GENERAL REQUIREMENTS

Finished sheet metalwork will form a weathertight construction without waves, warps, buckles, fastening stresses or distortion, which allows for expansion and contraction. Sheet metal mechanic is responsible for cutting, fitting, drilling, and other operations in connection with sheet

metal required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous roofing operations.

## 1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Flashing for roof drains;

Base flashing;

Counterflashing;

Flashing at roof penetrations;

Reglets;

Scuppers;

Copings;

Roof hatch

SD-11 Closeout Submittals

Quality Control Plan

Submit for sheet metal work in accordance with paragraph entitled "Field Quality Control."

## 1.4 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

# PART 2 PRODUCTS

## 2.1 MATERIALS

Do not use lead, lead-coated metal, or galvanized steel. Use aluminum or stainless steel, unless otherwise indicated. Conform to the requirements specified and to the thicknesses and configurations established in SMACNA Arch Manual for the materials.

Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the

gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used except as follows:

2.1.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; coping, gravel stops and fascias; cap, valley, steeped, base, and eave flashings and related accessories.

2.1.2 Finish and Color

Exposed exterior items must have a baked-on, factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Provide finish coating dry-film thickness of 0.8 to 1.3 mils and color of white.

2.1.3 Stainless Steel

ASTM A 167, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

2.1.4 Aluminum Alloy Sheet and Plate

ASTM B 209, anodized or color white form alloy, and temper appropriate for use.

2.1.4.1 Finish

Exposed exterior sheet metal items of aluminum must have a baked-on, factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Provide finish coating dry-film thickness of 0.8 to 1.3 mils, and color of white.

2.1.5 Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes

ASTM B 221.

2.1.6 Solder

ASTM B 32, 95-5 tin-antimony.

2.1.7 Polyvinyl Chloride Reglet

ASTM D 1784, Type II, Grade 1, Class 14333-D, 0.075 inch minimum thickness.

2.1.8 Bituminous Plastic Cement

ASTM D 4586, Type I.

2.1.9 Roofing Felt

ASTM D 226 Type I.

2.1.10 Asphalt Primer

ASTM D 41.

### 2.1.11 Fasteners

Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.

## 2.2 ROOF HATCH

Provide as indicated (if indicated) on drawings.

Nominal 36 inch by 30 inch roof hatch. The roof hatch shall be single leaf, pre-assembled unit from the manufacturer. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m2) with a maximum deflection of 1/150th of the span or 20 psf wind uplift. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing and shall not be affected by temperature.

Entire hatch shall be weathertight with fully welded corner joints on cover and curb. Cover shall be 14 gauge paint bond G-90 galvanized steel with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb. Cover insulation shall be fiberglass of 1" (25.4mm) thickness, fully covered and protected by a metal liner of 22 gauge paint bond G-90 galvanized steel.

Curb shall be a minimu of 10" in height measured from the finished surface of the roof and of 14 gauge paint bond G-90 galvanized steel. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features a built-in flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place. Curb insulation shall be rigid, high-density fiberboard of 1" (25.4mm) thickness on outside of curb.

Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe. For steel construction: through bolted to the curb assembly.

1. Heavy pintle hinges shall be provided
2. Cover shall be equipped with a spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" diameter vinyl grip handle to permit easy release for closing.
6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed. Springs shall have an electrocoated acrylic finish for corrosion resistance.
7. Cover hardware shall be bolted into heavy gauge channel

reinforcing welded to the underside of the cover and concealed within the insulation space.

Finishes: Factory finish shall be alkyd based red oxide primed steel. Contractor shall field paint all primed surfaces.

Provide telescoping safety post. Provide steel support angles as indicated and required for proper mounting.

# PART 3 EXECUTION

## 3.1 INSTALLATION

### 3.1.1 Welding and Mechanical Fastening

Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness must be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

#### 3.1.1.1 Welding of Aluminum

Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2/D1.2M.

#### 3.1.1.2 Mechanical Fastening of Aluminum

Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inch maximum on center. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inch from the end of the overlapping sheet.

### 3.1.2 Protection from Contact with Dissimilar Materials

#### 3.1.2.1 Copper or Copper-bearing Alloys

Paint with heavy-bodied bituminous paint surfaces in contact with dissimilar metal, or separate the surfaces by means of moistureproof building felts.

#### 3.1.2.2 Aluminum

Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

#### 3.1.2.3 Metal Surfaces

Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

#### 3.1.2.4 Wood or Other Absorptive Materials

Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

### 3.1.3 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fascias by expansion and contraction joints spaced not more than 12 feet apart.

### 3.1.4 Base Flashing

Extend up vertical surfaces of the flashing not less than 8 inch and not less than 4 inch under the roof covering. Where finish wall coverings form a counterflashing, extend the vertical leg of the flashing up behind the applied wall covering not less than 6 inch. Overlap the flashing strips with the previously laid flashing not less than 3 inch. Fasten the strips at their upper edge to the deck. Horizontal flashing at vertical surfaces must extend vertically above the roof surface and fastened at their upper edge to the deck a minimum of 6 inch on center with large headed aluminum roofing nails a minimum of 2-inch lap of any surface. Solder end laps and provide for expansion and contraction. Extend the metal flashing over crickets at the up-slope side of curbs, and similar vertical surfaces extending through sloping roofs, the metal flashings. Extend the metal flashings onto the roof covering not less than 4.5 inch at the lower side of chimneys and similar vertical surfaces extending through the roof decks. Install and fit the flashings so as to be completely weathertight. Provide factory-fabricated base flashing for interior and exterior corners. Do not use metal base flashing on built-up roofing.

### 3.1.5 Counterflashing

Except where indicated or specified otherwise, insert counterflashing in reglets located from 9 to 10 inch above roof decks, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inch. Fold the exposed edges of counterflashings 1/2 inch. Where stepped counterflashings are required, they may be installed in short lengths a minimum 8 inch by 10 inch or may be of the preformed one-piece type. Provide end laps in counterflashings not less than 3 inch and make it weathertight with plastic cement. Do not make lengths of metal counterflashings exceed 10 feet. Form the flashings to the required shapes before installation. Factory-form the corners not less than 12 inch from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inch apart; on short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counterflashing with caulking compound. Turn up the concealed edge of counterflashings built into masonry or concrete walls not less than 1/4 inch and extend not less than 2 inch into the walls. Install counterflashing to provide a spring action against base flashing. Where bituminous base flashings are provided, extend down the counter flashing as close as practicable to the top of the cant strip. Factory form counter flashing to provide spring action against the base flashing.

3.1.6 Metal Reglets

Provide factory fabricated caulked type or friction type reglets with a minimum opening of 1/4 inch and a depth of 1 1/4 inch, as approved.

3.1.6.1 Caulked Reglets

Provide with rounded edges and metal strap brackets or other anchors for securing to the concrete forms. Provide reglets with a core to protect them from injury during the installation. Provide built-up mitered corner pieces for internal and external angles. Wedge the flashing in the reglets with lead wedges every 18 inch, caulked full and solid with an approved compound.

3.1.6.2 Friction Reglets

Provide with flashing receiving slots not less than 5/8 inch deep, one inch jointing tongues, and upper and lower anchoring flanges installed at 24 inch maximum snaplock receiver. Insert the flashing the full depth of the slot and lock by indentations made with a dull-pointed tool, wedges, and filled with a sealant. For friction reglets, install flashing snaplock receivers at 24 inch on center maximum. When the flashing has been inserted the full depth, caulk the slot and lock and fill with sealant.

3.1.7 Flashing for Roof Drains

Provide a 30 inch square sheet indicated. Taper insulation to drain from 24 inch out. Set flashing on finished felts in a full bed of asphalt roof cement, ASTM D 4586. Heavily coat the drain flashing ring with asphalt roof cement. Clamp the roof membrane, flashing sheet, and stripping felt in the drain clamping ring. Secure clamps so that felts and drain flashing are free of wrinkles and folds. Retrofit roof drains must conform to ANSI/SPRI RD-1.

3.1.8 Scuppers

Line interior of scupper openings with sheet metal. Extend the lining through and project outside of the wall to form a drip on the bottom edge and form to return not less than one inch against the face of the outside wall at the top and sides. Fold outside edges under 1/2 inch on all sides. Provide the perimeter of the lining approximately 1/2 inch less than the perimeter of the scupper. Join the top and sides of the lining on the roof deck side to a closure flange by a locked and soldered joint. Join the bottom edge by a locked and soldered joint to the closure flange, where required, form with a ridge to act as a gravel stop around the scupper inlet. Provide surfaces to receive the scupper lining and coat with bituminous plastic cement.

3.1.9 Flashing at Roof Penetrations and Equipment Supports

Provide metal flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck.

3.1.10 Copings

Provide coping using aluminum sheets 8 or 10 feet long joined by a 3/4

inch locked and soldered seam unless indicated otherwise. Terminate outer edges in edge strips. Install with sealed cover plate joints as indicated.

## 3.2 ROOF HATCH

Install per roof hatch manufacturer's written instructions. Flash watertight as required by roof hatch manufacturer and roof membrance manufacturer.

## 3.3 PAINTING

Field-paint sheet metal for separation of dissimilar materials.

## 3.4 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

## 3.5 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

## 3.6 FIELD QUALITY CONTROL

Establish and maintain a Quality Control Plan for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification that specified material is provided and installed.

c. Inspection of sheet metalwork, for proper size(s) and thickness(es), fastening and joining, and proper installation.

### 3.6.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contracting Officer at the end of each day.

NOTE: The following table is provided as a guide to the minimum acceptable standards. Metal gauges listed are applicable to light commercial and residential types and uses. Compare metal thickness stated herein with the requirements of SMACNA Arch. Manual and use the more stringent requirement of the two. Gauges of metal gutters in the following tables are only applicable to gutters less than 6 inches x 6 inches. Use SMACNA Arch. Manual for commercial gutters of larger sizes.

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

| Sheet Metal Items | Copper, Ounces Per Square Foot | Aluminum, Inch | Stainless Steel, Inch | Terne-Coated Steel, Inch | Zinc-Coated Steel, U.S. Std. Gage |
|---|---|---|---|---|---|
| Building Expansion Joints | | | | | |
| Cover ..... | 16 | .032 | .015 | .015 | 24 |
| Waterstop-bellows or flanged, U-type. .... | 16 | - | .015 | .015 | - |
| Covering on minor flat, pitched or curved surfaces ..... | 20 | .040 | .018 | .018 | - |
| Downspouts and leaders ..... | 16 | .032 | .015 | .015 | 24 |
| Downspout clips and anchors ..... | - | .040 clip | - | - | - |
| | - | .125 anchor | - | - | - |
| Downspout straps, 2-inch ..... | 48(a) | .060 | .050 | - | - |
| Conductor heads ..... | 16 | .032 | .015 | .015 | - |
| Scupper lining ..... | 20 | .032 | .015 | .015 | - |
| | gage | .... diameter | No. 9 diameter | .144 | .109 - |
| Flashings: | | | | | |
| Base ..... | 20 | .040 | .018 | .018 | 24 |
| Cap (Counter-flashing) | 16 | .032 | .015 | .015 | 26 |
| Eave ..... | 16 | - | .015 | .015 | 24 |
| Spandrel beam ..... | 10 | - | .010 | .010 | - |
| Bond barrier ..... | 16 | - | .015 | .015 | - |
| Stepped ..... | 16 | .032 | .015 | .015 | - |
| Valley ..... | 16 | .032 | .015 | .015 | - |
| Roof drain ..... | 16(b) | | | | |
| Pipe vent sleeve(d) | | | | | |
| Coping ..... | 16 | - | - | - | - |
| Gravel stops and fascias: | | | | | |
| Extrusions ..... | - | .075 | - | - | - |
| Sheets, corrugated ..... | 16 | .032 | .015 | .015 | - |
| Sheets, smooth ..... | 20 | .050 | .018 | .018 | 24 |
| Edge strip ..... | 24 | .050 | .025 | - | - |
| Gutters: | | | | | |
| Gutter section..... | 16 | .032 | .015 | .015 | 24 |
| Continuous cleat..... | 16 | .032 | .015 | .015 | 24 |
| Hangers, dimensions ..... | 1 inch x 1/8 inch (a) | 1 inch x .080 inch (c) | 1 inch x .037 inch | - | - |
| Joint Cover plates... | 16 | .032 | .015 | .015 | 24 |

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

| Sheet Metal Items | Copper, Ounces Per Square Foot | Aluminum, Inch | Stainless Steel, Inch | Terne-Coated Steel, Inch | Zinc-Coated Steel, U.S. Std. Gage |
|---|---|---|---|---|---|
| (See Table II) | | | | | |
| Reglets (c) ..... | 10 | - | .010 | .010 | - |
| Splash pans ..... | 16 | .040 | .018 | .018 | - |

(a) Brass.

(b) May be lead weighing 4 pounds per square foot.

(c) May be polyvinyl chloride.

(d) 2.5 pound minimum lead sleeve with 4 inch flange. Where lead sleeve is impractical, refer to paragraph entitled "Single Pipe Vents" for optional material.

TABLE II. SHEET METAL JOINTS

| Item Designation | TYPE OF JOINT: Copper, Terne-Coated Steel, Zinc-Coated Steel and Stainless Steel | Aluminum | Remarks |
|---|---|---|---|
| Joint cap for building expansion seam, cleated joint at roof | 1.25 inch single lock, standing seam, cleated | 1.25 inch single lock, standing | - - - |
| Flashings | | | |
| Base | One inch 3 inch lap for expansion joint | One inch flat locked, soldered; sealed; 3 inch lap for expansion joint | Aluminum producer's recommended hard setting sealant for locked aluminum joints. Fill each metal expansion joint with a joint sealing compound compound. |
| Cap-in reglet | 3 inch lap | 3 inch lap | Seal groove with joint sealing compound. |

TABLE II. SHEET METAL JOINTS

| Item Designation | TYPE OF JOINT: Copper, Terne-Coated Steel, Zinc-Coated Steel and Stainless Steel | Aluminum | Remarks |
|---|---|---|---|
| Reglets | Butt joint | - - - | Seal reglet groove with joint sealing compound. |
| Eave | One inch flat locked, cleated One inch loose locked, expansion joint cleated | One inch flat locked, locked, cleated one inch loose locked, sealed expansion joints, cleated | Same as base flashing. |
| Stepped | 3 inch lap | 3 inch lap | - - - |
| Valley. | 6 inch lap cleated | 6 inch lap cleated | - - - |
| Edge strip | Butt | Butt | - - - |
| Gravel stops: | | | |
| Extrusions | - - - | Butt with 1/2 inch space | Use sheet flashing beneath and a cover plate. |
| Sheet, smooth | Butt with 1/4 inch space | Butt with 1/4 inch space | Use sheet flashing backup plate. |
| Sheet corrugated | Butt with 1/4 inch space | Butt with 1/4 inch space | Use sheet flashing beneath and a cover plate or a combination unit |
| Gutters | 1.5 inch lap, riveted and soldered | One inch flat locked, riveted, and sealed | Aluminum producers recommended hard setting sealant for locked aluminum joints. |

(a) Provide a 3 inch lap elastomeric flashing with manufacturer's recommended sealant.

(b) Seal polyvinyl chloride reglet with manufacturer's recommended sealant.

-- End of Section --

SECTION 07 61 15.00 20

ALUMINUM STANDING SEAM ROOFING
**20 April 2019**

# 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.

ALUMINUM ASSOCIATION (AA)

| | |
|---|---|
| AA ADM-105 | (2005; Errata 2005) Aluminum Design Manual |
| AA ASM-35 | (2000) Specifications for Aluminum Sheet Metal Work in Building Construction, Construction Manual Series Section 5 |

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

| | |
|---|---|
| AF&PA T101 | (2005) National Design Specification (NDS) for Wood Construction |

AMERICAN IRON AND STEEL INSTITUTE (AISI)

| | |
|---|---|
| AISI SG03-3 | (2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM B117 | (2011) Standard Practice for Operating Salt Spray (Fog) Apparatus |
| ASTM D1654 | (2008) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments |
| ASTM D2247 | (2011) Testing Water Resistance of Coatings in 100% Relative Humidity |
| ASTM D2565 | (1999; R 2008) Xenon Arc Exposure of Plastics Intended for Outdoor Applications |
| ASTM D4214 | (2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films |
| ASTM D522 | (1993a; R 2008) Mandrel Bend Test of Attached Organic Coatings |
| ASTM D523 | (2008) Standard Test Method for Specular Gloss |
| ASTM D714 | (2002; R 2009) Evaluating Degree of Blistering of Paints |

| | |
|---|---|
| ASTM D968 | (2005; R 2010) Abrasion Resistance of Organic Coatings by Falling Abrasive |
| ASTM E84 | (2012) Standard Test Method for Surface Burning Characteristics of Building Materials |
| ASTM G152 | (2006) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials |
| ASTM G153 | (2004; R 2010) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials |

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

| | |
|---|---|
| NRCA Details | (2003) NRCA Roof Perimeter Flashing Systems Construction Details for Class 1 Roof Construction |

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

| | |
|---|---|
| SMACNA 1013 | (2012) Architectural Sheet Metal Manual, 7th Edition |

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
PORCELAIN ENAMEL INSTITUTE (PEI)

UNDERWRITERS LABORATORIES (UL)

FM GLOBAL (FM)

## 1.2 DEFINITIONS

### 1.2.1 Roofing System

The roofing system is defined as the assembly of roofing components, including roofing panels, flashing, fasteners, and accessories which, when assembled properly result in a watertight installation.

## 1.3 SYSTEM DESCRIPTION

### 1.3.1 Design Requirements

a. Provide continuous length panels with no joints or seams, except where indicated. Individual panels shall be removable for replacement of damaged material.

b. There shall be no exposed or penetrating fasteners except where shown on the approved shop drawings. Fasteners shall be of materials compatible with aluminum as recommended by the manufacturer. Length and diameter of screws shall be sufficient to meet the design loads with a suitable factor of safety for the material to which the roofing

components are attached. Calculate fastener capacity in accordance with AISI SG03-3, AA ADM-105 or AF&PA T101 as applicable.

c. Roof panel standing seam shall include a capillary break and be mechanically locked closed by the manufacturer's locking tool. The seam shall include a continuous sealant when required by the manufacturer to withstand the rainfall and wind specified in paragraph entitled "Manufacturer's Requirements."

d. Roof panel anchor clips shall be concealed and designed to allow for thermal movement of the panels, except where specific fixed points are indicated.

e. The system shall resist the positive and negative loads specified herein in accordance with "Sheet Building Sheathing Design Guide" of the AA ADM-105.

f. Panels shall support walking loads without excessive distortion or telegraphing of the structural supports. Panels shall support a 250 pound load concentrated on a four square inch area at the center of the panel without buckling or permanent distortion.

1.3.2 Performance Requirements

1.3.2.1 Static pressure air infiltration (Roof panels)

Pressure Leakage Rate per ASTM E1680:
a. 1.57 PSF 0.0012 cfm/ sq. ft.
b. 6.24 PSF 0.0001 cfm/ sq. ft.
c. 20.0 PSF 0.0011 cfm/ sq. ft.

1.3.2.2 Static pressure water infiltration (Roof panels)

Pressure Result per ASTM E1646:
a. 5 Gal. / Hr. per S.F. and Static NO LEAKAGE
b. Pressure of 20.0 PSF for 15 Minutes NO LEAKAGE

1.3.2.3 Tests

Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results withing the range or test data. Extrapolations for conditions outside test range are not acceptable.

1.3.2.4 Water penetration (dynamic pressure):

No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.

1.3.2.5 Wind and wind driven rain resistance

No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.

1.3.2.6 Roof pressures

The installed roof system assembly shall show that it can resist the calculated roof pressure in section 1.11.B in accordance with the test results of TAS 125.

1.3.2.7 Water penetration in low slope application

No water penetration or panel movement when subject to 6" head of water for 6 hours when tested in accordance with the ASTM E2140 and when subject to 6" head of water for 7 days when tested in accordance with the TAS 114 appendix.

1.3.2.8 Hydrostatic Head Resistancee

No water penetration when tested according to ASTM E2140. Submit Leakage test report upon completion of installation with submittal data.

1.3.2.9 Wind Uplift Resistance

Provide metal roof panel system that conform to the requirements of ASTM E1592 and UL580. Uplift force due to wind action governs the design for panels. Submit wind uplift test report prior to commencing installation. Submit licensed Wind uplift calculations engineer's and substantiating data to validate any non-rated roof system. Base wind uplift measurements on a design wind speed of 209 km/h 150mph in accordance with ASCE 7 and/or other applicable building code requirements. Metal roof panels and component materials must also comply with the requirements in FM4471 as part of a panel roofing system as listed in Factory Mutual Guide (FMG) "Approval Guide" for class 1 or noncombustible construction, as applicable. Identify all materials with FMG Markings.

1.3.2.10 Standing Seam Water - Stop test:

Comply with ASTM E1680, ASTM E1646, AAMA 501.1, and ASTM E2140.

1.3.2.11 Fire Test

When required comply with ASTM E108 or UL 790.

1.4 SUBMITTALS

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

SD-02 Shop Drawings

Roofing panels; Gutter / Downspout System;

Submit drawings as necessary to supplement the instructions and diagrams. Drawings shall include design and erection drawings containing an isometric view of the roof showing the design uplift pressures and dimensions of edge, ridge and corner zones. Show typical and special conditions including flashings, accessory installation, materials and thicknesses, all dimensions, anchoring methods, sealant locations, sealant tape locations, fastener layout, sizes, spacing, provisions for thermal movement, terminations, penetrations, and attachments. Details of installation shall be in accordance with the manufacturer's

Standard Instructions and details or the SMACNA 1013. The manufacturer's technical engineering department shall approve the drawings before they are submitted.

SD-03 Product Data

Roofing panels;

Attachment clips;

Closures

Accessories

Sample warranty certificate;

Submit for all materials to be provided. Submit data sufficient to indicate conformance to specified requirements.

SD-04 Samples

Roofing panels

Submit a 12 inch long section of typical panel in color selected.

When colors are not indicated, submit samples of not less than six different standard colors from manufacturer for selection.

Accessories

Submit each type of accessory item used in the project including, but not limited to: each type of anchor clip, closures, fasteners and leg clamps.

SD-05 Design Data

Load calculations;

SD-06 Test Reports

Submit reports of the tests required by this section.

Manufacturer's field inspection; G

Submit manufacturer's technical representative's inspection reports as required in paragraph entitled "Manufacturer's Field Inspection."

SD-07 Certificates

Technical representative

Qualification of Installer

Submit documentation proving the installer is factory-trained, has the specified experience and is authorized by the manufacturer to install the products specified.

Coil stock compatibility

Provide certification of coil compatibility with roll forming machinery to be used for forming panels without warping, waviness, and rippling not part of panel profile; to be done without damage, abrasion or marking of finish coating.

Qualification of Manufacturer

Qualifications of Applicator

SD-08 Manufacturer's Instructions

Sealant

Submit manufacturer's sealant requirements for making the standing seam watertight when subjected to 5 inches of rainfall per hour simultaneous with 124 mph winds.

Installation manual

Submit manufacturer's printed installation manual/instructions and standard details.

SD-11 Closeout Submittals

Information card

For each roofing installation, submit a typewritten card or photoengraved aluminum card containing the information listed on Form 1 located at the end of this section.

## 1.5 LOAD CALCULATIONS

Submit load calculations for the following by a structural engineer registered as a Professional Engineer in any jurisdiction verifying that the system supplied meets the design loads indicated. Coordinate calculations with manufacturer's test results.

a. Wind load uplift design pressure at roof locations specified in paragraph entitled "Wind Loads."

b. Clip spacing and allowable load per clip calculations.

c. The fastening of clips to structure or intermediate support spacing.

d. Intermediate support spacing and fastening to structure when required.

e. Allowable panel span at anchorage spacing indicated.

f. Safety factor used in determining loading.

## 1.6 QUALITY ASSURANCE

### 1.6.1 Preroofing Conference

After submittals are received and approved but before roofing and insulation work, including associated work, is preformed, the Contractor shall hold a preroofing conference to review the following:

a. The drawings and specifications

b. Procedure for on site inspection and acceptance of the roofing substrate and pertinent structural details relating to the roofing system

c. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing

d. Safety requirements.

The preroofing conference shall be attended by the Contractor and personnel directly responsible for the roofing and insulation installation, mechanical and electrical work, and the roofing manufacturer's technical representative. Conflicts among those attending the preroofing conference shall be resolved and confirmed in writing before roofing work, including associated work, is begun. Prepare written minutes of the preroofing conference and submit to the Contracting Officer.

1.6.2 Manufacturer's Technical Representative

The representative shall have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and with installations in the geographical area where construction will take place. The manufacturer's representative shall be an employee of the manufacturer with at least 5 years experience in installing the roof system. The representative shall be available to perform field inspections and attend meetings as required herein, and as requested by the Contracting Officer.
When the project is in progress, the roofing system manufacturer shall provide the following:

1.6.2.1 Work Progress

Keep the Owner informed as to the progress and quality of the work as observed. Photographic Inspection Report to be turned in on a weekly basis to the Owner.

1.6.2.2 Inspections

Provide job site inspections a minimum of THREE days a week.

1.6.2.3 Reports

Report to the Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.

1.6.2.4 Confirmation of work done

Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.6.2.5 Annual Inspection

The roofing manufacturer must inspect the roof on an annual basis and submit an annual inspection report to Public Works at MC Base Camp Lejeune and MCAS New River.

#### 1.6.2.6 Manufacturer Inspector

The manufacturer's inspector must be a full time employee of the manufacturer with a minimum 5 years experience inspecting the specified roof system. A signed copy to attest to the full time employ and tenure of the inspector by the president of the manufacturing company will accompany submittals.

### 1.6.3 Qualification of Installer

The roofing system installer shall be factory-trained, approved by the metal roofing system manufacturer to install the system, and shall have a minimum of five (5) years experience as an approved applicator with that manufacturer. The applicator shall have applied five installations of similar size and scope to this project within the previous 3 years.

### 1.6.4 Single Source

Provide roofing panels, clips, closures and other accessories from a single manufacturer. Provide the most recent design of the manufacturer to operate as a complete system for the intended use.

### 1.6.5 Manufacturer

The SSMRS shall be the product of a metal roofing industry recognized SSMRS manufacturer who has been in the practice of manufacturing SSMRS for a period of not less than 5 years and who has been involved in at least 5 projects similar in size and complexity to this project.

### 1.6.6 Qualifications for Welding Work

Welding procedures must conform to AWS D1.1/D1.1Mfor steel or AWS D1.2/D1.2M for aluminum.

Operators are permitted to make only those types of weldments for which each is specifically qualified.

### 1.6.7 Field Verification

Prior to the preparation of drawings and fabrication, verify location of roof framing, roof openings and penetrations, and any other special conditions. Indicate all special conditions and measurements on final shop drawings.

## 1.7 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle preformed panels, bulk roofing products and other manufactured items in a manner to prevent damage or deformation.

### 1.7.1 Delivery

Provide adequate packaging to protect materials during shipment. Do not uncrate materials until ready for use except for inspection. Immediately upon arrival of materials at jobsite, inspect materials for damage, dampness, and staining. Replace damaged or permanently stained materials that cannot be restored to like-new condition with new material. If materials are wet, remove moisture, restack and protect panels until used.

1.7.2 Handling

Handle material carefully to avoid damage to surfaces, edges and ends.

1.7.3 Storage

Stack materials stored on the site on platforms or pallets and cover with tarpaulins or other suitable weathertight coverings which prevent water trapping or condensation. Store panels so that water which might have accumulated during transit or storage will drain off. Do not store the panels in contact with materials that might cause staining, such as mud, lime, cement, fresh concrete or chemicals. Protect stored panels from wind damage.

1.8 Warranty

Furnish manufacturer's no dollar limit materials and workmanship warranty for the roofing system. The warranty period shall be not less than 30 years from the date of Government acceptance of the work. The warranty shall be issued directly to the Government. The warranty shall provide that if within the warranty period the metal roofing system becomes non-watertight or shows evidence of corrosion, perforation, peeling paint, rupture or excess weathering due to deterioration of the roofing system resulting from defective materials or workmanship the repair or replacement of the defective materials and correction of the defective workmanship shall be the responsibility of the roofing system manufacturer. Repairs that become necessary because of defective materials and workmanship while roofing is under warranty shall be performed within 7 days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time will constitute grounds for having the repairs performed by others and the cost billed to the manufacturer and contractor as described herewith. Contractor shall also provide a 2 year contractor installation warranty during which time the materials are covered by the manufacturer per the warranty period described above.

Provide coverage for damage to the roofing system caused by sustained winds having a velocity up to and including:

Applications over existing structures: Up to and including 130 mph.

New Construction: Up to and including 150 mph.

PART 2 PRODUCTS

2.1 ROOFING PANELS

2.1.1 Material

3004 aluminum, ASTM B209 and AA ADM1.
All products must be American made and manufactured in a plant owned and operated by the roofing manufacturer listed in the submittals. Product re-labeling will not be acceptable.

2.1.1.1 Thickness

0.040 inch minimum.

2.1.1.2 Finish

Exposed Coil-Coated Finish: 2-Coat Fluoropolymer. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Manufacturers' approved applicator to prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Coating system shall provide nominal 1.0 mil (0.025 mm) dry film thickness, consisting of primer and color coat.

Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.1.1.3 Texture

Smooth with raised intermediate ribs for added stiffness.

2.1.1.4 Color

As selected from the Manufacturer's full array of offered colors and textures.

2.1.1.5 Configuration

a. Provide panels of continuous lengths from ridge to eaves or from top to eaves on shed roof designs. Panels from coil stock shall be formed without warping, waviness or ripples not a part of the panel profile, and shall be free of damage to the finish coating system.

b. Provide panels with UNLIMITED thermal movement.

c. Profile: 2 3/8" high seam at 16" o.c.; mechanically seamed "T" seam; continuous length, no splicing; Concealed 16 GA one piece stainless steel clip not to come in contact with seam sealant.

d. Panel/Cap configuration must have a total of four (4) layers of aluminum surrounding anchor clip for prevention of water infiltration and increased system strength designed to limit potential for panel blow-off.

e. Profile of panel shall have mesas every two (2) inches on center continuous throughout the panel which are a minimum of one and one half (1-1/2) inches wide.

f. Seam must be two and three-eighths (2 3/8) inches minimum height for added upwared pressures and aesthetic appeal. Seam shall have continuous anchor reveals to allow anchor clips to resist positive and negative loading and allow unlimited expansion and contraction of panels due to thermal changes. Integral (not mechanically sealed) seams are unacceptable.

g. Seam cap: Snap on cap shall be a minimum of 1" wide "T" shaped of continuous length up to forty five (45) feet according to job conditions and field seamed by means of manufacturer's standard seaming machine.

h. Cap shall be designed to receive two (2) beads of continuous gasketing sealant, which will be applied independent of of anchor clip, to allow

unlimited thermal movement of panel without serious damage to cap sealant.

i. Stiffening ribs : Located in flat of panel to minimize oil canning and telegraphing of structural members.

j. Replaceability: Panels shall be of a symmetical design with snap on, mechanically seamed cap configuration such that individual panels may be removable for replacement without removing adjacent panels and uncrimping the existing seam (Panels will be removed by replacing the batten seam cap only to maintain the structural integrity of the panel and seam. Uncrimping and recrimping a mechanical seam is unacceptable.

k. Panel ends shall be panned at ridge, headwall, and hip conditions, or where applicable.

l. Panel length: Full length without joints, including bends.

## 2.2 ATTACHMENT CLIPS

Provide one-piece chips of compatible materials to aluminum roof panels. Size, shape, thickness and capacity must meet the thickness and design load criteria specified. Two piece clips are not acceptable.

## 2.3 ACCESSORIES

Roofing panels; Gutter / Downspout System sheet metal flashings, trim, moldings, closure strips, caps, preformed crickets, equipment curbs, gutters,down spouts, and other similar sheet metal accessories provided in conjunction with preformed metal panels shall be of the same material and finish as panels, except that such items which will be concealed after installation may be provided without the finish if they are aluminum or stainless steel. Provide ridge and rib closures, as specified. Metal shall be of thickness not less than that of panels. Molded closure strips shall be closed-cell synthetic rubber, neoprene, or polyvinyl chloride premolded to match configurations of preformed metal panels. Thermal spacer blocks and other thermal barriers at concealed fasteners shall be as recommended by the roofing panel manufacturer.

### 2.3.1 Closures

#### 2.3.1.1 Ridge Closure

Metal-clad foam or metal closure with foam secondary closure matching panel configuration for installation on surface of roof panel between panel ribs at ridge and headwall roof panel flashing conditions and terminations. Foam material shall not absorb water.

#### 2.3.1.2 Rib Closure

Aluminum, closed-cell or solid-cell synthetic rubber, neoprene or polyvinyl chloride pre-molded to match configuration of rib opening. Material for closures shall not absorb water.

### 2.3.2 Fasteners

Series 300 stainless steel with composite metal and neoprene composition washers. Fasteners for attachment to structural supports and fasteners for attachment of panels shall be as approved and in accordance with manufacturer's recommendation. Unless specified otherwise herein,

fasteners shall be either self-tapping screws, bolts and nuts, or self-locking bolts. Design fastening system to withstand design loads indicated. Fasteners shall not be over-torqued and shall develop full capacity of attachment clips.

2.3.2.1 Screws

Concealed fasteners: Corrosion resistant steel screws, #10 minimum diameter x length appropriate for substrate, hex washer head or pancake head. Use self-drilling, self-tapping for metal substrate or A-point for plywood substrate.

Exposed fasteners: 305 series stainless steel screws (cadmium or zinc coatings are not acceptable) with neoprene sealing washer, or 1/8-inch-(3-mm-) diameter stainless steel rivets.

2.3.2.2 Bolts

Provide not less than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.3.2.3 Automatic End-Welded Studs

Provide shouldered type with a shank diameter of not less than 3/16 inch and cap or nut for holding covering against the shoulder.

2.3.2.4 Explosive Driven Fasteners

Provide fasteners to be driven with explosive actuated tools and with a shank diameter of not less than 1/2 inch for fastening to steel and not less than one inch for fastening to concrete.

2.3.2.5 Rivets

Blind rivets shall be aluminum with 3/16 inch nominal diameter shank or stainless steel with 1/8 inch nominal diameter shank. Rivets shall be threaded stem type if used for other than fastening trim. Rivets with hollow stems shall have closed ends.

2.3.3 Sealant

Provide manufacturer's recommended elastometric exposed sealant. Provide non-hardening, non-shrinking concealed sealants. Silicone-based sealants shall not be used in contact with finished metal panels and components unless approved otherwise by the Contracting Officer.

2.3.4 Sealant Tape

Polyvinyl chloride closed cell foam tape or composed of 99 percent solids in a base of butyl polyisobutylene rubber with the following properties and characteristics:

a. Webbing and Elongation: 100 percent minimum at 77 degrees F

b. Adhesion: Excellent to surfaces used

c. U-V light exposure: No effect

d. Ozone: No effect

e. Weathering: 1000 hours in QUV Test Apparatus - Excellent, no cracking, bleeding, or significant changes.

f. Moisture Transmission: 0.05 to 0.15 grams per 100 square inches in 24 hours.

g. Service Temperature Tests: Bending over 1/2 inch mandrel at minus 60 degrees F with no cracking. Expose sealed typical metal lap joint to plus 350 degrees F for 24 hours with no significant loss of original properties.

h. Reaction to Metals: Non-corrosive to metals

## 2.4 UNDERLAYMENT FOR WOOD SUBSTRATES

Apply Self-adhering rubberized asphaltic membrane over the entire roof area. Minimum of 1 mm 40 mils thick, high temperature as recommended by the standing seam manufacturer for use over entire roof and flashing conditions. Products shall meet or exceed the performance criteria of ASTM D1970/D197M. For areas subjected to excessive humidity generated by building equipment or occupant usage (such as swimming pools, locker rooms, etc), submit a synthetic, vapor permeable, UV-resistant membrane for approval. Atlas Roofing Summit 60, GAF Tiger Paw, or Firestone Clad-Gard MA, or approved equal.

## 2.5 LABORATORY TESTS FOR PANEL FINISH

Previously manufactured panels of the same type and finish as proposed for the project shall have been tested by an approved testing laboratory to ensure conformance to specifications. The term "appearance of base metal" refers to the aluminum base metal. Panels shall meet the following test requirements.

### 2.5.1 Salt Spray Test

Panels shall withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B117, including the scribe requirement in the test. Immediately upon removal of the panel from the test, coating shall receive a rating of 10, no blistering, as determined by ASTM D714; and a rating of 7, 1/16 inch failure at scribe, as determined by ASTM D1654, Rating Schedule No. 1.

### 2.5.2 Formability Test

For formability test, when subjected to a 180 degree bend over a 1/8 inch diameter mandrel in accordance with ASTM D522, exterior coating film shall show only microchecking of the exterior film and there shall be no loss of adhesion.

### 2.5.3 Accelerated Weathering Test

Panels shall withstand an accelerated weathering test for a minimum of 2000 hours in accordance with ASTM G152, ASTM G153 or ASTM D2565 without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with a penknife blade or similar instrument shall be considered to indicate loss of adhesion.

2.5.4 Chalking Resistance

After the 2000-hour weatherometer test, exterior coating shall not chalk greater than No. 8 rating when measured in accordance with ASTM D4214 test procedures.

2.5.5 Abrasion Resistance Test for Color Coating

When subjected to the falling sand test in accordance with ASTM D968, coating system shall withstand a minimum of 100 liters of sand per mil of coating thickness before appearance of base metal.

2.5.6 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage, or corrosion.

2.5.7 Fire Hazard

The finish on factory-fabricated panels shall have a flame spread rating of not more than 25 when tested in accordance with ASTM E84.

2.5.8 Gloss

The gloss of the finish shall be 30 plus or minus 5 at an angle of 60 degrees, when measured in accordance with ASTM D523.

2.5.9 Glare Resistance

Surfaces of panels that will be exposed to the exterior shall have a specular reflectance of not more than 10 when measured in accordance with ASTM D523 at an angle of 85 degrees. Requirements specified under "Formability Test" will be waived if necessary to conform to this requirement.

2.6 LINER PANELS

Where (if) indicated, provide liner panels.

Fabricate liner panels of the same material as roof panels, and formed or patterned to prevent waviness and distortion. Liner panels shall have a factory applied, one mil thick minimum painted coating on the inside face, and a prime coat on the liner side.

2.7 Retrofit Framing Over Existing Roofs

2.7.1 Shop Drawings

Show roof framing system with accessories in plan, sections and details. Include complete drawing/description of each framing component and fastener, including metal thickness and finishes, connection details, anchorage details, and special fabrication provisions. Indicate relationships with adjacent and interfacing work. Indicate fastener types and spacing; and provide fastener pullout values.

2.7.2 Product Data

Include manufacturer's detailed material and system description,

engineering performance data and finish specifications. Indicate fastener types and spacing; and required fastener pullout values.

2.7.3 Design Loads

Submit copy of manufacturer's minimum design load calculations according to ASCE 7. All loading types shall be considered: dead, live, snow, wind, and seismic.

2.7.4 System Certification

Provide statement certifying the proposed system's capacity to safely resist the calculated design loads. Statement shall be provided by a registered professional engineer and co-signed by an officer of the manufacturing company.

2.7.5 Warranties

Owner shall receive one (1) warranty from manufacturer of each roof framing system covering materials. Warranty shall commence on date of substantial completion. Owner shall receive one (1) warranty from the installer of the roof framing systems covering installation and workmanship.

See Section item 1.8 Warranty for warranty duration and other requirements.

2.8 Standing Seam System on Existing Metal Building Purlins

2.8.1 Demolition

Remove existing roof panel system to the existing framing members, including but not limited to flashing, ridge caps, gutters, downspouts, soffits, fascia, trims, etc.

2.8.2 Repair existing framing

Remove all damaged or deteriorated framing members. Remove framing members taht are not structuraly sound. Provide new steel metal building system purlins and related components. Match existing materials, shapes and thicknesses. Prepare as necessary to recieve new standing seam roof system. See drawings.

PART 3 EXECUTION

3.1 EXAMINATION

Examine surfaces to receive standing seam metal roofing and flashing. Provide plumb and true surfaces, clean, even, smooth and as dry as possible. Ensure that surfaces are free from defects and projections which might affect the installation. Report unsuitable conditions to Contracting Officer.

3.2 PROTECTION OF DISSIMILAR METALS

Where an aluminum component is in contact with, fastened to, or contacted by drainage from dissimilar metals other than stainless steel, give such dissimilar metals one of the following treatments:

a. A heavy brush coat of primer followed by two coats of aluminum metal and masonry paint.

b. A heavy coat of alkali-resistant bituminous paint.

c. Separate contact surfaces with non-absorptive tape or gasket.

3.2.1 Contact with Masonry

Where aluminum is in contact with masonry, concrete, or plaster, apply a heavy coat of alkali-resistant bituminous paint.

3.2.2 Contact with Wood

Where aluminum is in contact with wood or other absorptive material subject to wetting, or with wood treated with a preservative not compatible with aluminum, seal joints with sealing compound and apply one heavy brushcoat of aluminum pigmented bituminous paint.

3.3 INSTALLATION

Install in accordance with approved manufacturer's erection instructions shop drawings, and diagrams, except as specified otherwise herein. Provide panels in full and firm contact with clips. Obtain approval prior to installation on prefinished panels cut in the field, and factory applied coverings or coatings that were repaired after being abraded or damaged during handling or installation. Make repairs with material of same color as weather coating. Completely seal openings through panels. Correct defects or errors in materials in an approved manner. Replace materials which cannot be corrected in an approved manner with new materials. Provide molded closure strips where indicated and where necessary for weathertight construction. Use shims as required to ensure clip line is true. Use a spacing gage at each row of panels to ensure that panel width is not stretched or shortened. Provide one layer of synthetic underlayment with side laps down slope. Overlap side end laps 3 inches.

3.3.1 Roof Panels

Apply roofing panels with standing seams parallel to slope of roof. Provide roofing panels in full lengths from ridge to eaves (top to eaves on shed roofs), with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys, and similar openings. Form interlocking rib type panel seams in the field with an automatic mechanical seamer approved by the manufacturer. Attach panels to structure with concealed clips which are incorporated into the panel seams. Clip attachment shall allow roof to move freely and independently of the structure, except at fixed points as indicated.

All "Curving, S-Curbing, and Tapering" shall be mechanically done only. Curved panels must be mechanically factory curved to the exact radius of each curved roof area. Tapered panels must be formed from a single piece of metal. Performance tests must be applicable for the greatest panel width. Any other method shall not be allowed.

Provide Manufacturer's methods for lifting of large panels to prevent panel deformation during its installation. Use manufacturer's spreader bar where applicable to prevent kinking and damage to panels. Field formed panels shall be done with the same factory machinery and methods. Field

form machinery must be calibrated daily. For field forming of panels, the manufacturer must use the same equipment used in the factory to form the panels onsite. Manufacturer must engage a factory authorized service representative to form the panels on site and comply with the following:

a. Roll form operator is to be factory trained and authorized to provide job site operations of the panel forming process with quality control standards.

b. The panel profile shall be checked and verified to be within acceptable forming tolerances as called for under the factory defined panel quality control fabrication standards (Quality control sheets). These standards define the upper and lower acceptable forming tolerances. The actual forming dimensions shall be on or within these acceptable standards.

c. Dimensional checks shall be conducted at the beginning of the operation and at the beginning of each new slit coil. This process ensures proper panel profile is being produced with each new slit coil and consistency throughout the project.

d. These panel dimensions shall be recorded on site in the Daily Report and returned to the factory for quality control review.

e. Panels shall be formed on heavy duty factory type roll former with no fewer than 16 forming stations to improve quality and minimize oil canning.

f. Panels shall be of identical profile and characteristics as factory formed panels and specimens used as the basis of performance tests.

g. Sealant shall be factory applied in a separate factory formed snap on cap. Site/field applied seam sealant is unacceptable. Seam caps may be shipped in 45 feet (11.4 m) or less length and lap spliced over full length panels in accordance with manufacturer's system details.

h. Site roll-forming equipment shall be owned and maintained by the panel manufacturer and operated by the panel manufacturer's trained full-time experienced technician. The installer must provide additional personnel to handle raw materials and finished product as necessary.

### 3.3.2 Flashings

Provide flashing and related closures and accessories in connection with preformed metal panels and as necessary to provide a weathertight installation. Install flashing to ensure positive water drainage away from roof penetrations. Flash and seal roof at ridge, eaves and rakes, at projections through roof, and elsewhere as necessary. Accomplish placement of closure strips, flashing, and sealing material in an approved manner that will ensure complete weathertightness. Details of installation which are not indicated shall be in accordance with the NRCA Details, SMACNA 1793, AA ASM-35, panel manufacturer's printed instructions and details of the approved shop drawings. Installation shall allow for expansion and contraction of flashing.

### 3.3.3 Flashing Fasteners

Fastener spacings shall be in accordance with the panel manufacturer's recommendations and as necessary to withstand the indicated design loads. Install fasteners in roof valleys as recommended by the manufacturer of

the panels. Install fasteners in straight lines within a tolerance of 1/2 inch in the length of a bay. Drive exposed penetrating type fasteners normal to the surface and to a uniform depth to seat gasketed washers properly and drive so as not to damage factory applied coating. Exercise extreme care in drilling pilot holes for fastenings to keep drills perpendicular and centered. Do not drill through sealant tapes. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Torque used in applying fasteners shall not exceed that recommended by the manufacturer. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.

Fastener spacing shall not exceed 6" on center.

### 3.3.4 Closure/Closure Strips

Set closure/closure strips in joint sealant material.

## 3.4 CLEANING

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs on completion to prevent discoloration and harm to the panels and flashing. Remove grease and oil films, excess sealants handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces shall be free of dents, creases, waves, scratch marks, and solder or weld marks.

## 3.5 MANUFACTURER'S FIELD INSPECTION

Manufacturer's technical representative shall visit the site as necessary but not less than three (3) days a week during the installation process to assure panels, flashings, and other components are being installed in a satisfactory manner. Refer to 1.6.2.6 for Manufacturer's technical representative field inspections and at substantial completion prior to issuance of warranty. Each inspection visit shall include a review of the entire installation to date. After each inspection, a report, signed by the manufacturer's technical representative, shall be submitted to the Contracting Officer noting the overall quality of work, deficiencies and any other concerns, and recommended corrective actions in detail. Notify Contracting Officer a minimum of 2 working days prior to site visit by manufacturer's technical representative.

## 3.6 COMPLETED WORK

Completed work shall be plumb and true without oil canning, dents, ripples, abrasion, rust, staining, or other damage detrimental to the performance or aesthetics of the completed roof assembly.

## 3.7 INFORMATION CARD

For each roof, provide a typewritten card, laminated in plastic and framed for interior display or a photoengraved 0.032 inch thick aluminum card for exterior display. Card to be 8 1/2 by 11 inches minimum and contain the information listed on Form 1 at end of this section. Install card near point of access to roof, or where indicated. Send a photostatic paper copy to LANTNAVFACENGCOM, Code 1613, 1510 Gilbert Street, Norfolk, VA 23511-2699.

3.8 FORM ONE

FORM 1 - PREFORMED STANDING SEAM ROOFING SYSTEM COMPONENTS

1. Contract Number:

2. Building Number & Location:

3. NAVFAC Specification Number:

4. Deck/Substrate Type:

5. Slopes of Deck/Roof Structure:

6. Insulation Type & Thickness:

7. Insulation Manufacturer:

8. Vapor Retarder: ( )Yes ( )No

9. Vapor Retarder Type:

10. Preformed Steel Standing Seam Roofing Description:

a. Manufacturer (Name, Address, & Phone No.):
b. Product Name: c. Width: d. Gage:
e. Base Metal: f. Method of Attachment:

11. Repair of Color Coating:

a. Coating Manufacturer (Name, Address & Phone No.):
b. Product Name:
c. Surface Preparation:
d. Recoating Formula:
e. Application Method:

12. Statement of Compliance or Exception:_____
_____
_____

13. Date Roof Completed:

14. Warranty Period: From_____ To_____

15. Roofing Contractor (Name & Address):

16. Prime Contractor (Name & Address):

Contractor's Signature _____ Date:

Inspector's Signature _____ Date:

-- End of Section --

# SECTION 07 84 00

# FIRESTOPPING
**05/10**

## PART 1 GENERAL

### 1.1 SUMMARY

Furnish and install tested and listed firestopping systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps.

a. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents.

b. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint.

Gaps requiring firestopping include gaps between the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above and at the intersection of shaft assemblies and adjoining fire resistance rated assemblies.

### 1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM E119 | (2014) Standard Test Methods for Fire Tests of Building Construction and Materials |
| ASTM E1399/E1399M | (1997; E 2013;R 2013) Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems |
| ASTM E1966 | (2015) Fire-Resistive Joint Systems |
| ASTM E2174 | (2014b) Standard Practice for On-Site Inspection of Installed Fire Stops |
| ASTM E2307 | (2015a) Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus |
| ASTM E2393 | (2010a) Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers |

| | |
|---|---|
| ASTM E814 | (2013a) Standard Test Method for Fire Tests of Through-Penetration Fire Stops |
| ASTM E84 | (2015a) Standard Test Method for Surface Burning Characteristics of Building Materials |

FM GLOBAL (FM)

| | |
|---|---|
| FM 4991 | (2013) Approval of Firestop Contractors |
| FM APP GUIDE | (updated on-line) Approval Guide http://www.approvalguide.com/ |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 1479 | (2015) Fire Tests of Through-Penetration Firestops |
| UL 2079 | (2004; Reprint Dec 2014) Tests for Fire Resistance of Building Joint Systems |
| UL 723 | (2008; Reprint Aug 2013) Test for Surface Burning Characteristics of Building Materials |
| UL Fire Resistance | (2014) Fire Resistance Directory |

## 1.3 SEQUENCING

Coordinate the specified work with other trades. Apply firestopping materials, at penetrations of pipes and ducts, prior to insulating, unless insulation meets requirements specified for firestopping. Apply firestopping materials. at building joints and construction gaps, prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible. Firestop material shall be inspected and approved prior to final completion and enclosing of any assemblies that may conceal installed firestop.

## 1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping System;

SD-03 Product Data

Firestopping Materials;

SD-06 Test Reports

Inspection;

SD-07 Certificates

Inspector Qualifications
Firestopping Materials
Installer Qualifications;

1.5 QUALITY ASSURANCE

1.5.1 Installer

Engage an experienced Installer who is:

a. FM Research approved in accordance with FM 4991, operating as a UL Certified Firestop Contractor, or

b. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products in accordance with specified requirements. Submit documentation of this experience. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer installer qualifications on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures. The installer shall obtain from the manufacturer and submit written certification of training, and retain proof of certification for duration of firestop installation.

1.5.2 Inspector Qualifications

The inspector shall have a minimum of two years experience in construction field inspections of firestopping systems, products, and assemblies. The inspector shall be completely independent of, and divested from, the installer, the manufacturer, and the supplier of any material or item being inspected. The inspector shall not be a competitor of the installer, the contractor, the manufacturer, or supplier of any material or item being inspected. Include in the qualifications submittal a notarized statement assuring compliance with the requirements stated herein.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, protected from damage and exposure to elements and temperatures in accordance with manufacturer requirements. Remove damaged or deteriorated materials from the site. Use materials within their indicated shelf life.

PART 2 PRODUCTS

2.1 FIRESTOPPING SYSTEM

Submit detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL

tested system is available through a manufacturer, a manufacturer's engineering judgment, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal must indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" "T" and "L" ratings, and type of application.

Also, submit a written report indicating locations of and types of penetrations and types of firstopping used at each location; record type by UL list printed numbers.

## 2.2 FIRESTOPPING MATERIALS

Provide firestopping materials, supplied from a single domestic manufacturer, consisting of commercially manufactured, asbestos-free, nontoxic products FM APP GUIDE approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

### 2.2.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.

### 2.2.2 Toxicity

Material shall be nontoxic and carcinogen free to humans at all stages of application or during fire conditions and shall not contain hazardous chemicals or require harmful chemicals to clean material or equipment.

### 2.2.3 Fire Resistance Rating

Firestop systems shall be UL Fire Resistance listed or FM APP GUIDE approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected. Where required, firestop systems shall also have "T" rating at least equal to the fire-rated floor in which the openings are to be protected.

#### 2.2.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph SYSTEM DESCRIPTION, shall provide fire resistance ratings in accordance with ASTM E814 or UL 1479. Fire resistance ratings shall be as follows:

##### 2.2.3.1.1 Penetrations of Fire Resistance Rated Walls, Partitions, Floors, Roofs or other Assemblies

Rating shall be equal to that of the construction where the penetration occurs.

#### 2.2.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph SYSTEM DESCRIPTION, and gaps such as those between floor slabs and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials

and systems that have been tested in accordance with ASTM E119, ASTM E1966 or UL 2079 to meet the required fire resistance rating. Curtain wall joints shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E2307 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E1399/E1399M or UL 2079. All joints at the intersection of the top of a fire resistance rated wall and the underside of a fire-rated floor, floor ceiling, or roof ceiling assembly shall provide a minimum class II movement capability.

### 2.2.4 Material Certification

Submit certificates attesting that firestopping material complies with the specified requirements. For all intumescent firestop materials used in through penetration systems, manufacturer shall provide certification of compliance with UL 1479.

## PART 3 EXECUTION

### 3.1 PREPARATION

Areas to receive firestopping must be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement must be sound and capable of supporting device. Prepare surfaces as recommended by the manufacturer.

### 3.2 INSTALLATION

Completely fill void spaces with firestopping material regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction must be capable of supporting the same load as the floor is designed to support or be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Install firestopping in accordance with manufacturer's written instructions. Provide tested and listed firestop systems in the following locations, except in floor slabs on grade:

a. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.

b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.

c. Gaps at the intersection of floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.

d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.

e. Construction joints in floors and fire rated walls and partitions.

f. Other locations where required to maintain fire resistance rating of the construction.

3.2.1 Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Replace thermal insulation with a material having equal thermal insulating and firestopping characteristics.

3.2.2 Fire Dampers

Install and firestop fire dampers in accordance with Section 23 73 33 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM. Firestop installed with fire damper must be tested and approved for use in fire damper system. Firestop installed with fire damper must be tested and approved for use in fire damper system.

3.2.3 Data and Communication Cabling

Cabling for data and communication applications shall be sealed with re-enterable firestopping products and devices as indicated, or as required by Camp Lejeune Base Telephone and Communications Department.

3.2.3.1 Re-Enterable Devices

Firestopping devices shall be pre-manufactured modular devices, containing built-in self-sealing intumescent inserts. Firestopping devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop materials. Devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants; while maintaining "L" rating of <10 cfm/sf measured at ambient temperature and 400 degrees F at 0 percent to 100 percent visual fill.

3.2.3.2 Re-Sealable Products

Provide firestopping pre-manufactured modular products, containing self-sealing intumescent inserts. Firestopping products shall allow for cable moves, additions or changes. Devices shall be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants.

3.3 INSPECTION

For Navy projects, install one of each type of penetration and have it inspected and accepted by the Naval Facilities Engineering Command, Fire Protection Engineer prior to the installation of the remainder of the penetrations. At this inspection, the manufacturer's technical representative of the firestopping material shall be present. For all projects, the remainder of the firestopped areas shall not be covered or enclosed until inspection is complete and approved by the Contracting Officer. The inspector must inspect the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements. Submit written reports indicating locations of and types of penetrations and types of firestopping used at each location; type shall be recorded by UL listed printed numbers.

### 3.3.1 Inspection Standards

Inspect all firestopping in accordance to ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results to be submitted.

### 3.3.2 Inspection Reports

Submit inspection report stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

-- End of Section --

# SECTION 07 92 00

# JOINT SEALANTS

**10/03**

## 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 C 920 (2002) Elastomeric Joint Sealants

### 1.2 SUBMITTALS

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

SD-03 Product Data

Sealants

Primers

Bond breakers

Backstops

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

### 1.3 ENVIRONMENTAL CONDITIONS

The ambient temperature shall be within the limits of 40 and 90 degrees F when sealant is applied.

### 1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Elastomeric sealant containers shall be labeled to identify type, class, grade, and use.

Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

## PART 2 PRODUCTS

### 2.1 SEALANTS

Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

#### 2.1.1 Interior Sealant

ASTM C 920, Type S or M, Grade NS, Class 12.5, Use NT. Location(s) of sealant shall be as follows:

| LOCATION | COLOR |
|---|---|
| a. Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items. | _____ |
| b. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces. | _____ |
| c. Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed. | _____ |
| d. Joints between edge members for acoustical tile and adjoining vertical surfaces. | _____ |
| e. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted. | _____ |
| f. Joints between bathtubs and ceramic tile; joints between shower receptors and ceramic tile; joints formed where nonplaner tile surfaces meet. | _____ |
| g. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occuring where substrates change. | _____ |
| h. Behind escutcheon plates at valve pipe penetrations and showerheads in showers. | _____ |

Colors shall match conditions where sealant is to be applied. Where there is any question about the appropriate color to use, the Contracting Officer shall make the final selection.

#### 2.1.2 Exterior Sealant

For joints in vertical surfaces, provide ASTM C 920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide

ASTM C 920, Type S or M, Grade P, Class 25, Use T. Location(s) and color(s) of sealant shall be as follows:

| | LOCATION | COLOR |
|---|---|---|
| a. | Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations. | Match adjacent surface color - typical all situations _____ |
| b. | Joints between new and existing exterior masonry walls. | _____ |
| c. | Masonry joints where shelf angles occur. | _____ |
| d. | Joints in wash surfaces of stonework. | _____ |
| e. | Expansion and control joints. | _____ |
| f. | Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required. | _____ |
| g. | Voids where items pass through exterior walls. | _____ |
| h. | Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels. | _____ |
| i. | Metal-to-metal joints where sealant is indicated or specified. | _____ |
| j. | Joints between ends of gravel stops, fascias, copings, and adjacent walls. | _____ |
| k. | Exterior joints between pre-cast concrete units forming decorative horizontal cornice band. | _____ |

2.1.3 Floor Joint Sealant

ASTM C 920, Type S or M, Grade P, Class 25, Use T. Location(s) and color(s) of sealant shall be as follows:

| | LOCATION | COLOR |
|---|---|---|
| a. | Seats of metal thresholds for exterior doors. | _____ |
| b. | Control and expansion joints in floors, slabs, ceramic tile, and walkways. | _____ |

Colors shall match adjacent materials where sealant is to be applied. Where there is any question about the appropriate color to use, the Contracting Officer shall make the final selection.

### 2.1.4 Preformed Sealant

Preformed sealant shall be polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, the sealant shall be non-bleeding and shall have no loss of adhesion.

## 2.2 PRIMERS

Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

## 2.3 BOND BREAKERS

Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

## 2.4 BACKSTOPS

Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated. Backstop material shall be compatible with sealant. Do not use oakum or other types of absorptive materials as backstops.

## 2.5 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer, except do not use solvents for aluminum and bronze surfaces that will be in contact with sealant.

# PART 3 EXECUTION

## 3.1 SURFACE PREPARATION

Surfaces shall be clean, dry to the touch, and free from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

### 3.1.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

### 3.1.2 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use nonstaining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

### 3.1.3 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

### 3.1.4 Wood Surfaces

Wood surfaces to be in contact with sealants shall be free of splinters and sawdust or other loose particles.

## 3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant. Mix multicomponent elastomeric sealants in accordance with manufacturer's instructions.

## 3.3 APPLICATION

### 3.3.1 Joint Width-To-Depth Ratios

a. Acceptable Ratios:

| JOINT WIDTH | JOINT DEPTH Minimum | JOINT DEPTH Maximum |
|---|---|---|
| For metal, glass, or other nonporous surfaces: | | |
| 1/4 inch (minimum) | 1/4 inch | 1/4 inch |
| over 1/4 inch | 1/2 of width | Equal to width |
| For wood, concrete, masonry, stone: | | |
| 1/4 inch (minimum) | 1/4 inch | 1/4 inch |
| Over 1/4 inch to 1/2 inch | 1/4 inch | Equal to width |
| Over 1/2 inch to 2 inches | 1/2 inch | 5/8 inch |
| Over 2 inches | (As recommended by sealant manufacturer) | |

b. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.

### 3.3.2 Masking Tape

Masking tape may be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled. Any residue shall be cleaned from surfaces, and damage caused by tape or cleaning must be repaired and paint touched-up.

### 3.3.3 Backstops

Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

a. Where indicated.

b. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios."

### 3.3.4 Primer

Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

### 3.3.5 Bond Breaker

Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

### 3.3.6 Sealants

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

## 3.4 PROTECTION AND CLEANING

### 3.4.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

### 3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

-- End of Section --

# SECTION 08 11 13

# STEEL DOORS AND FRAMES
**02/10**

## PART 1 GENERAL

### 1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A653/A653M | (2015) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| ASTM A924/A924M | (2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process |
| ASTM C578 | (2015) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation |
| ASTM C591 | (2015) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation |
| ASTM C612 | (2014) Mineral Fiber Block and Board Thermal Insulation |
| ASTM D2863 | (2013) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index) |

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

| | |
|---|---|
| ANSI/BHMA A156.115 | (2014) Hardware Preparation in Steel Doors and Steel Frames |

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

| | |
|---|---|
| NAAMM HMMA HMM | (1999; R2000) Hollow Metal Manual |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 252 | (2012) Standard Methods of Fire Tests of Door Assemblies |
| NFPA 80 | (2016) Standard for Fire Doors and Other Opening Protectives |

STEEL DOOR INSTITUTE (SDI/DOOR)

| | |
|---|---|
| SDI/DOOR 111 | (2009) Recommended Selection and Usage |

| | |
|---|---|
| | Guide for Standard Steel Doors, Frames and Accessories |
| SDI/DOOR 113 | (2001; R2006) Standard Practice for Determining the Steady State Thermal Transmittance of Steel Door and Frame Assemblies |
| SDI/DOOR A250.11 | (2001) Recommended Erection Instructions for Steel Frames |
| SDI/DOOR A250.6 | (2003; R2009) Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames |
| SDI/DOOR A250.8 | (2003; R2008) Recommended Specifications for Standard Steel Doors and Frames |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 10C | (2009; Reprint Feb 2015) Standard for Positive Pressure Fire Tests of Door Assemblies |

## 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors;

Frames;

Accessories

Weatherstripping

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of doors;

Schedule of frames;

Submit door and frame locations.

SD-03 Product Data

Doors;

Frames;

Accessories

Weatherstripping

Submit manufacturer's descriptive literature for doors, frames,

and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to SDI/DOOR A250.8 requirements.

SD-04 Samples

Where colors are not indicated, submit manufacturer's standard colors and patterns for selection.

## 1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

# PART 2 PRODUCTS

## 2.1 BLAST RESISTANCE AS PER MINIMUM ANTITERRORISM STANDARDS

Building AS124 does not meet the thresholds for requiring Blast Resistant doors and windows. The building is typically uninhabited. When it is inhabited the occupant loads are below the level that requires blast resistance.

**Though strict compliance with the UFC 4-010-01 is not required, the following shall be provided for Exterior Doors:**

**Doors shall be 16 gage steel.**

**Frames shall be 14 gage steel.**

**Doors shall swing out in the direction of egress travel. The doors shall "seat" into the frame as viewed from the exterior of the building.**

**Glazing shall be as required in Section 08 81 00.**

The applicable version of UFC 4-010-01 DoD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS shall be the version available on the date the project is released for bid.

## 2.2 STANDARD STEEL DOORS

SDI/DOOR A250.8, except as specified otherwise. Prepare doors to receive door hardware as specified in Section 08 71 00. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1-3/4 inch thick, unless otherwise indicated.

2.2.1 Classification - Level, Performance, Model

2.2.1.1 Extra Heavy Duty Doors

SDI/DOOR A250.8, Level 3, physical performance Level A, Model 1 with core construction as required by the manufacturer for interior doors and for indicated exterior doors, of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners shall be filled with mineral board insulation.

2.3 CUSTOM HOLLOW METAL DOORS

Provide custom hollow metal doors where nonstandard steel doors are indicated. At the Contractor's option, custom hollow metal doors may be provided in lieu of standard steel doors. Door size(s), design(s), materials, construction, gages, and finish shall be as specified for standard steel doors and shall comply with the requirement of NAAMM HMMA HMM. Fill all spaces in doors with insulation. Close top and bottom edges with steel channels not lighter than 16 gage. Close tops of exterior doors flush with an additional channel and seal to prevent water intrusion. Prepare doors to receive hardware specified in Section 08 71 00 DOOR HARDWARE. Undercut doors where indicated. Doors shall be 1-3/4 inch thick, unless otherwise indicated.

2.4 SOUND RATED STEEL DOORS

Doors shall have a Sound Transmission Class (STC) 34.

2.5 ACCESSORIES

2.5.1 Louvers

2.5.1.1 Interior Louvers

SDI/DOOR 111, Louvers shall be stationary sightproof type. Detachable moldings on room or non security side of door; on security side of door, moldings to be integral part of louver. Form louver frames of 20 gage steel and louver blades of a minimum 24 gage. Sightproof louvers to be inverted "V" blade design with minimum 55 percent net-free opening.

2.5.1.2 Exterior Louvers

Louvers shall be inverted "Y" or "V" type with minimum of 35 percent net-free opening. Weld or tenon louver blades to continuous channel frame and weld assembly to door to form watertight assembly. Form louvers of hot-dip galvanized steel of same gage as door facings. Louvers shall have steel-framed insect screens secured to room side and readily removable. Provide aluminum wire cloth, 18 by 18 or 18 by 16 inch mesh, for insect screens. Net-free louver area to be before screening.

2.5.2 Astragals

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08 71 00 DOOR HARDWARE provide overlapping steel astragals with the doors. For interior pairs of fire rated doors, provide stainless steel astragals complying with NFPA 80 for fire rated assemblies.

### 2.5.3 Moldings

Provide moldings around glass of interior and exterior doors and louvers of interior doors. Provide nonremovable moldings on outside of exterior doors and on corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to stationary moldings, or provide snap-on moldings. Muntins shall interlock at intersections and shall be fitted and welded to stationary moldings.

## 2.6 INSULATION CORES

Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI/DOOR 113 and shall conform to:

a. Rigid Cellular Polyisocyanurate Foam: ASTM C591, Type I or II, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D2863; or

b. Rigid Polystyrene Foam Board: ASTM C578, Type I or II; or

c. Mineral board: ASTM C612, Type I.

## 2.7 STANDARD STEEL FRAMES

SDI/DOOR A250.8, Level 3, except as otherwise specified. Form frames to sizes and shapes indicated, with knock-down field-assembled corners. Provide steel frames for doors, transoms, sidelights, mullions, cased openings, and interior glazed panels, unless otherwise indicated.

### 2.7.1 Knock-Down Frames

Design corners for simple field assembly by concealed tenons, splice plates, or interlocking joints that produce square, rigid corners and a tight fit and maintain the alignment of adjoining members. Provide locknuts for bolted connections.

### 2.7.2 Mullions and Transom Bars

Mullions and transom bars shall be closed or tubular construction and be a member with heads and jambs butt-welded thereto or knock-down for field assembly. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

### 2.7.3 Stops and Beads

Form stops and beads from 20 gage steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inch on center. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

### 2.7.4 Cased Openings

Fabricate frames for cased openings of same material, gage, and assembly as specified for metal door frames, except omit door stops and preparation for hardware.

2.7.5 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.7.5.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof. Note that blast resistance requirements may require more anchors.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to wood studs with nails, to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding;

c. Completed openings: Secure frames to previously placed concrete or masonry with expansion bolts in accordance with SDI/DOOR 111; and

d. Solid plaster partitions: Secure anchors solidly to back of frames and tie into the lath. Provide adjustable top strut anchors on each side of frame for fastening to structural members or ceiling construction above. Size and type of strut anchors shall be as recommended by the frame manufacturer.

2.7.5.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.8 FIRE DOORS AND FRAMES

NFPA 80 and this specification. The requirements of NFPA 80 shall take precedence over details indicated or specified.

2.8.1 Labels

Fire doors and frames shall bear the label of Underwriters Laboratories (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing shall be in accordance with NFPA 252 or UL 10C. Labels shall be metal with raised letters, and shall bear the name or file number of the door and frame manufacturer. Labels shall be permanently affixed at the factory to frames and to the hinge edge of the door. Door labels shall not be painted.

2.8.2 Oversized Doors

For fire doors and frames which exceed the size for which testing and labeling are available, furnish certificates stating that the doors and frames are identical in design, materials, and construction to a door

which has been tested and meets the requirements for the class indicated.

2.8.3 Astragal on Fire Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements.

2.9 WEATHERSTRIPPING

As specified in Section 08 71 00 DOOR HARDWARE.

2.10 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in SDI/DOOR A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI/DOOR A250.8 and SDI/DOOR A250.6. For additional requirements refer to ANSI/BHMA A156.115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI/DOOR A250.8, as applicable. Punch door frames, with the exception of frames that will have weatherstripping, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.11 FINISHES

2.11.1 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A924/A924Mand ASTM A653/A653M. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in SDI/DOOR A250.8.

2.12 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 1/8 inch larger than the actual masonry thickness. Design other frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive caulking compound.

2.12.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

## 2.13 PROVISIONS FOR GLAZING

Materials are specified in Section 08 81 00, GLAZING.

# PART 3 EXECUTION

## 3.1 INSTALLATION

### 3.1.1 Frames

Set frames in accordance with SDI/DOOR A250.11. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. Coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

### 3.1.2 Doors

Hang doors in accordance with clearances specified in SDI/DOOR A250.8. After erection and glazing, clean and adjust hardware.

### 3.1.3 Fire Doors and Frames

Install fire doors and frames, including hardware, in accordance with NFPA 80.

## 3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

## 3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

-- End of Section --

SECTION 08 33 23

OVERHEAD COILING DOORS
**08/15**

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 CIVIL ENGINEERS (ASCE)

| | |
|---|---|
| ASCE 7 | (2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME B29.400 | (2001; R 2013) Combination, "H" Type Mill Chains, and Sprockets |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A153/A153M | (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware |
| ASTM A27/A27M | (2013) Standard Specification for Steel Castings, Carbon, for General Application |
| ASTM A307 | (2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength |
| ASTM A36/A36M | (2014) Standard Specification for Carbon Structural Steel |
| ASTM A48/A48M | (2003; R 2012) Standard Specification for Gray Iron Castings |
| ASTM A53/A53M | (2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| ASTM A653/A653M | (2015) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process |
| ASTM A666 | (2015) Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar |
| ASTM A780/A780M | (2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of |

| | |
|---|---|
| | Hot-Dip Galvanized Coatings |
| ASTM A924/A924M | (2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process |
| ASTM B221 | (2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes |
| ASTM D2000 | (2012) Standard Classification System for Rubber Products in Automotive Applications |
| ASTM E330 | (2002; R 2010) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference |
| ASTM F568M | (2007) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners |

## 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Overhead Coiling Doors;

Counterbalancing Mechanism

Manual Door Operators

Bottom Bars

Guides

Mounting Brackets

Overhead Drum

Hood

Installation Drawings

SD-03 Product Data

Overhead Coiling Doors

Hardware

Counterbalancing Mechanism

Manual Door Operators

SD-05 Design Data

Overhead Coiling Doors

Hardware

Counterbalancing Mechanism

Manual Door Operators

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

Materials

Devices

Procedures

Manufacture's Brochures

Parts Lists

SD-11 Closeout Submittals

Warranty

1.3 QUALITY CONTROL

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Store doors in an adequately ventilated dry location that is free from dirt and dust, water, or other contaminants. Store in a manner that permits easy access for inspection and handling.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Doors to be coiling type, with interlocking slats, complete with anchoring and door hardware, guides, hood, and operating mechanisms, and designed for use on openings as indicated. Use grease-sealed or self-lubricating bearings for rotating members.

2.1.1 Design Requirements

2.1.1.1 Overhead Coiling Door Detail Shop Drawings

Provide installation drawings for overhead coiling door assemblies which show: elevations of each door type, shape and thickness of materials, finishes, details of joints and connections, details of guides and fittings, rough opening dimensions, location and description of hardware, anchorage locations, and counterbalancing mechanism and door operator details. Include a schedule showing the location of each door with the drawings.

2.1.2 Performance Requirements

2.1.2.1 Wind Loading

Design and fabricate door assembly to withstand the wind loading pressure of at least 35 pounds per square foot with a maximum deflection of 1/120 of the opening width. Provide test data showing compliance with ASTM E330. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested. Ensure complete assembly meets or exceeds the requirements of ASCE 7.

2.1.2.2 Operational Cycle Life

Design all portions of the door, hardware and operating mechanism that are subject to movement, wear, or stress fatigue to operate through a minimum number of 10 cycles per day. One complete cycle of door operation is defined as when the door is in the closed position, moves to the fully open position, and returns to the closed position.

2.2 COMPONENTS

2.2.1 Overhead Coiling Doors

2.2.1.1 Curtain Materials and Construction

Provide curtain slats fabricated from Grade A steel sheets conforming to ASTM A653/A653M, with the additional requirement of a minimum yield point of 33,000 psi. Provide sheets, galvanized in accordance with ASTM A653/A653M and ASTM A924/A924M.

Fabricate doors from interlocking cold-rolled slats, with section profiles as specified, designed to withstand the specified wind loading. Ensure the provided slats are continuous without splices for the width of the door.

2.2.1.2 Non-Insulated Curtains

Form Curtains from manufacturer's standard shapes of interlocking slats.

2.2.1.3 Curtain Bottom Bar

Install curtain bottom bars as pairs of angles from the manufacturer's standard steel, stainless and aluminum extrusions not less than 2.0 by 2.0-inches by 0.188-inch. Ensure steel extrusions conform to ASTM A36/A36M. Stainless steel extrusions conforming to ASTM A666, Type 304. Aluminum extrusions conforming to ASTM B221. Galvanize angles and fasteners in accordance with ASTM A653/A653M and ASTM A924/A924M. Coat welds and abrasions with paint conforming to ASTM A780/A780M.

2.2.1.4 Locks

Provide end and/or wind locks of Grade B cast steel conforming to ASTM A27/A27M, galvanized in accordance with ASTM A653/A653M, ASTM A153/A153M and ASTM A924/A924M. Secure locks at every other curtain slat.

2.2.1.5 Weather Stripping

Ensure weather-stripping at the door-head and jamb is 1/8-inch thick sheet

of natural or neoprene rubber with air baffles. Secure weather stripping to the insides of hoods with galvanized-steel fasteners through continuous galvanized-steel pressure bars at least 5/8-inch wide and 1/8-inch thick.

Ensure threshold weather-stripping is 1/8-inch thick sheet natural or neoprene rubber secured to the bottom bars.

Provide weather-stripping of natural or neoprene rubber conforming to ASTM D2000.

2.2.1.6 Locking Devices

Ensure slide bolt engages through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

Provide chain lock keeper suitable for a standard padlock.

2.2.1.7 Overhead Drum

Fabricate drums from nominal 0.028-inch thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A653/A653M.

2.2.1.8 Slats

No. 5F, 20 gauge, Grade 40 steel, ASTM A653/A653M galvanized steel zinc coating.

2.2.2 Hardware

Ensure all hardware conforms to ASTM A153/A153M, ASTM A307, ASTM F568M, and ASTM A27/A27M.

2.2.2.1 Guides

Fabricate with structural steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Flare the top of inner and outer guide angles outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

2.2.2.2 Equipment Supports

Fabricate door-operating equipment supports from the manufacturer's standard steel shapes and plates conforming to ASTM A36/A36M, galvanized in accordance with ASTM A653/A653M and ASTM A924/A924M. Size the shapes and plates in accordance with the industry standards for the size, weight, and type of door installation.

2.2.2.3 Hood

Provide a 24-gauge galvanized steel hood with reinforced top and bottom edges. Provide minimum 1/4-inch steel intermediate support brackets as required to prevent excessive sag.

2.2.3 Counterbalancing Mechanism

Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted, around a steel shaft and contained in a spring barrel connected to top of curtain with

barrel rings. Use grease-sealed or self-lubricating bearings for rotating members.

2.2.3.1 Brackets

Provide the manufacturer's standard mounting brackets with one located at each end of the counterbalance barrel conforming to ASTM A48/A48M. Provide brackets of either cast iron or cold-rolled steel.

Brackets will be of 1/4-inch minimum thick steel plates, with permanently sealed ball bearings. Designed to enclose ends of coil and provide support of counterbalance pipe at each end.

2.2.3.2 Counterbalance Barrels

Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, conforming to ASTM A53/A53M. Ensure the barrel is of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats. Limit barrel deflection to not more than 0.03 inch per foot of span under full load.

Curtain to be coiled on a pipe of sufficient size to carry door load with deflection not to exceed 0.03 inches per foot of door span and to be correctly balanced by helical springs, oil tempered torsion type. Use cast iron barrel plugs to anchor springs to tension shaft and pipe.

a. Barrel

Provide steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot of width.

b. Spring Balance

Provide an oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door. Ensure that effort to operate manually operated units does not exceed 25 lbs. Provide wheel for applying and adjusting spring torque.

2.2.3.3 Spring Balance

Install one or more oil-tempered, heat-treated steel helical torsion springs within the barrel, capable of producing sufficient torque to assure easy operation of the door curtain. Provide and size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

2.2.3.4 Torsion Rod for Counter Balance

Fabricate rod from the manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

2.2.4 Manual Door Operators

2.2.4.1 Manual Chain-Hoist Door Operators

Provide door operators which consist of an endless steel hand chain, chain-pocket wheel, guard, and a geared reduction unit of at least a 3 to

1 ratio with a maximum lifting force of 25 lbf. Required pull for operation cannot exceed 35 pounds.

Provide chain hoists with a self-locking mechanism allowing the curtain to be stopped at any point in its upward or downward travel and to remain in that position until moved to the fully open or closed position. Provide hand chains of cadmium-plated alloy steel conforming to ASME B29.400. Ensure yield point of the chain is at least three times the required hand-chain pull.

Provide chain sprocket wheels of cast iron conforming to ASTM A48/A48M.

### 2.2.5 Surface Finishing

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Noticeable variations in the same metal component are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

## PART 3 EXECUTION

## 3.1 INSTALLATION

Install overhead coiling door assembly, anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories in accordance with approved detail drawings and manufacturer's written instructions. Upon completion of installation, ensure doors are free from all distortion.

Install overhead coiling doors, motors, hoods, and operators at the mounting locations as indicated for each door in the contract documents and as required by the manufacturer.

Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility and as required by the manufacturer.

### 3.1.1 Finish

Ensure finishes are free of scratches or other blemishes.

## 3.2 ADJUSTING AND CLEANING

### 3.2.1 Acceptance Provisions

After installation, adjust hardware and moving parts. Lubricate bearings and sliding parts as recommended by manufacturer to provide smooth operating functions for ease movement, free of warping, twisting, or distortion of the door assembly.

Adjust seals to provide weather-tight fit around entire perimeter.

Engage a factory-authorized service representative to perform startup service and checks according to manufacturer's written instructions.

Test and make final adjustment of new doors at no additional cost to the Government.

#### 3.2.1.1 Maintenance and Adjustment

Not more than 90 calendar days after completion and acceptance of the project, examine, lubricate, test, and re-adjust doors as required for proper operation.

#### 3.2.1.2 Cleaning

Clean doors in accordance with manufacturer's approved instructions.

## 3.3 CLOSEOUT ACTIVITIES

### 3.3.1 Warranty

Furnish a written guarantee that the helical spring and counterbalance mechanism are free from defects in material and workmanship for not less than two years after completion and acceptance of the project.

Warrant that upon notification by the Government, any defects in material, workmanship, and door operation are immediately correct within the same time period covered by the guarantee, at no cost to the Government.

### 3.3.2 Operation And Maintenance

Submit 6 copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the Overhead Coiling Door Assemblies. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

Submit Operation and Maintenance Manuals for Overhead Coiling Door Assemblies, including the following items:

Materials

Devices

Manual Door Operators

Hood

Counterbalancing Mechanism

Painting

Procedures

Manufacture's Brochures

Parts Lists

Provide operation and maintenance manuals which are consistent with manufacturer's standard brochures, schematics, printed instructions, operating procedures, and safety precautions. Provide test data that is legible and of good quality.

-- End of Section --

SECTION 08 51 13

ALUMINUM WINDOWS
**05/11**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

| | |
|---|---|
| AAMA 1503 | (2009) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections |
| AAMA 2603 | (2002) Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels |
| AAMA 701/702 | (2004) Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals |
| AAMA 902 | (1992; R 1999; R 2007) Voluntary Specification for Sash Balances |
| AAMA WSG.1 | (1995) Window Selection Guide |
| AAMA/WDMA/CSA 101/I.S.2/A440 | (2011) Standard/Specification for Windows, Doors, and Skylights |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM D1972 | (1997; R 2005) Standard Practice for Generic Marking of Plastic Products |
| ASTM F1642 | (2012) Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings |
| ASTM F2248 | (2012) Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass |

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

| | |
|---|---|
| NFRC 100 | (2014) Procedure for Determining Fenestration Product U-Factors |
| NFRC 200 | (2014) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at |

Normal Incidence

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2015; ERTA 2015) Life Safety Code

1.2 CERTIFICATION

Each prime window unit must bear the AAMA Label warranting that the product complies with AAMA/WDMA/CSA 101/I.S.2/A440. Certified test reports attesting that the prime window units meet the requirements of AAMA/WDMA/CSA 101/I.S.2/A440, including test size, will be acceptable in lieu of product labeling.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Windows;

Fabrication Drawings

SD-03 Product Data

Windows;

Hardware;

Fasteners;

Window Performance;

Thermal-Barrier Windows;

Mullions;

Screens;

Weatherstripping;

Accessories;

Thermal Performance;

SD-04 Samples

Finish Sample

Window Sample

SD-05 Design Data

Structural Calculations for Deflection;

Design Analysis;

Submit design analysis with calculations showing that the design of each different size and type of aluminum window unit and its anchorage to the structure meets the minimum antiterrorism standards required by paragraph "Minimum Antiterrorism Performance", unless conformance is demonstrated by Standard Airblast Test results. Calculations verifying the structural performance of each window proposed for use, under the given loads, must be prepared and signed by a registered Professional Engineer. The window components and anchorage devices to the structure, as determined by the design analysis, must be reflected in the shop drawings.

SD-06 Test Reports

Minimum Condensation Resistance Factor

For Minimum Antiterrorism windows, in lieu of a Design Analysis, results of airblast testing, whether by arena test or shocktube, must be included in a test report, providing information in accordance with ASTM F1642, as prepared by the independent testing agency performing the test. The test results must demonstrate the ability of each window proposed for use to withstand the airblast loading parameters and achieve the hazard level rating specified in paragraph "Standard Airblast Test Method".

SD-10 Operation and Maintenance Data

Windows, Data Package 1;

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

Plastic Identification

When not labeled, identify types in Operation and Maintenance Manual.

SD-11 Closeout Submittals

## 1.4 QUALITY ASSURANCE

### 1.4.1 Shop Drawing Requirements

Provide drawings that indicate elevations of windows, full-size sections, thickness and gages of metal, fastenings, proposed method of anchoring, size and spacing of anchors, details of construction, method of glazing, details of operating hardware, mullion details, method and materials for weatherstripping, method of attaching screens, material and method of attaching subframes, stools, casings, sills, trim, window cleaner anchors, installation details, and other related items.

### 1.4.2 Sample Requirements

#### 1.4.2.1 Finish Sample Requirements

Submit color chart of standard factory color coatings. Factory-finish color coating is to be provided.

#### 1.4.2.2 Window Sample Requirements

Submit one full-size corner of each window type proposed for use. Where screens or weatherstripping is required, fit sample with such items that are to be used.

### 1.4.3 Design Data Requirements

Submit calculations to substantiate compliance with deflection requirements and Minimum Antiterrorism Performance criteria. A registered Professional Engineer must provide calculations.

Submit design analysis with calculations showing that the design of each different size and type of aluminum window unit and its anchorage to the structure meets the requirements of paragraph "Minimum Antiterrorism Performance Criteria". Calculations verifying the structural performance of each window proposed for use, under the given loads, must be prepared and signed by a registered professional engineer. Reflect the window components and anchorage devices to the structure, as determined by the design analysis, in the shop drawings.

### 1.4.4 Test Report Requirements

Submit test reports for each type of window attesting that identical windows have been tested and meet the requirements specified herein for conformance to AAMA/WDMA/CSA 101/I.S.2/A440 including test size, and minimum condensation resistance factor (CRF), and for Minimum Antiterrorism windows, in lieu of a Design Analysis, results of a Standard Airblast Test.

## 1.5 DELIVERY AND STORAGE

Deliver windows to project site in an undamaged condition. Use care in handling and hoisting windows during transportation and at the jobsite. Store windows and components out of contact with the ground, under a weathertight covering, so as to prevent bending, warping, or otherwise damaging the windows. Repair damaged windows to an "as new" condition as approved. If windows can not be repaired, provide a new unit.

## 1.6 PROTECTION

Protect finished surfaces during shipping and handling using the manufacturer's standard method. Do not apply coatings or lacquers to surfaces to which caulking and glazing compounds must adhere.

## 1.7 PLASTIC IDENTIFICATION

Verify that plastic products to be incorporated into the project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in the Operation and Maintenance Manual.

a. Type 1: Polyethylene Terephthalate (PET, PETE).

b. Type 2: High Density Polyethylene (HDPE).

c. Type 3: Vinyl (Polyvinyl Chloride or PVC).

d. Type 4: Low Density Polyethylene (LDPE).

e. Type 5: Polypropylene (PP).

f. Type 6: Polystyrene (PS).

g. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

## 1.8 FIELD MEASUREMENTS

Take field measurements prior to preparation of the drawings and fabrication.

## 1.9 PERFORMANCE REQUIREMENTS

### 1.9.1 Wind Loading Design Pressure

Design window components, including mullions, hardware, and anchors, to withstand a wind-loading design pressure of at least 60 pounds per square foot (psf).

### 1.9.2 Tests

Test windows proposed for use in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 for the particular type and quality window specified.

Perform tests by a nationally recognized independent testing laboratory equipped and capable of performing the required tests. Submit the results of the tests as certified laboratory reports required herein.

Minimum design load for a uniform-load structural test must be 50 psf.

Test hung windows in accordance with the applicable portions of the AAMA WSG.1 for air infiltration, water resistance, uniform-load deflection, and uniform-load structural test.

Minimum desing load fir a uniform-load structural test shall be at least 60 pounds per square foot (psf).

## 1.10 DRAWINGS

Submit the Fabrication Drawings for aluminum window units showing complete window assembly including hardware, weatherstripping, and subframe assembly details.

## 1.11 WINDOW PERFORMANCE

Aluminum windows must meet the following performance requirements. Perform testing requirements by an independent testing laboratory or agency.

### 1.11.1 Structural Performance

Structural test pressures on window units must be for positive load (inward) and negative load (outward). After testing, there will be no glass breakage, permanent damage to fasteners, hardware parts, support

arms or actuating mechanisms or any other damage which could cause window to be inoperable. There must be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by AAMA/WDMA/CSA 101/I.S.2/A440 for the window types and classification specified in this section.

1.11.2 Minimum Antiterrorism Performance

Building AS124 does not meet the thresholds for requiring Blast Resistant doors and windows. The building is typically uninhabited. When it is inhabited the occupant loads are below the level that requires blast resistance.

**Blast resistant windows are not required.**

**Provide glazing as specified in Section 08 81 00 GLAZING.**

1.11.3 Water Penetration

Water penetration must not exceed the amount established by AAMA/WDMA/CSA 101/I.S.2/A440 for each window type.

1.11.4 Thermal Performance

Non-residential aluminum windows (including frames and glass) must be certified by the National Fenestration Rating Council with a whole-window Solar Heat Gain Coefficient (SHGC) maximum of 0.30 determined according to NFRC 200 procedures and a U-factor maximum of 0.35 Btu/hr-ft$^2$-F in accordance with NFRC 100.

1.11.5 Life Safety Criteria

Provide windows that conform to NFPA 101 Life Safety Code when rescue and/or second means of escape are indicated.

1.12 QUALIFICATION

Window manufacturer must specialize in designing and manufacturing the type of aluminum windows specified in this section, and have a minimum of 10 years of documented successful experience. Manufacturer must have the facilities capable of meeting contract requirements, single-source responsibility and warranty.

1.13 WARRANTY

Provide Manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period.

PART 2 PRODUCTS

2.1 WINDOWS

Provide prime windows that comply with AAMA/WDMA/CSA 101/I.S.2/A440 and the requirements specified herein. In addition to compliance with AAMA/WDMA/CSA 101/I.S.2/A440, window framing members for each individual light of glass must not deflect to the extent that deflection perpendicular to the glass light exceeds L/175 of the glass edge length when subjected to uniform loads at specified design pressures. Provide Structural calculations for deflection to substantiate compliance with

deflection requirements. Provide windows of types, performance classes, performance grades, combinations, and sizes indicated or specified. Design windows to accommodate hardware, glass, weatherstripping, screens, and accessories to be furnished. Each window must be a complete factory assembled unit with or without glass installed. Dimensions shown are approximate. Provide windows with insulating glass and thermal break necessary to achieve a minimum Condensation Resistance Factor (CRF) of 57 when tested in accordance with AAMA 1503.

2.1.1 Hung Windows (H)

Single Hung, Type H-AW40 (Performance Grade). Test and rate sash balance to conform with AAMA 902.

Design windows, mullions, hardware, and anchors to withstand the wind loading specified.

2.1.1.1 Window Materials

Window frames and sash members, mullions, mullion covers, screen frames, and glazing beads must be fabricated in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

Provide woven wool pile weatherstripping 0.210 inch thick, conforming to AAMA 701/702, or polypropylene multifilament fiber weatherstripping installed in an integral weatherstripping groove in the sash or frame, and flexible polyvinylchloride weatherstripping installed in the sill member.

2.1.2 Fixed Windows (F)

Type F-AW40 (Performance Grade).

2.1.3 Glass and Glazing

Materials are specified in Section 08 81 00 GLAZING.

2.1.4 Caulking and Sealing

Are specified in Section 07 92 00 JOINT SEALANTS.

2.1.5 Weatherstripping

AAMA/WDMA/CSA 101/I.S.2/A440.

2.2 FABRICATION

Fabrication of window units must comply with AAMA/WDMA/CSA 101/I.S.2/A440.

2.2.1 Provisions for Glazing

Design windows and rabbets suitable for glass thickness specified. For minimum antiterrorism windows, attach glazing to its supporting frame using structural silicone sealant or adhesive glazing tape in accordance with ASTM F2248. Design sash for double glazing and for securing glass for blast resistance.

2.2.2 Weatherstripping

Provide for ventilating sections of all windows to ensure a weather-tight

seal meeting the infiltration requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440. Provide easily replaceable factory-applied weatherstripping. Use molded vinyl, molded or molded-expanded neoprene or molded or expanded Ethylene Propylene Diene Terpolymer (EPDM) compression-type weatherstripping for compression contact surfaces. Use treated woven pile or wool, or polypropylene or nylon pile bonded to nylon fabric and metal or plastic backing strip weatherstripping for sliding surfaces. Do no use neoprene or polyvinylchloride weatherstripping where exposed to direct sunlight.

### 2.2.3 Fasteners

Use window manufacturer's standard for windows, trim, and accessories. Self-tapping sheet-metal screws are not acceptable for material more than 1/16 inch thick.

### 2.2.4 Adhesives

Provide joint sealants as specified in Section 07 92 00 JOINT SEALANTS. For interior application of joint sealants, comply with applicable regulations regarding reduced VOC's, and as specified in Section 07 92 00 JOINT SEALANTS.

### 2.2.5 Drips and Weep Holes

Provide continuous drips over heads of top ventilators. Where fixed windows adjoin ventilators, drips must be continuous across tops of fixed windows. Provide drips and weep holes as required to return water to the outside.

### 2.2.6 Combination Windows

Windows used in combination must be factory assembled of the same class and grade. Where factory assembly of individual windows into larger units is limited by transportation considerations, prefabricate, match mark, transport, and field assemble.

### 2.2.7 Mullions and Transom Bars

Provide mullions with a thermal break. Secure mullions and transom bars to adjoining construction and window units in such a manner as to permit expansion and contraction and to form a weathertight joint. Provide mullion covers on the interior and exterior to completely close exposed joints and recesses between window units and to present a neat appearance.

### 2.2.8 Accessories

Provide windows complete with necessary hardware, fastenings, clips, fins, anchors, glazing beads, and other appurtenances necessary for complete installation and proper operation. Furnish extruded aluminum subframe receptors and subsill with each window unit.

#### 2.2.8.1 Hardware

AAMA/WDMA/CSA 101/I.S.2/A440. The item, type, and functional characteristics must be the manufacturer's standard for the particular window type. Provide hardware of suitable design and of sufficient strength to perform the function for which it is used. Equip all operating ventilators with a lock or latching device which can be secured

from the inside.

2.2.8.2 Fasteners

Provide concealed anchors of the type recommended by the window manufacturer for the specific type of construction. Anchors and fasteners must be compatible with the window and the adjoining construction. Provide a minimum of three anchors for each jamb located approximately 6 inches from each end and at midpoint.

2.2.8.3 Window Anchors

Anchoring devices for installing windows must be made of aluminum, cadmium-plated steel, stainless steel, or zinc-plated steel conforming to AAMA/WDMA/CSA 101/I.S.2/A440.

2.2.9 Finishes

Exposed aluminum surfaces must be factory finished with an organic coating. Colors available must include white, bronze and medium bronze. All windows must have the same finish. Color shall be selected by Contracting Officer.

2.2.9.1 Organic Coating

Clean and prime exposed aluminum surfaces. Provide a baked enamel finish in accordance with AAMA 2603 with total dry film thickness not less than 0.8 mil.

2.2.10 Screens

Not required.

2.3 THERMAL-BARRIER WINDOWS

Provide thermal-barrier windows, complete with accessories and fittings, where indicated.

Specify material and construction except as follows:

a. Aluminum alloy must be 6063-T6.

b. Frame construction, including operable sash, must be factory-assembled and factory-sealed inner and outer aluminum completely separated from metal-to-metal contact. Join assembly by a continuous, concealed, low conductance divider housed in an interlocking extrusion of the inner frame. Metal fasteners, straps, or anchors must not bridge the connection between the inner and outer frame.

c. Operating hardware for each sash must consist of spring-loaded nylon cushion blocks and pin locks designed to lock in predetermined locations.

d. Sash must be completely separated from metal-to-metal contact by means of woven-pile weatherstripping, plastic, or elastomeric separation members.

e. Operating and storm sash must be factory-glazed with the type of glass indicated and of the quality specified in Section 08 81 00 GLAZING.

## 2.4 MULLIONS

Provide mullions between multiple-window units where indicated.

Provide profiles for mullions and mullion covers, reinforced as required for the specified wind loading, and securely anchored to the adjoining construction. Mullion extrusion will include serrations or pockets to receive weatherstripping, sealant, or tape at the point of contact with each window flange.

Mullion assembly must include aluminum window clamps or brackets screwed or bolted to the mullion and the mullion cover.

Mullion cover must be screw-fastened to the mullion unless otherwise indicated.

Mullion reinforcing members must be fabricated of the materials specified in AAMA/WDMA/CSA 101/I.S.2/A440 and meet the specified design loading.

# PART 3 EXECUTION

## 3.1 INSTALLATION

### 3.1.1 Method of Installation

Install in accordance with the window manufacturer's printed instructions and details. Build in windows as the work progresses or install without forcing into prepared window openings. Set windows at proper elevation, location, and reveal; plumb, square, level, and in alignment; and brace, strut, and stay properly to prevent distortion and misalignment. Protect ventilators and operating parts against accumulation of dirt and building materials by keeping ventilators tightly closed and locked to frame. Bed screws or bolts in sill members, joints at mullions, contacts of windows with sills, built-in fins, and subframes in mastic sealant of a type recommended by the window manufacturer. Install and caulk windows in a manner that will prevent entrance of water and wind. Fasten insect screens securely in place.

Any materials that show visual evidence of biological growth due to the presence of moisture must not be installed on the building project.

### 3.1.2 Dissimilar Materials

Where aluminum surfaces are in contact with, or fastened to masonry, concrete, wood, or dissimilar metals, except stainless steel or zinc, protect the aluminum surface from dissimilar materials as recommended in the Appendix to AAMA/WDMA/CSA 101/I.S.2/A440. Do not coat surfaces in contact with sealants after installation with any type of protective material.

### 3.1.3 Anchors and Fastenings

Make provision for securing units to each other, to masonry, and to other adjoining construction. Windows installed in masonry walls must have head and jamb members designed to recess into masonry wall not less than 7/16 inch.

### 3.1.4 Adjustments After Installation

After installation of windows and completion of glazing and field painting, adjust all ventilators and hardware to operate smoothly and to provide weathertight sealing when ventilators are closed and locked. Lubricate hardware and operating parts as necessary. Adjust double hung windows to operate with maximum applied force of 25 pounds in either direction, not including breakaway friction force. Verify that products are properly installed, connected, and adjusted.

## 3.2 CLEANING

Clean interior and exterior surfaces of window units of mortar, plaster, paint spattering spots, and other foreign matter to present a neat appearance, to prevent fouling of weathering surfaces and weather-stripping, and to prevent interference with the operation of hardware. Replace all stained, discolored, or abraded windows that cannot be restored to their original condition with new windows.

-- End of Section --

# SECTION 08 71 00

# DOOR HARDWARE

**01/08**

## PART 1 GENERAL

### 1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM E 283 | (2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen |

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

| | |
|---|---|
| BHMA A156.1 | (2006) Butts and Hinges |
| BHMA A156.15 | (2006) Closer Holder Release Devices |
| BHMA A156.16 | (2002) Auxiliary Hardware |
| BHMA A156.17 | (2004) Self Closing Hinges & Pivots |
| BHMA A156.18 | (2006) Materials and Finishes |
| BHMA A156.2 | (2003) Bored and Preassembled Locks and Latches |
| BHMA A156.21 | (2006) Thresholds |
| BHMA A156.22 | (2005) Door Gasketing and Edge Seal Systems |
| BHMA A156.3 | (2001) Exit Devices |
| BHMA A156.4 | (2000) Door Controls - Closers |
| BHMA A156.5 | (2001) Auxiliary Locks & Associated Products |
| BHMA A156.6 | (2005) Architectural Door Trim |
| BHMA A156.7 | (2003) Template Hinge Dimensions |
| BHMA A156.8 | (2005) Door Controls - Overhead Stops and Holders |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2005; Errata 2006; TIA 2006; TIA 2006) Life Safety Code, 2006 Edition

NFPA 80 (2007) Standard for Fire Doors and Other Opening Protectives

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8 (2003) Recommended Specification for Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir (2007) Building Materials Directory

## 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

SD-02 Shop Drawings

Hardware schedule

Keying system

SD-03 Product Data

Hardware items

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule items, Data Package 1

SD-11 Closeout Submittals

Key Bitting

## 1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

| Hardware Item | Quantity | Size | Reference Publication Type No. | Finish | Mfr. Name and Catalog No. | Key Control Symbols | UL Mark (If fire rated and listed) | BHMA Finish Designation |
|---|---|---|---|---|---|---|---|---|

## 1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

a. Complete listing of all keys (AA1, AA2, etc.).

b. Complete listing of all key cuts (AA1-123456, AA2-123458).

c. Tabulation showing which key fits which door.

d. Copy of floor plan showing doors and door numbers.

e. Listing of 20 percent more key cuts than are presently required in each master system.

## 1.5 QUALITY ASSURANCE

### 1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, pivots, and closers of one lock, hinge, pivot, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

## 1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

# PART 2 PRODUCTS

Note that this building is exempt from UFC 4-010-01 DoD Minimum Antiterrorism Standards. No blast reistant doors are required.

The following are acceptable hardware manufacturers:

1. Hinges: Hager, McKinney, Stanley
2. Continuous Gear Hinges: ABH, Select, Stanley
3. Cylinders: Best, Falcon, Arrow, Eagle
4. Door Closers: LCN, Norton, Stanley, Ryobi
5. Locks, Latches: Best, Sargent, Corbin-Russwin
6. Silencers, Stops & Flush Bolts: Baldwin, Burns, Rockwood
7. Kick Plates, & Misc.: Baldwin, Burns, Rockwood, Ives
8. Weatherstrip: National Guard, Reese, Zero
9. Push/Pulls: Hagar, Baldwin, Burns, Rockwood
10. Exit Devices: Precision, Sargent, Von Duprin
11. Thresholds: National Guard, Reese, Zero, Pemko
12. Overhead Stops/Holders: Norton, ABH, Rixson, Sargent
13. Electronics: Rixson, Best, RCI, SDC
14. Auto Operators: Hunter, Besam, Horton

Other manufacturer's not listed are permitted if products are equal in performance and construction. Due to changes in product lines and models, just because a manufacturer is listed it does not necessarily mean their product is approved. Contractor must verify that items bid and provided are equal to or better in quality of performance and construction than those specified. Architect shall make final decision on what is equal quality.

Contractor's bid shall be based on level of performance and construction of brands, models, finishes, and features as specified or equal.

Th eabove requirement applies because hardware performance specifications alone taht are based on ANSI and other certifications often do not adequately define quality levels of hardware items as evidenced by the vast range of product costs and quality levels available that all meet many of the standards. For example, product A and B may both comply with a certification standard, but product brand/model A costs $270 and product brand/model B costs $850. Regardless of the certification, product A is clearly inferior t product B. Product A is not as durable, as corrision resistant, or as maintenance free as product B. Do not substitute inferior quality products in lieu of those specified.

## 2.1 TEMPLATE HARDWARE

Provide hardware to be applied to metal or to prefinished doors manufactured to template. Promptly furnish template information or templates to door and frame manufacturers. Conform to BHMA A156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

## 2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements indicated, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Provide the label of Underwriters Laboratories, Inc. for such hardware listed in UL Bld Mat Dir or labeled and listed by another testing laboratory acceptable to the Contracting Officer. See Door Schedule in drawings for doors that must be fire rated.

## 2.3 EXISTING OPENINGS

See schedules on drawings for existing doors, frames, and other items to remain and existing doors, frames, and other items to be removed and new provided. Contractor shall feild verify rough opening dimensions and other items as ncessary; modify scheduled dimensions of new frames and doors as necessary at no additional cost to Government.

## 2.4 HARDWARE ITEMS

Clearly and permanently mark with the manufacturer's name or trademark, hinges, pivots, locks, latches, exit devices, bolts and closers where the identifying mark will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

General requirements for projects at Camp Lejeune:

1. Provide Series 4000, Grade 1, locks and latches with 2-3/4 inch backset.

2. Provide interchangeable cores with seven pin tumblers.

3. All locks shall have interchangeable cores by Best Lock Corp., Arrow Lock Corp., Falcon Lock, or Eagle.

4. For offices, entrances, classrooms, and maintenance shops, provide lock function F81, unless F82 or F84 is more appropriate.

5. For mechanical rooms and pipe chases, provide lock function F86 (storeroom lock, outside knob always rigid).

6. For sleeping room doors, provide one deadbolt, E2151, with concealed mounting screws, and one passage latchset, F75.

7. For Bachelor Enlisted Quarters, a separate master keying system is required for each floor of each building.

See hardware schedule for more specific requirements per door.

2.4.1 Hinges

BHMA A156.1, 4-1/2 by 4-1/2 inch unless otherwise indicated or scheduled. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges. Hinges shall be stainless steel in accrodance with ANSI A5112 unless specifically scheculed otherwise.

2.4.2 Pivots

BHMA A156.4.

2.4.3 Spring Hinges

BHMA A156.17.

2.4.4 Locks and Latches

2.4.4.1 Bored Locks and Latches

BHMA A156.2, Series 4000, Grade 1 with 2.75 inch backset.

2.4.5 Exit Devices

BHMA A156.3, Grade 1. Provide adjustable strikes for rim type devices. Provide touch bars in lieu of conventional crossbars and arms. Center case cover, touch bar end cap, case end cap, and touch bar trim shall be satin stainless steel. Mechanism case shall be anodized aluminum to match the appearance of stainless steel.

Where exit devices are provided on double doors, provide a removable mullion. Vertical rod devices shall only be provided if installation of a removable mullion is not possible.

Exit devices shall be rated for heavy traffic, and UL listed Panic Hardware (FVSR) SA163 (N) and tested in accordance to ANSI A156.3, 1989, Grade 1.
Device shall be security level with two peice security latchbolt.

2.4.6 Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Provide cylinders and cores with seven pin tumblers. Provide cylinders with interchangeable and fully compatible with products from Best Lock Corp., Arrow Lock Corp., Falcon Lock, or Eagle which are removable by special control keys. Engrave on or

stamp into the metal of each interchangeable core with a key control symbol in a concealed place on the core.

2.4.7 Keying System

Provide grand master keying system. Provide construction interchangeable cores. Provide key cabinet as specified.

2.4.8 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.4.8.1 Lever Handles

Provide lever handles in lieu of knobs. Conform to the minimum requirements of BHMA A156.13 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in BHMA A156.13 is applied to the lever handle. Provide lever handles return to within 1/2 inch of the door face.

2.4.8.2 Texture

Provide knurled or abrasive coated knobs or lever handles where specified in paragraph entitled "Hardware Schedule" and for doors which may be accessible to blind persons and which lead to dangerous areas, janitor's closets, and mechanical rooms.

2.4.9 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish two additional control keys for removable cores. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

2.4.10 Door Bolts

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA A156.3, Type 25.

2.4.11 Closers

BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers except at storefront mounting, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.4.11.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.4.12 Overhead Holders

BHMA A156.8.

2.4.13 Closer Holder-Release Devices

BHMA A156.15.

2.4.14 Door Protection Plates

BHMA A156.6.

2.4.14.1 Sizes of Armor, Mop, and Kick Plates

2 inch less than door width for single doors; one inch less than door width for pairs of doors. Provide 16 inch kick plates for flush doors and one inch less than height of bottom rail for panel doors. Provide a minimum 16 inch armor plates for flush doors and 16 inch high armor plates on fire doors. Provide 16 inch mop plates. If scheduled kick plate is larger, provide the larger size.

2.4.15 Door Stops and Silencers

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.4.16 Thresholds

BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.4.17 Weather Stripping Gasketing

BHMA A156.22. Provide the type and function designation where specified in paragraph entitled "Hardware Schedule". Provide a set to include head and jamb seals, sweep strips. Air leakage of weather stripped doors not to exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283. Provide weather stripping with one of the following:

2.4.17.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide clear (natural) anodized aluminum.

2.4.17.2 Interlocking Type

Zinc or bronze not less than 0.018 inch thick.

2.4.17.3 Spring Tension Type

Spring bronze or stainless steel not less than 0.008 inch thick.

2.4.18 Rain Drips

Extruded aluminum, not less than 0.08 inch thick, clear anodized. Set drips in sealant and fasten with stainless steel screws.

2.4.18.1 Door Rain Drips

Approximately 1-1/2 inch high by 5/8 inch projection. Align bottom with bottom edge of door.

2.4.18.2 Overhead Rain Drips

Approximately 1-1/2 inch high by 2-1/2 inch projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

2.4.19 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.5 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Provide stainless steel. Provide fasteners of type necessary to accomplish a permanent installation.

2.6 FINISHES

BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except aluminum paint finish for surface door closers, and except BHMA 600 finish (primed for painting) for steel hinges. Provide hinges for exterior doors in stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Furnish exit devices in BHMA 626 finish in lieu of BHMA 630 finish. Match exposed parts of concealed closers to lock and door trim. Match hardware finish for aluminum doors to the doors.

2.7 KEY CABINET AND CONTROL SYSTEM

BHMA A156.5, Type E8331 (25 hooks).

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping to prevent damage. Provide full contact, weather-tight seals. Operate doors without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 9 inch on center after doors and frames have been finish painted.

#### 3.1.1.2 Interlocking Type Weather Stripping

Provide interlocking, self-adjusting type on heads and jambs and flexible hook type at sills. Nail weather stripping to door one inch on centerand to heads and jambs at 4 inch on center

#### 3.1.1.3 Spring Tension Type Weather Stripping

Provide spring tension type on heads and jambs. Provide bronze nails with bronze, stainless steel nails with stainless steel. Space nails not more than 1-1/2 inch on center.

### 3.1.2 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves.

## 3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors.

## 3.3 HARDWARE LOCATIONS

SDI/DOOR A250.8, unless indicated or specified otherwise.

a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.

b. Mop Plates: Bottom flush with bottom of door.

## 3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed by Contracting Officer. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

## 3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.6 HARDWARE SETS

**Door Hardware Schedule**
**INT/EXT REPAIRS BLDG AS124**
**MARINE CORPS BASE, CAMP LEJEUNE, NC**

SET #01: entrance lockset
Doors: R102, R106, R110A, R116A, R116B,

| | | | | |
|---|---|---|---|---|
| 3 | HINGES | BB1199 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | LOCKSET | 93K-7AB15DS3 STD | 626 | BE |
| 1 | CLOSER | UNI-7500-H SN-134 | 689 | NO |
| 1 | SADDLE THRESHOLD | 424 X DW | AL | NGP |
| 1 | GASKETING | 127 NA 1 X DW + 2 X DH | | NGP |
| 1 | DOOR BOTTOM | 319 V X DW | AL | NGP |
| 3 | HMF SILENCER | SR64 | | IV |

110 degree swing

SET #02: entrance lockset, pair of doors
Doors: R108A(PR)

| | | | | |
|---|---|---|---|---|
| 6 | HINGES | BB1199 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | FLUSH BOLT | FB458 12" (top) | US26D | IV |
| 1 | FLUSH BOLT | FB458 6" (bottom) | US26D | IV |
| 1 | LOCKSET | 93K-7AB15DS3 STD | 626 | BE |
| 1 | CLOSER | UNI-7500-H SN-134 | 689 | NO |
| 2 | DUST PROOF STRIKES | DP2 | | IV |
| 1 | SADDLE THRESHOLD | 424 X DW | AL | NGP |
| 1 | GASKETING | 127 NA 1 X DW + 2 X DH | | NGP |
| 2 | DOOR BOTTOM | 319 V X DW | AL | NGP |
| 1 | ASTRAGAL SET | 115 NA Full Height | | NGP |
| 4 | HMF SILENCER | SR64 | | IV |

110 degree swing

6

SET #03: mechanical room exterior pair of doors
Doors: R117(PR)

| | | | | |
|---|---|---|---|---|
| 6 | HINGES | BB1199 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | FLUSH BOLT | FB458 12" (top) | US26D | IV |
| 1 | FLUSH BOLT | FB458 6" (bottom) | US26D | IV |
| 1 | STOREROOM LOCKSET | 93K-7D15DS3 STD | 626 | BE |
| 2 | DUST PROOF STRIKES | DP2 | | IV |
| 1 | SADDLE THRESHOLD | 424 X DW | AL | NGP |
| 1 | GASKETING | 127 NA 1 X DW + 2 X DH | | NGP |
| 2 | DOOR BOTTOM | 319 V X DW | AL | NGP |
| 1 | ASTRAGAL SET | 115 NA Full Height | | NGP |
| 4 | HMF SILENCER | SR64 | | IV |

110 degree swing

SET #04: unisex toilets & similar, privacy set
Doors: R104

| | | | | |
|---|---|---|---|---|
| 3 | HINGES | BB1191 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | LOCKSET | 93K-7L15DS3 STD | 626 | BE |
| 1 | WALL STOP | 236W | US26D | HA |
| 3 | HMF SILENCER | SR64 | | |

110 degree swing

SET #05: janitor, electrical, communications
Doors: R107

| | | | | |
|---|---|---|---|---|
| 3 | HINGES | BB1191 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | STOREROOM LOCKSET | 93K-7D15DS3 STD | 626 | BE |
| 1 | WALL STOP | 236W | US26D | HA |
| 3 | HMF SILENCER | SR64 | | |

180 degree swing

SET #06: office lockset, pair of doors
Doors: R108B(PR), R110B(PR)

| | | | | |
|---|---|---|---|---|
| 6 | HINGES | BB1191 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | FLUSH BOLT | FB458 12" (top) | US26D | IV |
| 1 | FLUSH BOLT | FB458 6" (bottom) | US26D | IV |
| 1 | LOCKSET | 93K-7B15DS3 STD | 626 | BE |
| 2 | DUST PROOF STRICKS | DP2 | | IV |
| 1 | SADDLE THRESHOLD | 424 X DW | AL | NGP |
| 1 | ASTRAGAL SET | 115 NA Full Height | | NGP |
| 4 | HMF SILENCER | SR64 | | IV |

110 degree swing

SET #07: offices and similar rooms
Doors: R111

| | | | | |
|---|---|---|---|---|
| 3 | HINGES | BB1191 4 1/2 X 4 1/2 NRP | US32D | HA |
| 1 | LOCKSET | 93K-7B15DS3 STD | 626 | BE |
| 1 | WALL STOP | 236W | US26D | HA |
| 3 | HMF SILENCER | SR64 | | |

110 degree swing

General Hardware Schedule Notes:

1. If hardware scheduled does not comply with the fire rating listed in the Door Schedule on the drawings, provide the appropriate fire rated hardware that is available in the same hardware series as that scheduled.

2. See Door Schedule in project drawings for additional locations where aluminum saddle thresholds may be required.

3. Before ordering hardware, Contractor shall review hardware and functions with Contracting Officer. Contracting Officer shall make final selections.

4. Products equal in performance and construction as listed in Part 2 of SECTION 08 71 00 shall be acceptable as specified.

5. Where "DW" or "DH" is used in the DOOR HARDWARE SCHEDULE, it references the DOOR WIDTH or DOOR HEIGHT.

Manufacturers List

| Code | Manufacturers Name* |
|---|---|
| BE | Best Lock |
| IV | H.B. Ives |
| KA | Kawneer |
| MC | McKinney |
| NGP | National Guard |
| NO | Norton |
| RO | Rockwood |
| RX | Rixson |
| HA | Hagar |
| TR | Trimco |
| VO | Von Duprin |

Finishes List

| Finish | Finish Description |
|---|---|
| 626 | Satin Chromium Plated |
| US26D | Chromium Plated, Dull |
| US32D | Stainless Steel, Dull/Satin |
| P | Primed for Painting |
| AL | Aluminum |
| 689 | Aluminum Painted |
| USP | Primed |
| SP28 | Sprayed Aluminum |

END of HARDWARE SCHEDULE

-- End of Section --

# SECTION 08 81 00

# GLAZING
**08/11**

## 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 Z97.1 | (2009; Errata 2010) Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM C1036 | (2010; E 2012) Standard Specification for Flat Glass |
| ASTM C1048 | (2012; E 2012) Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass |
| ASTM C1184 | (2014) Standard Specification for Structural Silicone Sealants |
| ASTM C509 | (2006; R 2011) Elastomeric Cellular Preformed Gasket and Sealing Material |
| ASTM C864 | (2005; R 2011) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers |
| ASTM C920 | (2014a) Standard Specification for Elastomeric Joint Sealants |
| ASTM D2287 | (2012) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds |
| ASTM D395 | (2014) Standard Test Methods for Rubber Property - Compression Set |
| ASTM E119 | (2014) Standard Test Methods for Fire Tests of Building Construction and Materials |
| ASTM E1300 | (2012a; E 2012) Determining Load Resistance of Glass in Buildings |

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

| | |
|---|---|
| GANA Glazing Manual | (2004) Glazing Manual |

GANA Sealant Manual (2008) Sealant Manual

INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA)

IGMA TB-3001 (2001) Guidelines for Sloped Glazing

IGMA TM-3000 (1990; R 2004) North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use

IGMA TR-1200 (1983; R 2007) Guidelines for Commercial Insulating Glass Dimensional Tolerances

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

16 CFR 1201 Safety Standard for Architectural Glazing Materials

## 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

SD-03 Product Data

Insulating Glass

Exterior Glazing - performance documentation for all glass types

Glazing Accessories

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-04 Samples

Insulating Glass

Glazing Compound

Glazing Tape

Sealant

Two 8 by 10 inch samples of each of the following: tinted glass, patterned glass, heat-absorbing glass, and insulating glass units.

Three samples of each indicated material.

SD-07 Certificates

Insulating Glass

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

SD-08 Manufacturer's Instructions

Setting and Sealing Materials

Glass Setting

Submit glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing material specified.

SD-11 Closeout Submittals

## 1.3 SYSTEM DESCRIPTION

Fabricate and install watertight and airtight glazing systems to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, or defects in the work. Glazed panels must comply with the safety standards, in accordance with ANSI Z97.1, and comply with indicated wind/snow loading in accordance with ASTM E1300.

## 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver products to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, enclosed dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

## 1.5 ENVIRONMENTAL REQUIREMENTS

Do not start glazing work until the outdoor temperature is above40 degrees F and rising, unless procedures recommended by the glass manufacturer and approved by the Contracting Officer are made to warm the glass and rabbet surfaces. Provide ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

## 1.6 WARRANTY

### 1.6.1 Warranty for Insulating Glass Units

Warranty insulating glass units against development of material obstruction to vision (such as dust, fogging, or film formation on the inner glass surfaces) caused by failure of the hermetic seal, other than through glass breakage, for a 10-year period following acceptance of the work. Provide new units for any units failing to comply with terms of this warranty within 45 working days after receipt of notice from the Government.

# PART 2 PRODUCTS

## 2.1 PRODUCT SUSTAINABILITY CRITERIA

## 2.2 GLASS

ASTM C1036, unless specified otherwise. In doors and sidelights, provide safety glazing material conforming to 16 CFR 1201.

### 2.2.1 Clear Glass

For interior glazing (i.e., pass and view/observation windows), 1/4 inch thick glass should be used.

Type I, Class 1 (clear), Quality q4 (A). Provide for glazing openings not indicated or specified otherwise. Glass shall be 1/4 inch thickness.

### 2.2.2 Wired Glass

Wired glass is not permitted.

### 2.2.3 Patterned Glass

Type II, Class 1 (translucent), Form 3 (patterned), Quality q7 (decorative), Finish f1 (patterned one side), Pattern p1 (linear) 1/4 inch thick.

### 2.2.4 Laminated Glass

**Bldg AS124 - Laminated glass is not required. Doors and windows are not blast resistant.**

### 2.2.5 One-Way Vision Glass (Transparent Mirrors)

Tempered, Type I, Class 1, Quality q1, 1/4 inch thick, coated on one face with a hard, adherent film of chromium or other approved coating of equal durability. Glass must transmit not less than 5 percent or more than 11 percent of total incident visible light and must reflect from the front surface of the coating not less than 45 percent of the total incident visible light. .

### 2.2.6 Tempered Glass

Tempered glass shall be provided in exterior windows, exterior view panels, and view panels in exterior doors. In double pane insulated installations, tempered glass shall be provided in the inboard pane and tempered glass in the outboard pane.

Tempered glass shall be used for interior glazing (i.e., pass and view/observation windows and view panels in doors), 1/4 inch thick glass should be used.

ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (transparent), Quality q3, 1/4 inch thick. Color shall be be clear. Provide and wherever safety glazing material is indicated, specified or required by code.

### 2.2.7 Fire/Safety Rated Glass

Fire/safety rated glass must be laminated Type I transparent flat type, Class 1-clear. Glass must have the appropriate fire rated for the wall or location where it occurs as per the International Building Code when tested in accordance with ASTM E119. Glass must be permanently labeled with appropriate markings.

## 2.3 INSULATING GLASS UNITS

### 2.3.1 Buildings

The inner and outer lights shall be tempered glass as specified.

Insulated units shall be double pane, nominal 1 inch thick, composed of 1/4 inch tempered glass on the inboard (interior) pane, 1/2 inch air space, and 1/4 inch tempered clear glass on the outboard (exterior) pane. Provide patterned obscure glass for outboard pane where window occurs in a toilet, shower or similar private area.

Two panes of glass separated by a dehydrated 1/2 inch airspace, filled with argon gas, or 0.63 inches of aerogel and hermetically sealed.

Dimensional tolerances shall be as specified in IGMA TR-1200. The units shall meet CBA Grade requirement when tested in accordance with ASTM E 773 and ASTM E 774, Class A. Spacer shall be black, roll-formed, thermally broken aluminum, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone.

### 2.3.2 Low Emissivity Insulating Glass

Interior and exterior glass panes for Low-E insulating units with anti-reflective low-emissivity coating on No. 2 surface (inside surface of exterior pane), conforming to ASTM C1036. Color must be gray or bronze. If installation is at an existing building, color shall match existing.

## 2.4 SETTING AND SEALING MATERIALS

Provide as specified in the GANA Glazing Manual, IGMA TM-3000, IGMA TB-3001, and manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted must be gray or neutral color.

### 2.4.1 Putty and Glazing Compound

Provide glazing compound as recommended by manufacturer for face-glazing metal sash. Putty must be linseed oil type. Do not use putty and glazing compounds with insulating glass or laminated glass.

### 2.4.2 Glazing Compound

Use for face glazing metal sash. Do not use with insulating glass units or laminated glass.

2.4.3 Sealants

Provide elastomeric sealants.

2.4.3.1 Elastomeric Sealant

ASTM C920, Type S, Grade NS, Class 12.5, Use G. Use for channel or stop glazing and aluminum sash. Sealant must be chemically compatible with setting blocks, edge blocks, and sealing tapes, with sealants used in manufacture of insulating glass units. Color of sealant must be white.

2.4.3.2 Structural Sealant

ASTM C1184, Type S.

2.4.4 Preformed Channels

Neoprene, vinyl, or rubber, as recommended by the glass manufacturer for the particular condition.

2.4.5 Sealing Tapes

Preformed, semisolid, PVC-based material of proper size and compressibility for the particular condition, complying with ASTM D2287. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes must be chemically compatible with the product being set.

2.4.6 Setting Blocks and Edge Blocks

Closed-cell neoprene setting blocks must be dense extruded type conforming to ASTM C509 and ASTM D395, Method B, Shore A durometer between 70 and 90. Edge blocking must be Shore A durometer of 50 (plus or minus 5). Provide silicone setting blocks when blocks are in contact with silicone sealant. Profiles, lengths and locations must be as required and recommended in writing by glass manufacturer. Block color must be black.

2.4.7 Glazing Gaskets

Glazing gaskets must be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening must be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets must be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Provide glazing gasket profiles as recommended by the manufacturer for the intended application.

2.4.7.1 Fixed Glazing Gaskets

Fixed glazing gaskets must be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C509, Type 2, Option 1.

2.4.7.2 Wedge Glazing Gaskets

Wedge glazing gaskets must be high-quality extrusions of cured elastomeric

virgin neoprene compounds, ozone resistant, conforming to ASTM C864, Option 1, Shore A durometer between 65 and 75.

#### 2.4.7.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing must be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

### 2.4.8 Accessories

Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

## PART 3 EXECUTION

Any materials that show visual evidence of biological growth due to the presence of moisture must not be installed on the building project.

## 3.1 PREPARATION

Preparation, unless otherwise specified or approved, must conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, IGMA TM-3000, and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on heat-absorbing glass and on insulating glass units as soon as glass is installed. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

## 3.2 GLASS SETTING

Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, must conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, IGMA TM-3000, and manufacturer's recommendations. Aluminum windows, wood doors, and wood windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place. Verify products are properly installed, connected, and adjusted.

### 3.2.1 Sheet Glass

Cut and set with the visible lines or waves horizontal.

### 3.2.2 Patterned Glass

Set glass with one patterned surface with smooth surface on the weather side. When used for interior partitions, place the patterned surface in same direction in all openings.

### 3.2.3 Insulating Glass Units

Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting will not be permitted. Handle units so as not to strike frames or other objects. Installation must conform to applicable recommendations of IGMA TB-3001 and IGMA TM-3000.

## 3.3 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass must be clean at the time the work is accepted.

## 3.4 PROTECTION

Protect glass work immediately after installation. Identify glazed openings with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Protect reflective glass with a protective material to eliminate any contamination of the reflective coating. Place protective material far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Remove and replace glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities with new units.

-- End of Section --

# SECTION 09 29 00

# GYPSUM BOARD

**08/09**

## 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 A108.11 | (1992) Interior Installation of Cementitious Backer Units |
| ANSI/CTI A108/A118/A136.1 | (2005) Specification for the Installation of Ceramic Tile |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM C 1002 | (2007) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs |
| ASTM C 1047 | (2009) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base |
| ASTM C 1396/C 1396M | (2006a) Standard Specification for Gypsum Board |
| ASTM C 36/C 36M | (2003e1) Gypsum Wallboard |
| ASTM C 475/C 475M | (2002; R 2007) Joint Compound and Joint Tape for Finishing Gypsum Board |
| ASTM C 840 | (2008) Application and Finishing of Gypsum Board |
| ASTM C 954 | (2007) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness |

GYPSUM ASSOCIATION (GA)

| | |
|---|---|
| GA 214 | (2007) Recommended Levels of Gypsum Board Finish |

GA 216 (2007) Application and Finishing of Gypsum Board

## 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Cementitious backer units

Water-Resistant Gypsum Backing Board

Accessories

Submit for each type of gypsum board and for cementitious backer units.

Gypsum Board;

Joint Treatment Materials

Submit manufacturer's product data, indicating VOC content.

SD-07 Certificates

Asbestos Free Materials;

Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

SD-10 Operation and Maintenance Data

Waste Management

## 1.3 DELIVERY, STORAGE, AND HANDLING

### 1.3.1 Delivery

Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

### 1.3.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board and cementitious backer units outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. Gypsum wallboard shall not be stored with materials which have high emissions of volatile organic compounds (VOCs)

or other contaminants. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.3.3 Handling

Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board, cementitious backer units, and joint treatment materials, or the bonding of adhesives.

1.4.2 Exposure to Weather

Protect gypsum board and cementitious backer unit products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.

1.4.3 Temporary Ventilation

Provide temporary ventilation for work of this section.

1.5 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 5 years of documented successful experience.

1.6 SCHEDULING

The gypsum wall board shall be taped, spackled and primed before the installation of highly-emitting materials.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types, gypsum backing board types, cementitious backing units, and joint treating materials manufactured from asbestos free materials only. Submit Material Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.

2.1.1 Gypsum Board

ASTM C 36/C 36M and ASTM C 1396/C 1396M. Gypsum board shall contain a minimum of 5 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content. Gypsum board may contain post-consumer or post-industrial recycled content.

2.1.1.1 Regular

Provide 5/8 inch Regular Type X.

2.1.2 Regular Water-Resistant Gypsum Backing Board

Provide 5/8 inch Type X, ASTM C 630/C 630M, with mold growth preventing additives.

Water-resistant gypsum board is also commonly referred to as moisture-resistant gypsum board.

2.1.3 Cementitious Backer Units

ANSI/CTI A108/A118/A136.1.

Provide 5/8 inch thick cementitiuos backer units (cement board) where the board thickness must match 5/8 inch gypsum board.

2.1.4 Joint Treatment Materials

ASTM C 475/C 475M. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

2.1.4.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.4.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.4.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.4.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

2.1.4.5 Joint Tape

Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

2.1.5 Fasteners

2.1.5.1 Nails

Not permitted.

2.1.5.2 Screws

ASTM C 1002, Type "G", Type "S" or Type "W" steel drill screws for fastening gypsum board to gypsum board, wood framing members and steel framing members less than 0.033 inch thick. ASTM C 954 steel drill screws for fastening gypsum board to steel framing members 0.033 to 0.112 inch thick. Provide cementitious backer unit screws with a polymer coating.

2.1.5.3 Staples

Not permitted.

2.1.6 Adhesives

Not permitted.

2.1.7 Accessories

ASTM C 1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials.

2.1.8 Water

Provide clean, fresh, and potable water.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board and cementitious backer units. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board and cementitious backer units.

3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with ASTM C 840 or GA 216 and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight joints around openings. In vertical application of gypsum board, provide panels in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may not be bonded together with an adhesive. Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. Provide type of gypsum board for use in each system specified herein as indicated.

Install gypsum board so that joints are supported. Install such that vertical joints occur over studs. Install such that horizontal joints occur over light gage purlins or over field cut stud bracing as indicated.

In wet or humid areas, such as toilet rooms, janitor's closets, shower rooms, kitchens, and other similar areas, provide moisture/water resistant gypsum board with mold prevention additives.

3.2.1 Application of Single-Ply Gypsum Board to Wood Framing

Apply in accordance with ASTM C 840, System I or GA 216.

3.2.2 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with ASTM C 840, System VIII or GA 216.

3.2.3 Arches and Bending Radii

Apply gypsum board in accordance with ASTM C 840, System IX or GA 216.

3.2.4 Board for Wall Tile or Tile Base Applied with Adhesive

Provide cementitious backer units as indicated.

3.3 APPLICATION OF CEMENTITIOUS BACKER UNITS

3.3.1 Application

Provide as a backing surface wherever ceramic or similar tile occurs, applicable to wet areas such as toilet rooms, tubs, shower enclosures, saunas, steam rooms, gang shower rooms. Apply cementitious backer units in accordance with ANSI A108.11 with a 15 lb asphalt impregnated, continuous felt paper membrane behind cementitious backer units, between backer units and studs or base layer of gypsum board. Place membrane with a minimum 6 inch overlap of sheets laid shingle style.

In dry areas, asphalt impregnated felt paper membrane is not required.

3.3.2 Joint Treatment

ANSI A108.11.

3.4 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216.

Finish plenum areas above ceilings to Level 1 in accordance with GA 214.

Finish walls and ceilings to receive a heavy-grade wall covering or heavy textured finish before painting to Level 3 in accordance with GA 214.

Finish all other gypsum board walls, partitions and ceilings to Level 5 in accordance with GA 214.

Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from gypsum dust.

3.4.1 Uniform Surface Level 5

Wherever gypsum board is to receive paint finish, or where severe, up or down lighting conditions occur, finish gypsum wall surface in accordance

to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

## 3.5 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board and cementitious backer units as specified in Section 07 92 00 JOINT SEALANTS Apply material with exposed surface flush with gypsum board or cementitious backer units.

## 3.6 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

## 3.7 WASTE MANAGEMENT

Identify manufacturer's policy for collection or return of remaining construction scrap, unused material, demolition scrap, and packaging material. Institute demolition and construction recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

# SECTION 09 67 23.13

# STANDARD RESINOUS FLOORING

**08/10**

## PART 1 GENERAL

### 1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM D2240 | (2005; R 2010) Standard Test Method for Rubber Property - Durometer Hardness |
| ASTM D4259 | (1988; R 2006) Standard Practice for Abrading Concrete |

### 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Drawings

SD-03 Product Data

Manufacturer's Catalog Data

Epoxy Undercoat

Urethane Mortar

Flakes

Urethane Sealer

SD-04 Samples

Hardboard Mounted Epoxy Flooring

SD-05 Design Data

Physical Properties

Design Mix Data

Urethane Mortar

SD-06 Test Reports

Records of Inspection

SD-07 Certificates

Listing of Product Installations

Referenced Standards Certificates

Warranty

## 1.3 ADMINISTRATIVE REQUIREMENTS

Submit installation drawings for heavy duty epoxy flooring systems clearly designating the areas of application.

### 1.3.1 Product Data

Within 30 days of contract award, submit manufacturer's catalog data for the following items:

a. Urethane Mortar

b. Epoxy Undercoat

c. Flakes

d. Urethane Sealer

### 1.3.2 Design Mix Data

Within 30 days of contract award, submit design mix data for the following items, including a complete list of ingredients and admixtures:

a. Urethane Mortar

b. Epoxy Undercoat

c. Urethane Sealer

Ensure applicable test reports verify the mix has been successfully tested and meets design requirements.

## 1.4 QUALITY ASSURANCE

Prior to commencement of work, submit referenced standards certificates for the following, showing conformance with the referenced standards contained in this section:

a. Urethane Mortar

b. Epoxy Undercoat

c. Flakes

d. Urethane Sealer

Submit a sample records of inspection plan, including the records of corrective action to be taken.

1.4.1 Qualifications

Submit a listing of product installations for heavy duty epoxy flooring including identification of at least 5 units, similar to those proposed for use, that have been in successful service for a minimum period of 5 years. Identify purchaser, address of installation, service organization, and date of installation.

Ensure floor system applicators are experienced in the application of troweled urethane flakes aggregate thin-set floor topping.

1.4.2 Sampling

Submit hardboard mounted epoxy flooring samples not less than 12 inch square for each required color.

Provide panels showing nominal thickness of finished toppings, color, and texture of finished surfaces. Finished floor toppings and the approved samples are to match in color and texture.

1.5 DELIVERY, HANDLING, AND STORAGE

Protect materials from weather, soil, and damage during delivery, storage, and construction. Deliver materials in original packages, containers, or bundles bearing brand name and name of material.

Maintain materials used in the installation of floor topping at a temperature between 65 and 85 degrees F.

PART 2 PRODUCTS

2.1 RESINOUS FLOORING

Resinous Flooring shal be a nominal 3/16 inch (5mm) thick system comprised of a penetrating three-component urethae primer, a high performance four-component mortar consisting of urethane resin, curing agent, selected, graded aggregates and inorganic pigments, two-component epoxy undercoat, brightly colored 1/16 inch flake broadcast, and two coats of a high performance two-component clear urethane sealer.

2.1.1 Physical Properties

Provide flooring system in which physical properties of topping, including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:

| PROPERTY | TEST METHOD | REQUIREMENT |
|---|---|---|
| Compressive strength | ASTM C579 | 10,000 psi |
| Tensile strength | ASTM C307 | 1,750 psi |

| PROPERTY | TEST METHOD | REQUIREMENT |
|---|---|---|
| Flexural strength | ASTM C580 | 4,300 psi |
| Hardness, Shore D | ASTM D2240 | 85 - 90 |
| Bond strength | ASTM D4541 | >400 psi<br>(100% concrete failure |
| Impact resistance | ASTM D4226 | >160 inch lbs. |
| Abrasion resistance | ASTM D4060<br>Taber Agrader CS-17 wheel | 0.1 gm max. weight loss |
| Coefficient of friction | ASTM D2047 | 0.65 - 0.79 |
| | | |
| Cure rate at 77 degree F<br>8 hours for foot traffic<br>12 hours for normal operations | | |

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Safety Precautions

Prior to application in confined spaces of toppings and coatings containing flammable or toxic properties, provide forced ventilation to ensure that vapor concentration is kept at acceptable limits recommended by the manufacturer of the product.

Erect "NO SMOKING" signs, and prohibit smoking or use of spark- or flame-producing devices within 50 feet of any mixing or placing operation involving flammable materials.

Provide personnel required to handle, mix, or apply toppings containing toxic or flammable properties with such items of personal protective equipment and apparel for eye, skin, and respiratory protection as are recommended by the manufacturer of the product. Ensure all personnel are trained in the appropriate use and wearing of personal protection equipment.

Accomplish sand blasting under approved controlled conditions with respect to sand and dust control to prevent damage to personnel and facility.

## 3.2 PREPARATION

Prior to applying resinous flooring material, inspect substrate and immediately report any unsatisfactory conditions that exist and repair.

### 3.2.1 Concrete Subfloor

#### 3.2.1.1 New Concrete Floors

Do not commence installation of floor topping until concrete has cured a minimum of 28 calendar days. Verify concrete floor is straight, properly sloped, and has suface type finish as recommended by manufacturer. Ensure concrete is moist cured with burlap or polyethylene. Do not use curing agents, methods, or materials which prevent proper bonding of resinous flooring. Prior to applying the prime coat, clean concrete surface by an approved method.

#### 3.2.1.2 Existing Concrete Floors

Clean existing concrete floors, with hard troweled or contaminated areas in conformance with ASTM D4259, and ensure concrete is free of all paint, sealers, curing agents, oil, grease, moisture, dirt or any other contaminants. Remove any loose or corroded segments of existing concrete and patch with a grouting compound as recommended by the resinous flooring manufacturer. Prepare concrete with mechanical means and include use of a scabbler, scarifier, or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance. Fill all cracks with an elastomeric jointing compound compatible with the resinous flooring system used.

### 3.2.2 Protection

In addition to the protection of adjacent surfaces during installation, provide areas used to store and mix materials with a protective covering under the materials. After application of the sealer coats, protect finished flooring during the remainder of the construction period. In areas of expected minimum or moderate traffic, cover floors with 70-pound kraft paper, a 30-30-30 waterproof kraft paper, or an approved substitute, with strips taped together and edges secured to prevent roll-up. Place vegetable fiberboard, plywood, or other suitable material that does not mar the flooring over the paper to protect areas used as passages by workmen and areas subject to floor damage because of subsequent building operations. Upon completion of construction, remove the protection, clean flooring and, where necessary, repair, reseal, or both, at no additional cost to the Government.

## 3.3 APPLICATION

General: Apply each component of resinous flooring system in compliance with manufacturer's direction to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other joints (if any), indicated or required. Temperature and floor condition shall be as stated in manufacturer's written requirments.

Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resionous flooring materials and

substrate.

Troweled Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed box adjusted to manufacturer's recommended height. Hand trowel apply mixed material over freshly primed substrate using steel finishing trowels or power trowel material.

Undercoat: Remove any surface irregularities by lightly abrading and vacuuming the floor surface. Mix and apply aundercoat with strict adjearance to manufacturer's installatin procedures and coverage rates.

Broadcast: Immediately broadcast colored flakes into the undercoat by hand to refusal. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

Sealer: Remove excess unbonded flakes by lightly brushing and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures.

Sanding: Lightly sand the floor with 80 grit sandpaper on a rotary sander. Remove all dust by vacuuming the floor surface.

Second Sealer Coat: Mix and apply sealer with strict adherence to manufacturer's installation installation procedures.

## 3.4 FIELD QUALITY CONTROL

### 3.4.1 Repairing

Remove and replace damaged or unacceptable portions of completed work with new work to match adjacent surfaces at no additional cost to the Government.

## 3.5 CLEANING

Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during each stage of application and prior to completion of curing process. Close aea of application for a minimum of 24 hours.

Protect resinous flooring materials from damage and wear during construction operations. Provide temporary covering in accordance with manufacturer's recommendations, if necessary. Contractor is responsible for protection of flooring and cleaning.

Cleaning: Remove temporary protection. Clean resinous flooring just prior to final inspection. Use cleaning materials and procedures as directed by flooring manufacturer.

## 3.6 WARRANTY

Submit a 2 year written warranty for all materials and installation work to the Contracting Officer.

-- End of Section --

# SECTION 09 90 00

# PAINTS AND COATINGS

**05/11**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

| | |
|---|---|
| ACGIH 0100 | (2001; Supplements 2002-2008) Documentation of the Threshold Limit Values and Biological Exposure Indices |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM D235 | (2002; R 2007) Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent) |
| ASTM D2824 | (2006) Aluminum-Pigmented Asphalt Roof Coatings, Non-Fibered, Asbestos Fibered, and Fibered without Asbestos |
| ASTM D4214 | (2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films |
| ASTM D4263 | (1983; R 2005) Indicating Moisture in Concrete by the Plastic Sheet Method |
| ASTM D4444 | (2008) Use and Calibration of Hand-Held Moisture Meters |
| ASTM D523 | (2008) Standard Test Method for Specular Gloss |
| ASTM D6386 | (2010) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting |
| ASTM F 1869 | (2011) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride |

MASTER PAINTERS INSTITUTE (MPI)

| | |
|---|---|
| MPI 1 | (Oct 2009) Aluminum Paint |
| MPI 10 | (Oct 2009) Exterior Latex, Flat, MPI Gloss Level 1 |

| | |
|---|---|
| MPI 101 | (Oct 2009) Epoxy Anti-Corrosive Metal Primer |
| MPI 107 | (Oct 2009) Rust Inhibitive Primer (Water-Based) |
| MPI 108 | (Oct 2009) High Build Epoxy Coating, Low Gloss |
| MPI 11 | (Oct 2009) Exterior Latex, Semi-Gloss, MPI Gloss Level 5 |
| MPI 113 | (Oct 2009) Exterior Pigmented Elastomeric Coating (Water Based) |
| MPI 116 | (Oct 2009) Epoxy Block Filler |
| MPI 119 | (Oct 2009) Exterior Latex, Gloss |
| MPI 13 | (Oct 2009) Exterior Solvent-Based Semi-Transparent Stain |
| MPI 134 | (Oct 2009) Galvanized Primer (Waterbased) |
| MPI 138 | (Oct 2009) Interior High Performance Latex, MPI Gloss Level 2 |
| MPI 139 | (Oct 2009) Interior High Performance Latex, MPI Gloss Level 3 |
| MPI 140 | (Oct 2009) Interior High Performance Latex, MPI Gloss Level 4 |
| MPI 141 | (Oct 2009) Interior High Performance Latex MPI Gloss Level 5 |
| MPI 144 | (Oct 2009) Institutional Low Odor / VOC Interior Latex, MPI Gloss Level 2 |
| MPI 145 | (Oct 2009) Institutional Low Odor / VOC Interior Latex, MPI Gloss Level 3 |
| MPI 146 | (Oct 2009) Institutional Low Odor/VOC Interior Latex, MPI Gloss Level 4 |
| MPI 147 | (Oct 2009) Institutional Low Odor / VOC Interior Latex, Semi-Gloss, MPI Gloss Level 5 |
| MPI 151 | (Oct 2009) Interior W.B. Light Industrial Coating, MPI Gloss Level 3 |
| MPI 153 | (Oct 2009) Interior W.B. Light Industrial Coating, Semi-Gloss, MPI Gloss Level 5 |
| MPI 154 | (Oct 2009) Interior W.B. Light Industrial Coating, Gloss, MPI Gloss Level 6 |

| | |
|---|---|
| MPI 16 | (Oct 2009) Exterior Latex-Based Solid Hide Stain |
| MPI 161 | (Oct 2009) Exterior W.B. Light Industrial Coating, MPI Gloss Level 3 |
| MPI 163 | (Oct 2009) Exterior W.B. Light Industrial Coating, Semi-Gloss, MPI Gloss Level 5 |
| MPI 164 | (Oct 2009) Exterior W.B. Light Industrial Coating, Gloss, MPI Gloss Level 6 |
| MPI 19 | (Oct 2009) Inorganic Zinc Rich Primer |
| MPI 2 | (Oct 2009) Aluminum Heat Resistant Enamel (up to 427 C and 800 F |
| MPI 21 | (Oct 2009) Heat Resistant Enamel, Gloss (up to 205 degrees C and 400 degrees F), MPI Gloss Level 6 |
| MPI 22 | (Oct 2009) Aluminum Paint, High Heat (up to 590 degrees C and 1100 degrees F. |
| MPI 23 | (Oct 2009) Surface Tolerant Metal Primer |
| MPI 26 | (Oct 2009) Cementitious Galvanized Metal Primer |
| MPI 27 | (Oct 2009) Exterior / Interior Alkyd Floor Enamel, Gloss |
| MPI 31 | (Oct 2009) Polyurethane, Moisture Cured, Clear Gloss |
| MPI 39 | (Oct 2009) Interior Latex-Based Wood Primer |
| MPI 4 | (Oct 2009) Interior/Exterior Latex Block Filler |
| MPI 42 | (Oct 2009) Latex Stucco and Masonry Textured Coating |
| MPI 44 | (Oct 2009) Interior Latex, MPI Gloss Level 2 |
| MPI 45 | (Oct 2009) Interior Alkyd Primer Sealer |
| MPI 46 | (Oct 2009) Interior Enamel Undercoat |
| MPI 47 | (Oct 2009) Interior Alkyd, Semi-Gloss, MPI Gloss Level 5 |
| MPI 48 | (Oct 2009) Interior Alkyd, Gloss, MPI Gloss Level 6 |
| MPI 49 | (Oct 2009) Interior Alkyd, Flat, MPI Gloss Level 1 |

| | |
|---|---|
| MPI 5 | (Oct 2009) Exterior Alkyd Wood Primer |
| MPI 50 | (Oct 2009) Interior Latex Primer Sealer |
| MPI 51 | (Oct 2009) Interior Alkyd, Eggshell, MPI Gloss Level 2 |
| MPI 52 | (Oct 2009) Interior Latex, MPI Gloss Level 3 |
| MPI 54 | (Oct 2009) Interior Latex, Semi-Gloss, MPI Gloss Level 5 |
| MPI 56 | (Oct 2009) Interior Oil Modified Urethane Clear Gloss |
| MPI 57 | (Oct 2009) Interior Oil Modified Urethane Clear Satin |
| MPI 59 | (Oct 2009) Interior/Exterior Floor Enamel, Low Gloss |
| MPI 6 | (Oct 2009) Exterior Latex Wood Primer |
| MPI 60 | (Oct 2009) Interior/Exterior Latex Floor Paint, Low Gloss |
| MPI 68 | (Oct 2009) Interior/Exterior Latex Floor Enamel, Gloss |
| MPI 7 | (Oct 2009) Exterior Oil Wood Primer |
| MPI 71 | (Oct 2009) Polyurethane, Moisture Cured, Clear, Flat |
| MPI 72 | (Oct 2009) Polyurethane, Two Component, Pigmented, Gloss |
| MPI 77 | (Oct 2009) Epoxy Gloss |
| MPI 79 | (Oct 2009) Alkyd Anti-Corrosive Metal Primer |
| MPI 8 | (Oct 2009) Exterior Alkyd, Flat, MPI Gloss Level I |
| MPI 9 | (Oct 2009) Exterior Alkyd, Gloss, MPI Gloss Level 6 |
| MPI 90 | (Oct 2009) Interior Wood Stain, Semi-Transparent |
| MPI 94 | (Oct 2009) Exterior Alkyd, Semi-Gloss, MPI Gloss Level 5 |
| MPI 95 | (Oct 2009) Quick Drying Primer for Aluminum |

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

| | |
|---|---|
| SCS SP-01 | (2000) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints |

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

| | |
|---|---|
| SSPC Guide 6 | (2004) Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations |
| SSPC Guide 7 | (2004; E 2004) Guide to the Disposal of Lead-Contaminated Surface Preparation Debris |
| SSPC PA 1 | (2000; E 2004) Shop, Field, and Maintenance Painting of Steel |
| SSPC PA Guide 3 | (1982; E 1995) A Guide to Safety in Paint Application |
| SSPC Paint 18 | (1982; E 2004) Chlorinated Rubber Intermediate Coat Paint |
| SSPC SP 1 | (1982; E 2004) Solvent Cleaning |
| SSPC SP 10/NACE No. 2 | (2007) Near-White Blast Cleaning |
| SSPC SP 12/NACE No.5 | (2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating |
| SSPC SP 2 | (1982; E 2004) Hand Tool Cleaning |
| SSPC SP 3 | (1982; E 2004) Power Tool Cleaning |
| SSPC SP 6/NACE No.3 | (2007) Commercial Blast Cleaning |
| SSPC SP 7/NACE No.4 | (2007) Brush-Off Blast Cleaning |
| SSPC VIS 1 | (2002; e 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning |
| SSPC VIS 3 | (2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning |
| SSPC VIS 4/NACE VIS 7 | (1998; E 2000; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting |

U.S. ARMY CORPS OF ENGINEERS (USACE)

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

U.S. DEPARTMENT OF DEFENSE (DOD)

| | |
|---|---|
| MIL-PRF-680 | (2010; Rev C) Degreasing Solvent |
| MIL-STD-101 | (1970; Rev B) Color Code for Pipelines & for Compressed Gas Cylinders |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|---|---|
| EPA Method 24 | (2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings |

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

| | |
|---|---|
| FED-STD-313 | (Rev D; Am 1) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities |

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

| | |
|---|---|
| 29 CFR 1910.1000 | Air Contaminants |
| 29 CFR 1910.1001 | Asbestos |
| 29 CFR 1910.1025 | Lead |
| 29 CFR 1926.62 | Lead |

## 1.2 SUBMITTALS

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

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Piping identification

Submit color stencil codes

SD-03 Product Data

Coating

Manufacturer's Technical Data Sheets

Indicate VOC content.

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings:

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

SD-11 Closeout Submittals

## 1.3 APPLICATOR'S QUALIFICATIONS

### 1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on on a minimum of five similar projects within the past two years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

## 1.4 QUALITY ASSURANCE

### 1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that conform to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

#### 1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

#### 1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

## 1.5 REGULATORY REQUIREMENTS

### 1.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

### 1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

### 1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

### 1.5.4 Asbestos Content

Materials shall not contain asbestos.

### 1.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

### 1.5.6 Silica

Abrasive blast media shall not contain free crystalline silica.

### 1.5.7 Human Carcinogens

Materials shall not contain ACGIH 0100 confirmed human carcinogens (A1) or suspected human carcinogens (A2).

## 1.6 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a

high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

## 1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

### 1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

### 1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100, threshold limit values.

d. The appropriate OSHA standard in 29 CFR 1910.1025 and 29 CFR 1926.62 for surface preparation on painted surfaces containing lead and Section 02 82 33.13 REMOVAL AND DISPOSAL OF PAINT WITH LEAD. Additional guidance is given in SSPC Guide 6 and SSPC Guide 7. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.

e. The appropriate OSHA standards in 29 CFR 1910.1001 for surface preparation of painted surfaces containing asbestos. Removal and disposal of coatings which contain asbestos materials is specified in Section 02 82 16 REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS. Refer to drawings for list of hazardous materials located on this project. Contractor to coordinate paint preparation activities with this specification section.

## 1.8 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation. Isolate area of application from rest of building when applying high-emission paints or coatings.

### 1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

### 1.8.2 Post-Application

Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

a. Supply 100 percent outside air 24 hours a day, unless humidity level is high enough to prohibit proper drying of paint. If high humidity is a problem, condition space as recommended by manufacturer.

b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

## 1.9 SCHEDULING

Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that adsorb VOCs, including gypsum board, carpets, ceiling panels, and similar materials.

## 1.10 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be as directed by Contracting Officer. Colors stated in drawings and specifications are typically for reference only and final selection shall be by Contracting Officer.

## 1.11 LOCATION AND SURFACE TYPE TO BE PAINTED

### 1.11.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during

performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.11.1.1 Exterior Painting

Includes new surfaces, existing coated surfaces, and existing uncoated surfaces, of the building and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

1.11.1.2 Interior Painting

Includes new surfaces, existing uncoated surfaces, and existing coated surfaces of the buildings and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and painted metal deck; and

b. Other contiguous surfaces.

1.11.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

f. The exposed underside of galvanized roof decking if it has not been previously painted.

g. Pre-finished surfaces.

1.11.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new and existing surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.11.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals throughout the piping systems.

1.11.4 Definitions and Abbreviations

1.11.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.11.4.2 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.11.4.3 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.11.4.4 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.11.4.5 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.11.4.6 EXT

MPI short term designation for an exterior coating system.

1.11.4.7 INT

MPI short term designation for an interior coating system.

1.11.4.8 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.11.4.9 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.11.4.10 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.11.4.11 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

| Gloss Level | Description | Units at 60 degrees | Units at 85 degrees |
|---|---|---|---|
| G1 | Matte or Flat | 0 to 5 | 10 max |
| G2 | Velvet | 0 to 10 | 10 to 35 |
| G3 | Eggshell | 10 to 25 | 10 to 35 |

| Gloss Level | Description | Units at 60 degrees | Units at 85 degrees |
|---|---|---|---|
| G4 | Satin | 20 to 35 | 35 min |
| G5 | Semi-Gloss | 35 to 70 | |
| G6 | Gloss | 70 to 85 | |
| G7 | High Gloss | | |

Gloss is tested in accordance with ASTM D523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.11.4.12 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.11.4.13 Paint

See Coating definition.

1.11.4.14 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.11.4.15 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents. Comply with applicable regulations regarding toxic and hazardous materials.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair

damaged items.

## 3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

### 3.2.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

a. Test existing finishes for lead before sanding, scraping, or removing. If lead is present, refer to paragraph Toxic Materials.

b. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, ASTM D235. Allow surface to dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.

c. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.

d. The requirements specified are minimum. Comply also with the application instructions of the paint manufacturer.

e. Previously painted surfaces specified to be repainted or damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.

f. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.

g. Chalk shall be removed so that when tested in accordance with ASTM D4214, the chalk resistance rating is no less than 8.

h. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.

i. Edges of chipped paint shall be feather edged and sanded smooth.

j. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting.

k. New, proposed coatings shall be compatible with existing coatings.

3.2.2 Existing Coated Surfaces with Minor Defects

Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings. Remove chalking by sanding so that when tested in accordance with ASTM D4214, the chalk rating is not less than 8.

3.2.3 Removal of Existing Coatings

Remove existing coatings from the following surfaces:

a. Surfaces containing large areas of minor defects;

b. Surfaces containing more than 20 percent peeling area; and

c. Surfaces where rust shows through existing coatings.

d. Surfaces designated by the Contracting Officer.

3.2.4 Substrate Repair

a. Repair substrate surface damaged during coating removal;

b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and

c. Clean and prime the substrate as specified.

3.3 PREPARATION OF METAL SURFACES

3.3.1 Existing and New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6/NACE No.3, or SSPC SP 10/NACE No. 2. Brush-off blast remaining surface in accordance with SSPC SP 7/NACE No.4; Water jetting to SSPC SP 12/NACE No.5 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/NACE No.3/SSPC SP 12/NACE No.5 WJ-3 or SSPC SP 10/NACE No. 2/ SSPC SP 12/NACE No.5 WJ-2.

c. Metal Floor Surfaces to Receive Nonslip Coating: Clean in accordance with SSPC SP 10/NACE No. 2 or SSPC SP 12/NACE No.5 WJ-2.

3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7/NACE No.4, SSPC SP 6/NACE No.3, and SSPC SP 10/NACE No. 2. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12/NACE No.5. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4/NACE VIS 7.

3.3.3 Galvanized Surfaces

a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D6386, Appendix X2, and remove by one of the methods described therein.

b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to SSPC SP 12/NACE No.5 WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.

c. Galvanized With Severe Deteriorated Coating or Severe Rusting: Water jet to SSPC SP 12/NACE No.5 WJ3 degree of cleanliness. Or, spot abrasive blast rusted areas as described for steel in SSPC SP 6/NACE No.3, and waterjet to SSPC SP 12/NACE No.5, WJ3 to remove existing coating.

3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.3.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, ASTM D235. Wipe dry with clean, dry cloths.

3.3.6 Existing Surfaces with a Bituminous or Mastic-Type Coating

Remove chalk, mildew, and other loose material by washing with a solution of 1/2 cup trisodium phosphate, 1/4 cup household detergent, one quart 5 percent sodium hypochlorite solution and 3 quarts of warm water.

3.3.7 Metal Building Structure

Primary and secondary metal building steel structure. Remove rust, clean, prime and paint. Paint shall be a gloss finish.

## 3.4 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

### 3.4.1 Concrete and Masonry

a. Curing: Concrete, stucco and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cuphousehold detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. Wash existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.

(2) Fungus and Mold: Wash new, existing coated, and existing uncoated surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

(5) Removal of Existing Coatings: For surfaces to receive textured coating MPI 42, remove existing coatings including soundly adhered coatings if recommended by textured coating manufacturer.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

### 3.4.2 Gypsum Board, Plaster, and Stucco

a. Surface Cleaning: Plaster and stucco shall be clean and free from loose matter; gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D4263. New plaster to be coated shall have a maximum moisture content of 8 percent, when measured in accordance with ASTM D4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

3.4.3 Existing Asbestos Cement Surfaces

Remove oily stains by solvent cleaning with mineral spirits, MIL-PRF-680, ASTM D235. Remove loose dirt, dust, and other deleterious substances by brushing with a soft brush or rubbing with a dry cloth prior to application of the first coat material. Do not wire brush or clean using other abrasive methods. Surfaces shall be dry and clean prior to application of the coating.

3.5 PREPARATION OF WOOD AND PLYWOOD SURFACES

3.5.1 New, Existing Uncoated, and Existing Coated Plywood and Wood Surfaces, Except Floors:

a. Wood surfaces shall be cleaned of foreign matter.

Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood. Scrape to remove loose coatings. Lightly sand to roughen the entire area of previously enamel-coated wood surfaces.

b. Removal of Fungus and Mold: Wash existing coated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

c. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter in accordance with ASTM D4444, Method A, unless otherwise authorized.

d. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints.

e. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.

f. Cosmetic Repair of Minor Defects:

(1) Knots and Resinous Wood and Fire, Smoke, Water, and Color Marker Stained Existing Coated Surface: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut shellac varnish, plasticized with 5 ounces of castor oil per gallon. Scrape away existing coatings from knotty areas, and sand before treating. Prime before applying any putty over shellacked area.

(2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.

(3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

g. Prime Coat For New Exterior Surfaces: Prime coat wood doors, windows, frames, and trim before wood becomes dirty, warped, or weathered.

3.5.2 Wood Floor Surfaces, Natural Finish

a. Initial Surface Cleaning: As specified in paragraph entitled "Surface Preparation."

b. Existing Loose Boards and Shoe Molding: Before sanding, renail loose boards. Countersink nails and fill with an approved wood filler. Remove shoe molding before sanding and reinstall after completing other work. At Contractor's option, new shoe molding may be provided in lieu of reinstalling old. New wood molding shall be same size, wood species, and finish as the existing.

c. Sanding and Scraping: Sanding of wood floors is specified in Section 09 64 29 WOOD STRIP FLOORING or 09 64 66 WOOD ATHLETIC FLOORING. Floors of oak or similar open-grain wood shall be filled with wood filler recommended by the finish manufacturer and the excess filler removed.

d. Final Cleaning: After sanding, sweep and vacuum floors clean. Do not walk on floors thereafter until specified sealer has been applied and is dry.

3.5.3 Interior Wood Surfaces, Stain Finish

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth.

3.6 APPLICATION

3.6.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces.

Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

e. Floors: For nonslip surfacing on level floors, as the intermediate coat is applied, cover wet surface completely with almandite garnet, Grit No. 36, with maximum passing U.S. Standard Sieve No. 40 less than 0.5 percent. When the coating is dry, use a soft bristle broom to sweep up excess grit, which may be reused, and vacuum up remaining residue before application of the topcoat. For nonslip surfacing on ramps, provide MPI 77 with non-skid additive, applied by roller in accordance with manufacturer's instructions.

### 3.6.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

### 3.6.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

### 3.6.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

| Table | |
|---|---|
| EXTERIOR | |
| Division 3. | Exterior Concrete Paint Table |
| Division 4. | Exterior Concrete Masonry Units Paint Table |
| Division 5. | Exterior Metal, Ferrous and Non-Ferrous Paint Table |
| Division 6. | Exterior Wood; Dressed Lumber, Paneling, Decking, Shingles Paint Table |
| Division 9. | Exterior Stucco Paint Table |
| Division 10. | Exterior Cloth Coverings and Bituminous Coated Surfaces Paint Table |
| INTERIOR | |
| Division 3. | Interior Concrete Paint Table |
| Division 4. | Interior Concrete Masonry Units Paint Table |
| Division 5. | Interior Metal, Ferrous and Non-Ferrous Paint Table |
| Division 6. | Interior Wood Paint Table |

| Table | |
|---|---|
| Division 10. | Interior Plaster, Gypsum Board, Textured Surfaces Paint Table |

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

## 3.7 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

## 3.8 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

## 3.9 COATING SYSTEMS FOR WOOD AND PLYWOOD

a. Apply coatings of Tables in Division 6 for Exterior and Interior.

b. Prior to erection, apply two coats of specified primer to treat and prime wood and plywood surfaces which will be inaccessible after erection.

c. Apply stains in accordance with manufacturer's printed instructions.

d. Wood Floors to Receive Natural Finish: Thin first coat 2 to 1 using thinner recommended by coating manufacturer. Apply all coatings at rate of 300 to 350 square feet per gallon. Apply second coat not less than 2 hours and not over 24 hours after first coat has been applied. Apply with lambs wool applicators or roller as recommended by coating manufacturer. Buff or lightly sand between intermediate coats as recommended by coating manufacturer's printed instructions.

## 3.10 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with MIL-STD-101. Place stenciling in clearly visible locations. On piping not covered by MIL-STD-101, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

## 3.11 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

## 3.12 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Set aside extra paint for future color matches or reuse by the Government.

## 3.13 PAINT TABLES

All DFT's are minimum values. Use only materials having a minimum MPI "Environmentally Friendly" E1 or better rating based on VOC (EPA Method 24 ) content levels. Acceptable products are listed in the MPI Green Approved Products List, available at http://www.specifygreen.com/APL/ProductIdxByMPInum.asp.

### 3.13.1 EXTERIOR PAINT TABLES

| | | |
|---|---|---|
| HL4>DIVISION 3: EXTERIOR CONCRETE PAINT TABLE | | |
| A. New and uncoated existing and Existing, previously painted concrete; vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs: | | |
| 1. Latex | | |
| New; MPI EXT 3.1A-G2 (Flat) / Existing; MPI REX 3.1A-G2 (Flat) | | |
| Primer: MPI 10 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 3.5 mils | | |
| New; MPI EXT 3.1A-G5 (Semigloss) / Existing; MPI EXT 3.1A-G5 (Semigloss) | | |
| Primer: MPI 11 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 3.5 mils | | |
| New; MPI EXT 3.1A-G6 (Gloss) / Existing; MPI REX 3.1A-G6 (Gloss) | | |
| Primer: MPI 119 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. | | |
| | | |
| B. New and uncoated existing and Existing, previously painted concrete, textured system; vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs: | | |
| 1. Latex Aggregate | | |
| New; MPI EXT 3.1B-G2 (Flat) / Existing; MPI REX 3.1B-G2 (Flat) | | |
| Primer: MPI 42 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: Per Manufacturer | | |
| New; MPI EXT 3.1B-G5 (Semigloss) / Existing; MPI REX 3.1B-G5 (Semigloss) | | |
| Primer: MPI 42 | Intermediate: MPI 11 | Topcoat: MPI 11 |

| | | |
|---|---|---|
| HL4>DIVISION 3: EXTERIOR CONCRETE PAINT TABLE | | |
| System DFT: Per Manufacturer | | |
| New; MPI EXT 3.1B-G6 (Gloss) / Existing; MPI REX 3.1B-G6 (Gloss) | | |
| Primer: MPI 42 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: Per Manufacturer | | |
| Texture - Medium. Surface preparation and number of coats in accordance with manufacturer's instructions. Topcoat: Coating to match adjacent surfaces. | | |
| C. New and uncoated existing and Existing, previously painted concrete, elastomeric System; vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs: | | |
| 1. Elastomeric Coating | | |
| New; MPI EXT 3.1F / Existing; MPI REX 3.1F | | |
| Primer: Per Manufacturer | Intermediate: MPI 113 | Topcoat: MPI 113 |
| System DFT: 16 mils | | |
| Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions. | | |
| NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils. | | |
| D. New and uncoated existing and Existing, previously painted concrete: walls and bottom of swimming pools. | | |
| 1. Chlorinated Rubber | | |
| New; / Existing; | | |
| Primer: SSPC Paint 18 | Intermediate: SSPC Paint 18 | Topcoat: SSPC Paint 18 |
| System DFT: Per Manufacturer | | |
| NOTE: Thin first coat (primer) with 1 part of approved thinner to 4 parts of paint by volume. | | |

| | | |
|---|---|---|
| HL4>DIVISION 3: EXTERIOR CONCRETE PAINT TABLE | | |
| E. New and Existing Cementitious composition board (including Asbestos cement board): | | |
| 1. Latex | | |
| | | |
| | | |
| | | |
| New; MPI EXT 3.3A-G5 (Semigloss) / Existing; MPI REX 3.3A-G5 (Semigloss) | | |
| Primer: MPI 11 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 4.5 mils | | |
| New; MPI EXT 3.3A-G6 (Gloss) / Existing; MPI REX 3.3A-G6 (Gloss) | | |
| Primer: MPI 119 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 4.5 mils | | |
| Topcoat: Coating to match adjacent surfaces. | | |

| | | | |
|---|---|---|---|
| DIVISION 4: EXTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | | |
| A. New and Existing concrete masonry on uncoated surface: | | | |
| 1. Latex | | | |
| New; MPI EXT 4.2A-G1 (Flat) / Existing; MPI REX 4.2A-G1 (Flat) | | | |
| Block Filler: MPI 4 | Primer: N/A | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 11 mils | | | |

| DIVISION 4: EXTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | | |
|---|---|---|---|
| New; MPI EXT 4.2A-G5 (Semigloss) / Existing; MPI REX 4.2A-G5 (Semigloss) | | | |
| Block Filler: MPI 4 | Primer: N/A | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 11 mils | | | |
| New; MPI EXT 4.2A-G6 (Gloss) / Existing; MPI REX 4.2A-G6 (Gloss) | | | |
| Block Filler: MPI 4 | Primer: N/A | Intermediate: MPI 119 | Topcoat: MPI 119 |
| Topcoat: Coating to match adjacent surfaces. | | | |
| B. New and Existing concrete masonry, textured system; on uncoated surface: | | | |
| 1. Latex Aggregate | | | |
| New; MPI EXT 4.2B-G1 (Flat) / Existing; MPI REX 4.2B-G1 (Flat) | | | |
| Primer: MPI 42 | Intermediate: MPI 42 | | Topcoat: MPI 10 |
| System DFT: Per Manufacturer | | | |
| New; MPI EXT 4.2B-G5 (Semigloss) / Existing; MPI REX 4.2B-G5 (Semigloss) | | | |
| Primer: MPI 42 | Intermediate: MPI 42 | | Topcoat: MPI 11 |
| System DFT: Per Manufacturer | | | |
| New; MPI EXT 4.2B-G6 (Gloss) / Existing; MPI REX 4.2B-G6 (Gloss) | | | |
| Primer: MPI 42 | Intermediate: MPI 42 | | Topcoat: MPI 119 |
| System DFT: Per Manufacturer | | | |
| Texture - Fine Medium Course. Surface preparation and number of coats in accordance with manufacturer's instructions. Topcoat: Coating to match adjacent surfaces. | | | |
| C. New and Existing concrete masonry, elastomeric System; on uncoated surface: | | | |
| 1. Elastomeric Coating | | | |
| New; MPI EXT 4.2D / Existing; MPI REX 4.2D | | | |
| Primer: Per Manufacturer | Intermediate: MPI 113 | | Topcoat: MPI 113 |

| DIVISION 4: EXTERIOR CONCRETE MASONRY UNITS PAINT TABLE |
|---|
| System DFT: 16 mils |
| Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions. |
| NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils. |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| STEEL / FERROUS SURFACES | | |
| A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3 | | |
| 1. Alkyd | | |
| New; MPI EXT 5.1Q-G5 (Semigloss) / Existing; MPI REX 5.1D-G5 | | |
| Primer: MPI 23 | Intermediate: MPI 94 | Topcoat: MPI 94 |
| System DFT: 5.25 mils | | |
| New; MPI EXT 5.1Q-G6 (Gloss) / Existing; MPI REX 5.1D-G6 | | |
| Primer: MPI 23 | Intermediate: MPI 9 | Topcoat: MPI 9 |
| System DFT: 5.25 mils | | |
| B. New Steel that has been blast-cleaned to SSPC SP 6/NACE No.3: | | |
| 1. Alkyd | | |
| New; MPI EXT 5.1D-G5 (Semigloss) / Existing; MPI REX 5.1D-G5 | | |
| Primer: MPI 79 | Intermediate: MPI 94 | Topcoat: MPI 94 |
| System DFT: 5.25 mils | | |
| New; MPI EXT 5.1D-G6 (Gloss) / Existing; MPI REX 5.1D-G6 | | |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| Primer: MPI 79 | Intermediate: MPI 9 | Topcoat: MPI 9 |
| System DFT: 5.25 mils | | |
| C. Existing steel that has been spot-blasted to SSPC SP 6/NACE No.3: | | |
| 1. Surface previously coated with alkyd or latex: | | |
| Waterborne Light Industrial Coating | | |
| MPI REX 5.1C-G5 (Semigloss) | | |
| Spot Primer: MPI 79 | Intermediate: MPI 163 | Topcoat: MPI 163 |
| System DFT: 5 mils | | |
| MPI REX 5.1C-G6 (Gloss) | | |
| Spot Primer: MPI 79 | Intermediate: MPI 164 | Topcoat: MPI 164 |
| System DFT: 5 mils | | |
| 2. Surface previously coated with epoxy: | | |
| Waterborne Light Industrial | | |
| a. MPI REX 5.1L-G5 (Semigloss) | | |
| Spot Primer: MPI 101 | Intermediate: MPI 163 | Topcoat: MPI 163 |
| System DFT: 5 mils | | |
| MPI REX 5.1L-G6 (Gloss) | | |
| Spot Primer: MPI 101 | Intermediate: MPI 164 | Topcoat: MPI 164 |
| System DFT: 5 mils | | |
| Pigmented Polyurethane | | |
| b. MPI REX 5.1H-G6 (Gloss) | | |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| Spot Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 72 |
| System DFT: 8.5 mils | | |
| D. New and existing steel blast cleaned to SSPC SP 10/NACE No. 2: | | |
| 1. Waterborne Light Industrial | | |
| MPI EXT 5.1R-G5 (Semigloss) | | |
| Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 163 |
| System DFT: 8.5 mils | | |
| MPI EXT 5.1R-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 164 |
| System DFT: 8.5 mils | | |
| 2. Pigminted Polyurethane | | |
| 2. Pigmented Polyurethane | | |
| MPI EXT 5.1J-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 72 |
| System DFT: 8.5 mils | | |
| E. Metal floors (non-shop-primed surfaces or non-slip deck surfaces) with non-skid additive (NSA), load at manufacturer's recommendations: | | |
| 1. Alkyd Floor Enamel | | |
| MPI EXT 5.1S-G6 (Gloss) | | |
| Primer: MPI 79 | Intermediate: MPI 27 | Topcoat: MPI 27 (plus NSA) |
| System DFT: 5.25 mils | | |
| EXTERIOR GALVANIZED SURFACES | | |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| F. New Galvanized surfaces: | | |
| 1. Cementitious primer / Latex | | |
| MPI EXT 5.3A-G1 (Flat) | | |
| Primer: MPI 26 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 4.5 mils | | |
| MPI EXT 5.3A-G5 (Semigloss) | | |
| Primer: MPI 26 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 4.5 mils | | |
| MPI EXT 5.3A-G6 (Gloss) | | |
| Primer: MPI 26 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 4.5 mils | | |
| 2. Waterborne Primer / Latex | | |
| MPI EXT 5.3H-G1 (Flat) | | |
| Primer: MPI 134 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 4.5 mils | | |
| MPI EXT 5.3H-G5 (Semigloss) | | |
| Primer: MPI 134 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 4.5 mils | | |
| MPI EXT 5.3H-G6 (Gloss) | | |
| Primer: MPI 134 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 4.5 mils | | |
| 3. Waterborne Primer / Waterborne Light Industrial Coating | | |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| MPI EXT 5.3J-G5 (Semigloss) | | |
| Primer: MPI 134 | Intermediate: MPI 163 | Topcoat: MPI 163 |
| System DFT: 4.5 mils | | |
| MPI EXT 5.3J-G6 (Gloss) | | |
| Primer: MPI 134 | Intermediate: MPI 164 | Topcoat: MPI 164 |
| System DFT: 4.5 mils | | |
| 4. Epoxy Primer / Waterborne Light Industrial Coating | | |
| MPI EXT 5.3K-G5 (Semigloss) | | |
| Primer: MPI 101 | Intermediate: MPI 163 | Topcoat: MPI 163 |
| System DFT: 5 mils | | |
| MPI EXT 5.3K-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: MPI 164 | Topcoat: MPI 164 |
| System DFT: 5 mils | | |
| 5. Pigmented Polyurethane | | |
| MPI EXT 5.3L-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: N/A | Topcoat: MPI 72 |
| System DFT: 5 mils | | |
| G. Galvanized surfaces with slight coating deterioration; little or no rusting: | | |
| 1. Waterborne Light Industrial Coating | | |
| MPI REX 5.3J-G5 (Semigloss) | | |
| Primer: MPI 134 | Intermediate: N/A | Topcoat: MPI 163 |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| System DFT: 4.5 mils | | |
| 2. Pigmented Polyurethane | | |
| MPI REX 5.3D-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: N/A | Topcoat: MPI 72 |
| System DFT: 5 mils | | |
| H. Galvanized surfaces with severely deteriorated coating or rusting: | | |
| 1. Waterborne Light Industrial Coating | | |
| MPI REX 5.3L-G5 (Semigloss) | | |
| Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 163 |
| System DFT: 8.5 mils | | |
| MPI REX 5.3L-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 164 |
| System DFT: 8.5 mils | | |
| 2. Pigmented Polyurethane | | |
| MPI REX 5.3K-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: MPI 108 | Topcoat: MPI 72 |
| System DFT: 5 mils | | |
| EXTERIOR SURFACES, OTHER METALS (NON-FERROUS) | | |
| I. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish: | | |
| 1. Alkyd | | |
| MPI EXT 5.4F-G1 (Flat) | | |
| Primer: MPI 95 | Intermediate: MPI 8 | Topcoat: MPI 8 |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| System DFT: 5 mils | | |
| MPI EXT 5.4F-G5 (Semigloss) | | |
| Primer: MPI 95 | Intermediate: MPI 94 | Topcoat: MPI 94 |
| System DFT: 5 mils | | |
| MPI EXT 5.4F-G6 (Gloss) | | |
| Primer: MPI 95 | Intermediate: MPI 9 | Topcoat: MPI 9 |
| System DFT: 5 mils | | |
| 2. Waterborne Light Industrial Coating | | |
| MPI EXT 5.4G-G3 (Eggshell) | | |
| Primer: MPI 95 | Intermediate: MPI 161 | Topcoat: MPI 161 |
| System DFT: 5 mils | | |
| MPI EXT 5.4G-G5 (Semigloss) | | |
| Primer: MPI 95 | Intermediate: MPI 163 | Topcoat: MPI 163 |
| System DFT: 5 mils | | |
| MPI EXT 5.4G-G6 (Gloss) | | |
| Primer: MPI 95 | Intermediate: MPI 164 | Topcoat: MPI 164 |
| System DFT: 5 mils | | |
| J. Existing roof surfaces previously coated: | | |
| 1. Aluminum Pigmented Asphalt Roof Coating | | |
| ASTM D2824: Sufficient coats to provide not less than 8 mils of finished coating system (without asbestos fibers). | | |
| 2. Aluminum Paint | | |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| MPI REX 10.2D | | |
| Primer: MPI 107 | Intermediate: MPI 1 | Topcoat: MPI 1 |
| System DFT: 3.5 mils | | |
| K. Surfaces adjacent to painted surfaces; Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports,exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish: | | |
| 1. Alkyd | | |
| MPI EXT 5.1D-G1 (Flat) | | |
| Primer: MPI 79 | Intermediate: MPI 8 | Topcoat: MPI 8 |
| System DFT: 5.25 mils | | |
| MPI EXT 5.1D-G5 (Semigloss) | | |
| Primer: MPI 79 | Intermediate: MPI 94 | Topcoat: MPI 94 |
| System DFT: 5.25 mils | | |
| MPI EXT 5.1D-G6 (Gloss) | | |
| Primer: MPI 79 | Intermediate: MPI 9 | Topcoat: MPI 9 |
| System DFT: 5.25 mils | | |
| 2. Waterborne Light Industrial Coating | | |
| MPI EXT 5.1C-G3 (Eggshell) | | |
| Primer: MPI 79 | Intermediate: MPI 161 | Topcoat: MPI 161 |
| System DFT: 5 mils | | |
| MPI EXT 5.1C-G5 (Semigloss) | | |
| Primer: MPI 79 | Intermediate: MPI 163 | Topcoat: MPI 163 |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| System DFT: 5 mils | | |
| MPI EXT 5.1C-G6 (Gloss) | | |
| Primer: MPI 79 | Intermediate: MPI 164 | Topcoat: MPI 164 |
| System DFT: 5 mils | | |
| L. Hot metal surfaces including smokestacks subject to temperatures up to 400 degrees F. | | |
| 1. Heat Resistant Enamel | | |
| MPI EXT 5.2A | | |
| Primer: MPI 21 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |
| M. Ferrous metal subject to high temperature, up to 750 degrees F: | | |
| 1. Inorganic Zinc Rich Coating | | |
| MPI EXT 5.2C | | |
| Primer: MPI 19 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |
| 2. Heat Resistant Aluminum Enamel | | |
| MPI EXT 5.2B (Aluminum Finish) | | |
| Primer: MPI 2 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |

| DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| System DFT: Per Manufacturer | | |
| N. New surfaces and Existing surfaces made bare cleaning to SSPC SP 10/NACE No. 2 subject to temperatures up to 1100 degrees F: | | |
| 1. Heat Resistant Coating | | |
| MPI EXT 5.2D | | |
| Primer: MPI 22 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |

| DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES PAINT TABLE | | |
|---|---|---|
| A. New and existing, uncoated Dressed lumber, Wood and plywood, trim, including top, bottom and edges of doors not otherwise specified: | | |
| 1. Alkyd | | |
| MPI EXT 6.3B-G5 (Semigloss) | | |
| Primer: MPI 7 | Intermediate: MPI 94 | Topcoat: MPI 94 |
| System DFT: 5 mils | | |
| MPI EXT 6.3B-G6 (Gloss) | | |
| Primer: MPI 7 | Intermediate: MPI 9 | Topcoat: MPI 9 |
| System DFT: 5 mils | | |
| 2. Latex | | |
| MPI EXT 6.3A-G1 (Flat) | | |
| Primer: MPI 7 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| MPI EXT 6.3A-G5 (Semigloss) | | |

| DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES PAINT TABLE | | |
|---|---|---|
| Primer: MPI 7 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 5 mils | | |
| MPI EXT 6.3A-G6 (Gloss) | | |
| Primer: MPI 7 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 5 mils | | |
| 3. Waterborne Solid Color Stain | | |
| MPI EXT 6.3K | | |
| Primer: MPI 7 | Intermediate: MPI 16 | Topcoat: MPI 16 |
| System DFT: 4.25 mils | | |
| B. Existing, dressed lumber, Wood and plywood, trim including top, bottom and edges of doors previously coated with an alkyd / oil based finish coat not otherwise specified: | | |
| 1. Alkyd | | |
| MPI REX 6.3B-G5 (Semigloss) | | |
| Primer: MPI 5 | Intermediate: MPI 94 | Topcoat: MPI 94 |
| System DFT: 5 mils | | |
| MPI REX 6.3B-G6 (Gloss) | | |
| Primer: MPI 5 | Intermediate: MPI 9 | Topcoat: MPI 9 |
| System DFT: 5 mils | | |
| 2. Latex | | |
| MPI REX 6.3A-G1 (Flat) | | |
| Primer: MPI 5 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 5 mils | | |
| MPI REX 6.3A-G5 (Semigloss) | | |
| Primer: MPI 5 | Intermediate: MPI 11 | Topcoat: MPI 11 |

| DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES PAINT TABLE | | |
|---|---|---|
| System DFT: 5 mils | | |
| MPI REX 6.3A-G6 (Gloss) | | |
| Primer: MPI 5 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 5 mils | | |
| C. Existing, dressed lumber, Wood and plywood, trim, including top, bottom and edges of doors previously coated with a latex / waterborne finish coat not otherwise specified: | | |
| 1. Latex | | |
| MPI REX 6.3L-G1 (Flat) | | |
| Primer: MPI 6 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 5 mils | | |
| MPI REX 6.3L-G5 (Semigloss) | | |
| Spot Primer: MPI 6 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 4.5 mils | | |
| MPI REX 6.3L-G6 (Gloss) | | |
| Spot Primer: MPI 6 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 4.5 mils | | |
| 2. Waterborne Solid Color Stain | | |
| MPI REX 6.3K (Stain) | | |
| Spot Primer: MPI 6 | Intermediate: MPI 16 | Topcoat: MPI 16 |
| System DFT: 4 mils | | |
| D. New, Uncoated wood siding: | | |
| 1. Semi-Transparent Stain | | |
| MPI EXT 6.3D | | |
| Spot Primer: N/A | Intermediate: MPI 13 | Topcoat: MPI 13 |
| System DFT: N/A | | |

| DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES PAINT TABLE | | |
|---|---|---|
| E. Existing, previously stained wood siding: | | |
| 1. Latex | | |
| MPI REX 6.2K-G1 (Flat) | | |
| Primer: MPI 5 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 4.5 mils | | |
| MPI REX 6.2K-G5 (Semigloss) | | |
| Primer: MPI 5 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 4.5 mils | | |
| F. Existing Uncoated or previously semitransparent stained wood siding: | | |
| 1. Semi-Transparent Stain | | |
| MPI REX 6.3D | | |
| Spot Primer: N/A | Intermediate: MPI 13 | Topcoat: MPI 13 |
| System DFT: Per Manufacturer | | |
| G. Wood: Steps, platforms, floors of open porches, and with non-skid additive (NSA), load at manufacturer's recommendations.: | | |
| 1. Latex Floor Paint | | |
| MPI EXT 6.3A-G2 (Flat) | | |
| Primer: MPI 5 | Intermediate: MPI 60 plus NSA | Topcoat: MPI 60 plus NSA |
| System DFT: 4.5 mils | | |
| MPI EXT 6.5A-G6 (Gloss) | | |
| Primer: MPI 5 | Intermediate: MPI 68 plus NSA | Topcoat: MPI 68 plus NSA |
| System DFT: 4.5 mils | | |
| 2. Alkyd Floor Paint | | |

| DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES PAINT TABLE | | |
|---|---|---|
| MPI EXT 6.5B-G2 (Flat) | | |
| Primer: MPI 59 | Intermediate: MPI 59 plus NSA | Topcoat: MPI 59 plus NSA |
| System DFT: 5 mils | | |
| MPI EXT 6.5B-G6 (Gloss) | | |
| Primer: MPI 27 | Intermediate: MPI 27 plus NSA | Topcoat: MPI 27 plus NSA |
| System DFT: 5 mils | | |

| DIVISION 9: EXTERIOR STUCCO PAINT TABLE | | |
|---|---|---|
| A. New and Existing stucco: | | |
| 1. Latex | | |
| New; MPI EXT 9.1A-G1 (Flat) / Existing; MPI REX 9.1A-G2 (Flat) | | |
| Primer: MPI 10 | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 4.5 mils | | |
| New; MPI EXT 9.1A-G5 (Semigloss) / Existing; MPI REX 9.1A-G5 (Semigloss) | | |
| Primer: MPI 11 | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 4.5 mils | | |
| New; MPI EXT 9.1A-G6 (Gloss) / Existing; MPI REX 9.1A-G6 (Gloss) | | |
| Primer: MPI 119 | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 4.5 mils | | |
| Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. On existing stucco, apply primer based on surface condition. | | |

| DIVISION 9: EXTERIOR STUCCO PAINT TABLE | | |
|---|---|---|
| B. New and Existing stucco, elastomeric system: | | |
| 1. Elastomeric Coating | | |
| New; MPI EXT 9.1C / Existing; MPI REX 9.1C | | |
| Primer: See note below. | Intermediate: MPI 113 | Topcoat: MPI 113 |
| System DFT: 16 mils | | |
| Provide Primer recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation, primer and 2 coats in accordance with manufacturer's instructions. | | |
| NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils. | | |

| DIVISION 10: EXTERIOR CLOTH COVERINGS AND BITUMINOUS COATED SURFACES PAINT TABLE | | |
|---|---|---|
| A. Insulation and surfaces of insulation coverings (canvas, cloth, paper): (Interior and Exterior Applications) | | |
| 1. Latex | | |
| MPI EXT 10.1A-G1 (Flat) | | |
| Primer: N/A | Intermediate: MPI 10 | Topcoat: MPI 10 |
| System DFT: 3.2 mils | | |
| MPI EXT 10.1A-G5 (Semigloss) | | |
| Primer: N/A | Intermediate: MPI 11 | Topcoat: MPI 11 |
| System DFT: 3.2 mils | | |
| MPI EXT 10.1A-G6 (Gloss) | | |
| Primer: N/A | Intermediate: MPI 119 | Topcoat: MPI 119 |
| System DFT: 3.2 mils | | |
| Topcoat: Coating to match adjacent surfaces. | | |

## 3.13.2 INTERIOR PAINT TABLES

| DIVISION 3: INTERIOR CONCRETE PAINT TABLE | | |
|---|---|---|
| A. New and uncoated existing and Existing, previously painted concrete; vertical surfaces, not specified otherwise: | | |
| 1. Latex | | |
| New; MPI INT 3.1A-G2 (Flat) / Existing; MPI RIN 3.1A-G2 (Flat) | | |
| Primer: MPI 50 | Intermediate: MPI 44 | Topcoat: MPI 44 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1A-G3 (Eggshell) / Existing; MPI RIN 3.1A-G3 (Eggshell) | | |
| Primer: MPI 50 | Intermediate: MPI 52 | Topcoat: MPI 52 |
| | | |
| New; MPI INT 3.1A-G5 (Semigloss) / Existing; MPI RIN 3.1A-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 54 | Topcoat: MPI 54 |
| System DFT: 4 mils | | |
| 2. High Performance Architectural Latex | | |
| New; MPI INT 3.1C-G2 (Flat) / Existing; MPI RIN 3.1J-G2 (Flat) | | |
| Primer: MPI 50 | Intermediate: MPI 138 | Topcoat: MPI 138 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1C-G3 (Eggshell) / Existing; MPI RIN 3.1J-G3 (Eggshell) | | |
| Primer: MPI 50 | Intermediate: MPI 139 | Topcoat: MPI 139 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1C-G4 (Satin) / Existing; MPI RIN 3.1J-G4 | | |
| Primer: MPI 50 | Intermediate: MPI 140 | Topcoat: MPI 140 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1C-G5 (Semigloss) / Existing; MPI RIN 3.1J-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 4 mils | | |

| DIVISION 3: INTERIOR CONCRETE PAINT TABLE | | |
|---|---|---|
| 3. Institutional Low Odor / Low VOC Latex | | |
| New; MPI INT 3.1M-G2 (Flat) / Existing; MPI RIN 3.1L-G2 (Flat) | | |
| Primer: MPI 50 | Intermediate: MPI 144 | Topcoat: MPI 144 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1M-G3 (Eggshell) / Existing; MPI RIN 3.1L-G3 (Eggshell) | | |
| Primer: MPI 50 | Intermediate: MPI 145 | Topcoat: MPI 145 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1M-G4 (Satin) / Existing; MPI RIN 3.1L-G4 | | |
| Primer: MPI 50 | Intermediate: MPI 146 | Topcoat: MPI 146 |
| System DFT: 4 mils | | |
| New; MPI INT 3.1M-G5 (Semigloss) / Existing; MPI RIN 3.1L-G5 (Semogloss) | | |
| Primer: MPI 50 | Intermediate: MPI 147 | Topcoat: MPI 147 |
| System DFT: 4 mils | | |
| B. Concrete ceilings, uncoated: | | |
| 1. Latex Aggregate | | |
| MPI INT 3.1N | | |
| Primer: N/A | Intermediate: N/A | Topcoat: MPI 42 |
| System DFT: Per Manufacturer | | |
| Texture - Fine Medium Coarse. Surface preparation, number of coats, and primer in accordance with manufacturer's instructions. Topcoat: Coating to match adjacent surfaces. | | |
| C. New and uncoated existing and Existing, previously painted Concrete in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, _____ and other high-humidity areas not otherwise specified except floors: | | |
| 1. Waterborne Light Industrial Coating | | |
| New; MPI INT 3.1L-G3 (Eggshell) / Existing; MPI RIN 3.1C-G3 (Eggshell) | | |
| Primer: MPI 151 | Intermediate: MPI 151 | |
| System DFT: 4.8 mils | | |

| DIVISION 3: INTERIOR CONCRETE PAINT TABLE | | |
|---|---|---|
| New; MPI INT 3.1L-G5 (Semigloss) / Existing; MPI RIN 3.1C-G5 (Semigloss) | | |
| Primer: MPI 153 | Intermediate: MPI 153 | Topcoat: MPI 153 |
| System DFT: 4.8 mils | | |
| New; MPI INT 3.1L-G6 (Gloss) / Existing; MPI RIN 3.1C-G6 (Gloss) | | |
| Primer: MPI 154 | Intermediate: MPI 154 | Topcoat: MPI 154 |
| System DFT: 4.8 mils | | |
| 2. Alkyd | | |
| New; MPI INT 3.1D-G3 (Eggshell) / Existing; RIN 3.1D-G3 (Eggshell) | | |
| Primer: MPI 50 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 4.5 mils | | |
| New; MPI INT 3.1D-G5 (Semigloss) / Existing; RIN 3.1D-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | |
| New; MPI INT 3.1D-G6 (Gloss) / Existing; RIN 3.1D-G6 (Gloss) | | |
| Primer: MPI 50 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | |
| 3. Epoxy | | |
| New; MPI INT 3.1F-G6 (Gloss) / Existing; MPI RIN 3.1E-G6 (Gloss) | | |
| Primer: MPI 77 | Intermediate: MPI 77 | Topcoat: MPI 77 |
| System DFT: 4 mils | | |
| Note: Primer may be reduced for penetration per manufacturer's instructions. | | |
| D. New and uncoated existing and Existing, previously painted concrete: walls and bottom of swimming pools. | | |
| 1. Chlorinated Rubber | | |

| DIVISION 3: INTERIOR CONCRETE PAINT TABLE | | |
|---|---|---|
| Primer: SSPC Paint 18 | Intermediate: SSPC Paint 18 | Topcoat: SSPC Paint 18 |
| System DFT: Per Manufacturer | | |
| Note: Primer may be reduced for penetration per manufacturer's instructions. | | |
| 2. Epoxy | | |
| New; MPI INT 3.1F / Existing; MPI RIN 3.1E | | |
| Primer: MPI 77 | Intermediate: MPI 77 | Topcoat: MPI 77 |
| System DFT: 4 mils | | |
| Note: Primer may be reduced for penetration per manufacturer's instructions. | | |
| E. New and uncoated existing and Existing, previously painted concrete floors in following areas _____: | | |
| 1. Latex Floor Paint | | |
| New; MPI INT 3.2A-G2 (Flat) / Existing; MPI RIN 3.3A-G2 (Flat) | | |
| Primer: MPI 60 | Intermediate: MPI 60 | Topcoat: MPI 60 |
| System DFT: 5 mils | | |
| 2. Alkyd Floor Paint | | |
| New; MPI INT 3.2B-G2 (Flat) / Existing; MPI RIN 3.2B-G2 (Flat) | | |
| Primer: MPI 59 | Intermediate: MPI 59 | Topcoat: MPI 59 |
| System DFT: 5 mils | | |
| 3. Epoxy | | |
| New; MPI INT 3.2C-G6 (Gloss) / Existing; MPI REX 3.2C-G6 (Gloss) | | |
| Primer: MPI 77 | Intermediate: MPI 77 | Topcoat: MPI 77 |
| System DFT: 5 mils | | |
| Note: Primer may be reduced for penetration per manufacturer's instructions. | | |

| DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | | |
|---|---|---|---|
| A. New and uncoated Existing Concrete masonry: | | | |
| 1. High Performance Architectural Latex | | | |
| MPI INT 4.2D-G2 (Flat) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 138 | Topcoat: MPI 138 |
| System DFT: 11 mils | | | |
| MPI INT 4.2D-G3 (Eggshell) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 139 | |
| System DFT: 11 mils | | | |
| MPI INT 4.2D-G4 (Satin) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 140 | Topcoat: MPI 140 |
| System DFT: 11 mils | | | |
| MPI INT 4.2D-G5 (Semigloss) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 11 mils | | | |
| Fill all holes in masonry surface | | | |
| 2. Institutional Low Odor / Low VOC Latex | | | |
| New; MPI INT 4.2E-G2 (Flat) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 144 | |
| System DFT: 4 mils | | | |
| New; MPI INT 4.2E-G3 (Eggshell) | | | |

| DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | | |
|---|---|---|---|
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 145 | Topcoat: MPI 145 |
| System DFT: 4 mils | | | |
| New; MPI INT 4.2E-G4 (Satin) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 146 | |
| System DFT: 4 mils | | | |
| New; MPI INT 4.2E-G5 (Semigloss) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 147 | Topcoat: MPI 147 |
| System DFT: 4 mils | | | |
| B. Existing, previously painted Concrete masonry: | | | |
| 1. High Performance Architectural Latex | | | |
| MPI RIN 4.2K-G2 (Flat) | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 138 | | Topcoat: MPI 138 |
| System DFT: 4.5 mils | | | |
| MPI RIN 4.2K-G3 (Eggshell) | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 139 | | Topcoat: MPI 139 |
| System DFT: 4.5 mils | | | |
| MPI RIN 4.2K-G4 | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 140 | | Topcoat: MPI 140 |
| System DFT: 4.5 mils | | | |
| MPI RIN 4.2K-G5 (Semigloss) | | | |

| DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | | |
|---|---|---|---|
| Spot Primer: MPI 50 | Intermediate: MPI 141 | | Topcoat: MPI 141 |
| System DFT: 4.5 mils | | | |
| 2. Institutional Low Odor / Low VOC Latex | | | |
| Existing; MPI RIN 4.2L-G2 (Flat) | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 144 | | Topcoat: MPI 144 |
| System DFT: 4 mils | | | |
| Existing; MPI RIN 4.2L-G3 (Eggshell) | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 145 | | |
| System DFT: 4 mils | | | |
| Existing; MPI RIN 4.2L-G4 (Satin) | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 146 | | Topcoat: MPI 146 |
| System DFT: 4 mils | | | |
| Existing; MPI RIN 4.2L-G5 (Semigloss) | | | |
| Spot Primer: MPI 50 | Intermediate: MPI 147 | | Topcoat: MPI 147 |
| System DFT: 4 mils | | | |
| C. New and uncoated Existing Concrete masonry units in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, _____, and other high humidity areas unless otherwise specified: | | | |
| 1. Waterborne Light Industrial Coating | | | |
| MPI INT 4.2K-G3(Eggshell) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 151 | Topcoat: MPI 151 |
| System DFT: 11 mils | | | |
| MPI INT 4.2K-G5(Semigloss) | | | |

| DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | | |
|---|---|---|---|
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 153 | Topcoat: MPI 153 |
| System DFT: 11 mils | | | |
| MPI INT 4.2K-G6(Gloss) | | | |
| Filler: MPI 4 | Primer: N/A | Intermediate: MPI 154 | Topcoat: MPI 154 |
| System DFT: 11 mils | | | |
| Fill all holes in masonry surface | | | |
| 2. Alkyd | | | |
| MPI INT 4.2N-G3 (Eggshell) | | | |
| Filler: MPI 4 | Primer: MPI 50 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 12 mils | | | |
| MPI INT 4.2N-G5 (Semigloss) | | | |
| Filler: MPI 4 | Primer: MPI 50 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 12 mils | | | |
| MPI INT 4.2N-G6 (Gloss) | | | |
| Filler: MPI 4 | Primer: MPI 50 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 12 mils | | | |
| Fill all holes in masonry surface | | | |
| 3. Epoxy | | | |
| Filler: MPI 116 | Primer: N/A | Intermediate: MPI 77 | Topcoat: MPI 77 |
| System DFT: 10 mils | | | |
| Fill all holes in masonry surface | | | |

| DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | |
|---|---|---|
| D. Existing, previously painted, concrete masonry units in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, , and other high humidity areas unless otherwise specified: | | |
| 1. Waterborne Light Industrial Coating | | |
| MPI RIN 4.2G-G3(Eggshell) | | |
| Spot Primer: MPI 151 | Intermediate: MPI 151 | Topcoat: MPI 151 |
| System DFT: 4.5 mils | | |
| MPI RIN 4.2G-G5(Semigloss) | | |
| Spot Filler: MPI 153 | Intermediate: MPI 153 | Topcoat: MPI 153 |
| System DFT: 4.5 mils | | |
| MPI RIN 4.2G-G6(Gloss) | | |
| Spot Primer: MPI 154 | Intermediate: MPI 154 | Topcoat: MPI 154 |
| System DFT: 4.5 mils | | |
| 2. Alkyd | | |
| MPI RIN 4.2C-G3 (Eggshell) | | |
| Spot Primer: MPI 50 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 4.5 mils | | |
| MPI RIN 4.2C-G5 (Semigloss) | | |
| Spot Primer: MPI 50 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | |
| MPI RIN 4.2C-G6 (Gloss) | | |
| Spot Primer: MPI 50 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | |

| DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE | | |
|---|---|---|
| 3. Epoxy | | |
| MPI RIN 4.2D-G6 (Gloss) | | |
| Spot Primer: MPI 77 | Intermediate: MPI 77 | Topcoat: MPI 77 |
| System DFT: 5 mils | | |

| DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| INTERIOR STEEL / FERROUS SURFACES | | |
| A. Metal, Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports,Surfaces adjacent to painted surfaces (Match surrounding finish), exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment: | | |
| 1. High Performance Architectural Latex | | |
| MPI INT 5.1R-G2 (Flat) | | |
| Primer: MPI 138 | Intermediate: MPI 138 | Topcoat: MPI 138 |
| System DFT: 5 mils | | |
| MPI INT 5.1R-G3 (Eggshell) | | |
| Primer: MPI 79 | Intermediate: MPI 139 | Topcoat: MPI 139 |
| System DFT: 5 mils | | |
| MPI INT 5.1R-G5 (Semigloss) | | |
| Primer: MPI 79 | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 5 mils | | |
| 2. Alkyd | | |
| MPI INT 5.1E-G2 (Flat) | | |
| Primer: MPI 79 | Intermediate: MPI 49 | Topcoat: MPI 49 |
| System DFT: 5.25 mils | | |
| MPI INT 5.1E-G3 (Eggshell) | | |
| Primer: MPI 79 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 5.25 mils | | |
| MPI INT 5.1E-G5 (Semigloss) | | |
| Primer: MPI 79 | Intermediate: MPI 47 | Topcoat: MPI 47 |

| DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| INTERIOR STEEL / FERROUS SURFACES | | |
| System DFT: 5.25 mils | | |
| MPI INT 5.1E-G6 (Gloss) | | |
| Primer: MPI 79 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 5.25 mils | | |
| B. Metal floors (non-shop-primed surfaces or non-slip deck surfaces) with non-skid additive (NSA), load at manufacturer's recommendations: | | |
| 1. Alkyd Floor Paint | | |
| MPI INT 5.1U-G6 (Gloss) | | |
| Primer: MPI 79 | Intermediate: MPI 27 | Topcoat: MPI 27 (plus NSA) |
| System DFT: 5.25 mils | | |
| 2. Epoxy | | |
| MPI INT 5.1L-G6 (Gloss) | | |
| Primer: MPI 101 | Intermediate: MPI 77 | Topcoat: MPI 77 (plus NSA) |
| System DFT: 5.25 mils | | |
| C. Metal in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, _____, and other high-humidity areas not otherwise specified except floors, hot metal surfaces, and new prefinished equipment: | | |
| 1. Alkyd | | |
| MPI INT 5.1E-G3 (Eggshell) | | |
| Primer: MPI 79 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 5.25 mils | | |
| MPI INT 5.1E-G5 (Semigloss) | | |
| Primer: MPI 79 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 5.25 mils | | |
| MPI INT 5.1E-G6 (Gloss) | | |
| Primer: MPI 79 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 5.25 mils | | |
| 2. Alkyd | | |
| MPI INT 5.1T-G3 (Eggshell) For hand tool cleaning | | |
| Primer: MPI 23 | Intermediate: MPI 51 | Topcoat: MPI 51 |

| DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| INTERIOR STEEL / FERROUS SURFACES | | |
| System DFT: 5.25 mils | | |
| MPI INT 5.1T-G5 (Semigloss) | | |
| Primer: MPI 23 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 5.25 mils | | |
| MPI INT 5.1T-G6 (Gloss) | | |
| Primer: MPI 23 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 5.25 mils | | |
| D. Ferrous metal in concealed damp spaces or in exposed areas having unpainted adjacent surfaces as follows: | | |
| 1. Aluminum Paint | | |
| MPI INT 5.1M | | |
| Primer: MPI 79 | Intermediate: MPI 1 | Topcoat: MPI 1 |
| System DFT: 4.25 mils | | |
| E. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish: | | |
| 1. High Performance Architectural Latex | | |
| MPI INT 5.4F-G2 (Flat) | | |
| Primer: MPI 95 | Intermediate: MPI 138 | Topcoat: MPI 138 |
| System DFT: 5 mils | | |
| MPI INT 5.4F-G3 (Eggshell) | | |
| Primer: MPI 95 | Intermediate: MPI 139 | Topcoat: MPI 139 |
| System DFT: 5 mils | | |
| MPI INT 5.4F-G4 (Satin) | | |
| Primer: MPI 95 | Intermediate: MPI 140 | Topcoat: MPI 140 |
| System DFT: 5 mils | | |
| MPI INT 5.4F-G5 (Semigloss) | | |
| Primer: MPI 95 | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 5 mils | | |
| 2. Alkyd | | |

| DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| INTERIOR STEEL / FERROUS SURFACES | | |
| MPI INT 5.4J-G2 (Flat) | | |
| Primer: MPI 95 | Intermediate: MPI 49 | Topcoat: MPI 49 |
| System DFT: 5 mils | | |
| MPI INT 5.4J-G3 (Eggshell) | | |
| Primer: MPI 95 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 5 mils | | |
| MPI INT 5.4J-G5 (Semigloss) | | |
| Primer: MPI 95 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 5 mils | | |
| MPI INT 5.4J-G6 (Gloss) | | |
| Primer: MPI 95 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 5 mils | | |
| F. Hot metal surfaces including smokestacks subject to temperatures up to 400 degrees F: | | |
| 1. Heat Resistant Enamel | | |
| MPI INT 5.2A | | |
| Primer: MPI 21 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |
| G. Ferrous metal subject to high temperature, up to 750 degrees F: | | |
| 1. Inorganic Zinc Rich Coating | | |
| MPI INT 5.2C | | |

| DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE | | |
|---|---|---|
| INTERIOR STEEL / FERROUS SURFACES | | |
| Primer: MPI 19 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |
| 2. Heat Resistant Aluminum Paint | | |
| MPI INT 5.2B (Aluminum Finish) | | |
| Primer: MPI 2 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |
| H. New surfaces and made bare cleaning to SSPC SP 10/NACE No. 2 subject to temperatures up to 1100 degrees F: | | |
| 1. High Heat Resistant Coating | | |
| MPI INT 5.2D | | |
| Primer: MPI 22 | Intermediate: Surface preparation and number of coats per manufacturer's instructions. | Topcoat: Surface preparation and number of coats per manufacturer's instructions. |
| System DFT: Per Manufacturer | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | |
|---|---|---|
| A. New and Existing, uncoated Wood and plywood not otherwise specified: | | |
| 1. High Performance Architectural Latex | | |
| MPI INT 6.4S-G3 (Eggshell) | | |
| Primer: MPI 39 | Intermediate: MPI 139 | Topcoat: MPI 139 |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | |
|---|---|---|
| System DFT: 4.5 mils | | |
| MPI INT 6.4S-G4 (Satin) | | |
| Primer: MPI 39 | Intermediate: MPI 140 | Topcoat: MPI 140 |
| System DFT: 4.5 mils | | |
| MPI INT 6.4S-G5 (Semigloss) | | |
| Primer: MPI 39 | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 4.5 mils | | |
| 2. Alkyd | | |
| MPI INT 6.4B-G3 (Eggshell) | | |
| Primer: MPI 45 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 4.5 mils | | |
| MPI INT 6.4B-G5 (Semigloss) | | |
| Primer: MPI 45 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | |
| MPI INT 6.4B-G6 (Gloss) | | |
| Primer: MPI 45 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | |
| 3. Institutional Low Odor / Low VOC Latex | | |
| New; MPI INT 6.3V-G2 (Flat) | | |
| Primer: MPI 39 | Intermediate: MPI 144 | Topcoat: MPI 144 |
| System DFT: 4 mils | | |
| New; MPI INT 6.3V-G3 (Eggshell) | | |
| Primer: MPI 39 | Intermediate: MPI 145 | Topcoat: MPI 145 |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | |
|---|---|---|
| System DFT: 4 mils | | |
| New; MPI INT 6.3V-G4 | | |
| Primer: MPI 39 | Intermediate: MPI 146 | Topcoat: MPI 146 |
| System DFT: 4 mils | | |
| New; MPI INT 6.3V-G5 (Semigloss) | | |
| Primer: MPI 39 | Intermediate: MPI 147 | Topcoat: MPI 147 |
| System DFT: 4 mils | | |
| B. Existing, previously painted Wood and plywood not otherwise specified: | | |
| 1. High Performance Architectural Latex | | |
| MPI RIN 6.4B-G3 (Eggshell) | | |
| Primer: MPI 46 | Intermediate: MPI 139 | Topcoat: MPI 139 |
| System DFT: 4.5 mils | | |
| MPI RIN 6.4B-G4 (Satin) | | |
| Primer: MPI 46 | Intermediate: MPI 140 | Topcoat: MPI 140 |
| System DFT: 4.5 mils | | |
| MPI RIN 6.4B-G5 (Semigloss) | | |
| Primer: MPI 46 | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 4.5 mils | | |
| 2. Alkyd | | |
| MPI RIN 6.4C-G3 (Eggshell) | | |
| Primer: MPI 46 | Intermediate: MPI 51 | Topcoat: MPI 51 |
| System DFT: 4.5 mils | | |
| MPI RIN 6.4C-G5 (Semigloss) | | |
| Primer: MPI 46 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | |
| MPI RIN 6.4C-G6 (Gloss) | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | |
|---|---|---|
| Primer: MPI 46 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | |
| 3. Institutional Low Odor / Low VOC Latex | | |
| Existing; MPI RIN 6.4D-G2 (Flat) | | |
| Primer: MPI 39 | Intermediate: MPI 144 | Topcoat: MPI 144 |
| System DFT: 4 mils | | |
| Existing; MPI RIN 6.4D-G3 (Eggshell) | | |
| Primer: MPI 39 | Intermediate: MPI 145 | Topcoat: MPI 145 |
| System DFT: 4 mils | | |
| Existing; MPI RIN 6.4D-G4 | | |
| Primer: MPI 39 | Intermediate: MPI 146 | Topcoat: MPI 146 |
| System DFT: 4 mils | | |
| Existing; MPI RIN 6.4D-G5 (Semigloss) | | |
| Primer: MPI 39 | Intermediate: MPI 147 | Topcoat: MPI 147 |
| System DFT: 4 mils | | |
| C. New and Existing, previously finished or stained Wood and Plywood, except floors; natural finish or stained: | | |
| 1. Natural finish, oil-modified polyurethane | | |
| New; MPI INT 6.4J-G4 / Existing; MPI RIN 6.4L-G4 | | |
| Primer: MPI 57 | Intermediate: MPI 57 | Topcoat: MPI 57 |
| System DFT: 4 mils | | |
| New; MPI INT 6.4J-G6 (Gloss) / Existing; MPI RIN 6.4L-G6 (Gloss) | | |
| Primer: MPI 56 | Intermediate: MPI 56 | Topcoat: MPI 56 |
| System DFT: 4 mils | | |
| 2. Stained, oil-modified polyurethane | | |
| New; MPI INT 6.4E-G4 / Existing; MPI RIN 6.4G-G4 | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | | |
|---|---|---|---|
| Stain: MPI 90 | Primer: MPI 57 | Intermediate: MPI 57 | Topcoat: MPI 57 |
| System DFT: 4 mils | | | |
| New; MPI INT 6.4E-G6 (Gloss) / Existing; MPI RIN 6.4G-G6 (Gloss) | | | |
| Stain: MPI 90 | Primer: MPI 56 | Intermediate: MPI 56 | Topcoat: MPI 56 |
| System DFT: 4 mils | | | |
| 3. Stained, Moisture Cured Urethane | | | |
| New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat) | | | |
| Stain: MPI 90 | Primer: MPI 71 | Intermediate: MPI 71 | Topcoat: MPI 71 |
| System DFT: 4 mils | | | |
| New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss) | | | |
| Stain: MPI 90 | Primer: MPI 31 | Intermediate: MPI 31 | Topcoat: MPI 31 |
| System DFT: 4 mils | | | |
| D. New and Existing, previously finished or stained Wood Floors; Natural finish or stained: | | | |
| 1. Natural finish, oil-modified polyurethane | | | |
| New; MPI INT 6.5C-G6 (Gloss) / Existing; MPI RIN 6.5C-G6 (Gloss) | | | |
| Primer: MPI 56 | Intermediate: MPI 56 | | Topcoat: MPI 56 |
| System DFT: 4 mils | | | |
| 2. Natural finish, Moisture Cured Polyurethane | | | |
| New; MPI INT 6.5K-G6 (Gloss) / Existing; MPI RIN 6.5D-G6 (Gloss) | | | |
| Primer: MPI 31 | Intermediate: MPI 31 | | Topcoat: MPI 31 |
| System DFT: 4 mils | | | |
| 3. Stained, oil-modified polyurethane | | | |
| New; MPI INT 6.5B-G6 (Gloss) / Existing; MPI RIN 6.5B-G6 (Gloss) | | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | | |
|---|---|---|---|
| Stain: MPI 90 | Primer: MPI 56 | Intermediate: MPI 56 | Topcoat: MPI 56 |
| System DFT: 4 mils | | | |
| 4. Stained, Moisture Cured Polyurethane | | | |
| New; MPI INT 6.5J-G6 (Gloss) / Existing; MPI RIN 6.5L-G6 (Gloss) | | | |
| Stain: MPI 90 | Primer: MPI 31 | Intermediate: MPI 31 | Topcoat: MPI 31 |
| System DFT: 4 mils | | | |
| E. New and Existing, previously coated Wood floors; pigmented finish: | | | |
| 1. Latex Floor Paint | | | |
| New; MPI INT 6.5G-G2 (Flat) / Existing; MPI RIN 6.5J-G2 (Flat) | | | |
| Primer: MPI 45 | Intermediate: MPI 60 | | Topcoat: MPI 60 |
| System DFT: 4.5 mils | | | |
| New; MPI INT 6.5G-G6 (Gloss) / Existing; MPI RIN 6.5J-G6 (Gloss) | | | |
| Primer: MPI 45 | Intermediate: MPI 68 | | Topcoat: MPI 68 |
| System DFT: 4.5 mils | | | |
| 2. Alkyd Floor Paint | | | |
| New; MPI INT 6.5A-G2 (Flat) / Existing; MPI RIN 6.5A-G2 (Flat) | | | |
| Primer: MPI 59 | Intermediate: MPI 59 | | Topcoat: MPI 59 |
| System DFT: 4.5 mils | | | |
| New; MPI INT 6.5A-G6 (Gloss) / Existing; MPI RIN 6.5A-G6 (Gloss) | | | |
| Primer: MPI 27 | Intermediate: MPI 27 | | Topcoat: MPI 27 |
| System DFT: 4.5 mils | | | |
| F. New and Existing, uncoated wood surfaces in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, otherwise specified: | | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | |
|---|---|---|
| 1. As specified in Section 09 96 59 HIGH-BUILD GLAZE COATINGS. | | |
| 2. Waterborne Light Industrial | | |
| MPI INT 6.3P-G5 (Semigloss) | | |
| Primer: MPI 45 | Intermediate: MPI 153 | Topcoat: MPI 153 |
| System DFT: 4.5 mils | | |
| MPI INT 6.3P-G6 (Gloss) | | |
| Primer: MPI 45 | Intermediate: MPI 154 | Topcoat: MPI 154 |
| System DFT: 4.5 mils | | |
| 3. Alkyd | | |
| MPI INT 6.3B-G5 (Semigloss) | | |
| Primer: MPI 45 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | |
| MPI INT 6.3B-G6 (Gloss) | | |
| Primer: MPI 45 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | |
| G. Existing, previously painted wood surfaces in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, otherwise specified: | | |
| 1. As specified in Section 09 96 59 HIGH-BUILD GLAZE COATINGS. | | |
| 2. Waterborne Light Industrial Coating | | |
| MPI RIN 6.3P-G5 (Semigloss) | | |
| Primer: MPI 46 | Intermediate: MPI 153 | Topcoat: MPI 153 |
| System DFT: 4.5 mils | | |
| MPI RIN 6.3P-G6 (Gloss) | | |
| Primer: MPI 46 | Intermediate: MPI 154 | Topcoat: MPI 154 |
| System DFT: 4.5 mils | | |
| 3. Alkyd | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | | |
|---|---|---|---|
| MPI RIN 6.3B-G5 (Semigloss) | | | |
| Primer: MPI 46 | Intermediate: MPI 47 | | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | | |
| MPI RIN 6.3B-G6 (Gloss) | | | |
| Primer: MPI 46 | Intermediate: MPI 48 | | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | | |
| H. New and Existing, previously finished or stained Wood Doors; Natural Finish or Stained: | | | |
| 1. Natural finish, oil-modified polyurethane | | | |
| New; MPI INT 6.3K-G4 / Existing; MPI RIN 6.3K-G4 | | | |
| Primer: MPI 57 | Intermediate: MPI 57 | | Topcoat: MPI 57 |
| System DFT: 4 mils | | | |
| New; MPI INT 6.3K-G6 (Gloss) / Existing; MPI RIN 6.3K-G6 (Gloss) | | | |
| Primer: MPI 56 | Intermediate: MPI 56 | | Topcoat: MPI 56 |
| System DFT: 4 mils | | | |
| Note: Sand between all coats per manufacturers recommendations. | | | |
| 2. Stained, oil-modified polyurethane | | | |
| New; MPI INT 6.3E-G4 / Existing; MPI RIN 6.3E-G4 | | | |
| Stain: MPI 90 | Primer: MPI 57 | Intermediate: MPI 57 | Topcoat: MPI 57 |
| System DFT: 4 mils | | | |
| New; MPI INT 6.3E-G6 (Gloss) / Existing; MPI RIN 6.3E-G6 (Gloss) | | | |
| Stain: MPI 90 | Primer: MPI 56 | Intermediate: MPI 56 | Topcoat: MPI 56 |
| System DFT: 4 mils | | | |
| Note: Sand between all coats per manufacturers recommendations. | | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | | |
|---|---|---|---|
| 3. Stained, Moisture Cured Urethane | | | |
| New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat) | | | |
| Stain: MPI 90 | Primer: MPI 71 | Intermediate: MPI 71 | Topcoat: MPI 71 |
| System DFT: 4 mils | | | |
| New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss) | | | |
| Stain: MPI 90 | Primer: MPI 31 | Intermediate: MPI 31 | Topcoat: MPI 31 |
| System DFT: 4 mils | | | |
| Note: Sand between all coats per manufacturers recommendations. | | | |
| I. New and Existing, uncoated Wood Doors; Pigmented finish: | | | |
| 1. Alkyd | | | |
| New; MPI INT 6.3B-G5 (Semigloss) | | | |
| Primer: MPI 45 | Intermediate: MPI 47 | | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | | |
| New; MPI INT 6.3B-G6 (Gloss) | | | |
| Primer: MPI 45 | Intermediate: MPI 48 | | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | | |
| Note: Sand between all coats per manufacturers recommendations. | | | |
| 2. Pigmented Polyurethane | | | |
| New; MPI INT 6.1E-G6 (Gloss) | | | |
| Primer: MPI 72 | Intermediate: MPI 72 | | Topcoat: MPI 72 |
| System DFT: 4.5 mils | | | |
| Note: Sand between all coats per manufacturers recommendations. | | | |
| J. Existing, previously painted Wood Doors; Pigmented finish: | | | |
| 1. Alkyd | | | |
| New; MPI RIN 6.3B-G5 (Semigloss) | | | |

| DIVISION 6: INTERIOR WOOD PAINT TABLE | | |
|---|---|---|
| Primer: MPI 46 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4.5 mils | | |
| New; MPI RIN 6.3B-G6 (Gloss) | | |
| Primer: MPI 46 | Intermediate: MPI 48 | Topcoat: MPI 48 |
| System DFT: 4.5 mils | | |
| Note: Sand between all coats per manufacturers recommendations. | | |

| DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE | | |
|---|---|---|
| A. New and Existing, previously painted Plaster and Wallboard not otherwise specified: | | |
| 1. Latex | | |
| New; MPI INT 9.2A-G2 (Flat) / Existing; RIN 9.2A-G2 (Flat) | | |
| Primer: MPI 50 | Intermediate: MPI 44 | Topcoat: MPI 44 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2A-G3 (Eggshell) / Existing; RIN 9.2A-G3 (Eggshell) | | |
| Primer: MPI 50 | Intermediate: MPI 52 | Topcoat: MPI 52 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2A-G5 (Semigloss) / Existing; RIN 9.2A-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 54 | Topcoat: MPI 54 |
| System DFT: 4 mils | | |
| 2. High Performance Architectural Latex - High Traffic Areas | | |
| New; MPI INT 9.2B-G2 (Flat) / Existing; MPI RIN 9.2B-G2 (Flat) | | |
| Primer: MPI 50 | Intermediate: MPI 138 | Topcoat: MPI 138 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell) | | |

| DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE | | |
|---|---|---|
| Primer: MPI 50 | Intermediate: MPI 139 | Topcoat: MPI 139 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 141 | Topcoat: MPI 141 |
| System DFT: 4 mils | | |
| 3. Institutional Low Odor / Low VOC Latex | | |
| New; MPI INT 9.2M-G2 (Flat) / Existing; MPI RIN 9.2M-G2 (Flat) | | |
| Primer: MPI 50 | Intermediate: MPI 144 | Topcoat: MPI 144 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell) | | |
| Primer: MPI 50 | Intermediate: MPI 145 | Topcoat: MPI 145 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin) | | |
| Primer: MPI 50 | Intermediate: MPI 146 | Topcoat: MPI 146 |
| System DFT: 4 mils | | |
| New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 147 | Topcoat: MPI 147 |
| System DFT: 4 mils | | |
| B. New and Existing, previously painted Plaster and Wallboard in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, areas requiring a high degree of sanitation, _____ and other high humidity areas not otherwise specified: | | |
| 1. Waterborne Light Industrial Coating | | |
| New; MPI INT 9.2L-G5(Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 153 | Topcoat: MPI 153 |
| System DFT: 4 mils | | |
| 2. Alkyd | | |

| DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE | | |
|---|---|---|
| New; MPI INT 9.2C-G5 (Semigloss) / Existing; MPI RIN 9.2C-G5 (Semigloss) | | |
| Primer: MPI 50 | Intermediate: MPI 47 | Topcoat: MPI 47 |
| System DFT: 4 mils | | |
| 3. Epoxy | | |
| New; MPI INT 9.2E-G6 (Gloss) / Existing; MPI RIN 9.2D-G6 (Gloss) | | |
| Primer: MPI 50 | Intermediate: MPI 77 | Topcoat: MPI 77 |
| System DFT: 4 mils | | |

## 3.14 PROJECT PAINT SELECTOR GUIDE

Select paints from the above tables in accordance with the following instructions. For materials or surfaces not addressed herein, provide paint in accordance with manufacturer's recommendations applicable to the material, condition, location, and previous coatings (if any) on the surface in question.

### 3.14.1 EXTERIOR

As applicable:

Div. 3: Concrete

General application: Elastomeric Coating

Div. 4: Concrete Masonry Units

General application: Block filler, Elastomeric Coating

Div. 5: Metal, Ferrous, and Non-Ferrous

General application: Alkyd, gloss

Galvanized surfaces: Waterborne light industrial coating, gloss

Div. 6: Wood, Dressed Lumber, Paneling, Decking, Shingles

General application: Latex, gloss

Div. 9: Stucco

General application: Elastomeric Coating

Div. 10: Cloth (interior and exterior inusulation coverings)

General application: Latex, semigloss

### 3.14.2 INTERIOR

Div. 3: Concrete

General application: High Performance Architectural Latex*, semigloss
*if existing surface has alkyd, use alkyd, semigloss

Concrete ceilings: Latex Aggregate, Medium Texture

Sanitary, restrooms, high humidity locations: Alkyd, gloss.

Concrete floors: Polish, apply hardener, Clean and Seal

Div. 4: Concrete Masonry Units

General application: Block filler, High Performance Architectural Latex, semigloss

Sanitary, restrooms, high humidity locations: Alkyd, gloss

Div. 5: Metal, Ferrous, and Non-Ferrous

General application: High Performance Architectural Latex, gloss

Metal floors: Alkyd, gloss

Sanitary, restrooms, high humidiy locations: Alkyd, gloss

Div. 6: Wood

General application and Trim: High Performance Architectural Latex, semigloss

Stained: Natural finish, oil-modified polyurethane

Wood floors: See spec section for wood flooring

Sanitary, restrooms, high humidity locations: Alkyd, gloss

Wood doors: See spec section for wood doors (if applicable)

Div. 9: Plaster, Gypsum Board, Textured Surfaces

General application: High Performance Architectural Latex, eggshell

Sanitary, restrooms, high humidity locations: Alkyd, gloss

3.14.3 GENERAL PROJECT PAINTING NOTES

The PROJECT PAINT SELECTOR GUIDE is to be followed for locations and conditions as described. For locations, surfaces, or conditions not specifically addressed, select product that is most compatible to above selections and in accordance with manufacturer's written recommendations.

If multiple products are appropriate or if there is not a readily appropriate selection, contact the Contracting Officer for a final decision.

Colors are as indicated, see finish schedule, color schedule, and related notes. See Color Schedule on drawings. Contracting Officer reserves the right to select other colors from manufacturer's standard selections. Contracting Officer shall make final decision on colors.

Exterior colors shall be in compliance with the BEAP. Contracting Officer can provide Contractor with BEAP requirements and colors.

-- End of Section --

# SECTION 10 28 13

# TOILET ACCESSORIES

**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 C 1036 | (2006) Standard Specification for Flat Glass |

### 1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Finishes;
Accessory Items;

Manufacturer's descriptive data and catalog cuts indicating materials of construction, fasteners proposed for use for each type of wall construction, mounting instructions, operation instructions, and cleaning instructions.

SD-04 Samples

Finishes;
Accessory Items;

One sample of each accessory proposed for use. Incorporate approved samples into the finished work, provided they are identified and their locations noted.

SD-07 Certificates

Accessory Items

Certificate for each type of accessory specified, attesting that the items meet the specified requirements.

SD-10 Operation and Maintenance Data

## 1.3 DELIVERY, STORAGE, AND HANDLING

Wrap toilet accessories for shipment and storage, then deliver to the jobsite in manufacturer's original packaging, and store in a clean, dry area protected from construction damage and vandalism.

## 1.4 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period.

# PART 2 PRODUCTS

## 2.1 MANUFACTURED UNITS

Provide toilet accessories as indicated or scheduled in drawings. Provide each accessory item complete with the necessary mounting plates of sturdy construction with corrosion resistant surface. Unless specifically shown otherwise, provide the following items as a minimum:

At each Men's watercloset: 1 Toilet Tissue Dispenser

At each Women's watercloset: 1 Toilet Tissue Dispenser

At each Women's watercloset: 1 Sanitary Napkin Disposer

At each Shower: 1 Shower Curtain Rod, 1 Shower Curtain, 2 Robe Hooks

At each Lavatory: 1 Soap Dispenser and 1 Paper Towel Dispenser

In each Women's Restroom: 1 Sanitary Napkin and Tampon Dispenser

Porcelain type, tile-wall accessories are specified in Section 09 31 00 CERAMIC TILE QUARRY TILE, AND PAVER TILE if they occur on a tile wall.

### 2.1.1 Anchors and Fasteners

Provide anchors and fasteners capable of developing a restraining force commensurate with the strength of the accessory to be mounted and suited for use with the supporting construction. Provide tamperproof design exposed fasteners with finish to match the accessory.

### 2.1.2 Finishes

Except where noted otherwise, provide the following finishes on metal:

| Metal | Finish |
|---|---|
| Stainless steel | No. 4 satin finish |
| Carbon steel, copper alloy, and brass | Chromium plated, bright |

## 2.2 ACCESSORY ITEMS

Conform to the requirements for accessory items specified below.

2.2.1 Grab Bar (GB)

Provide an 18 gauge, 1-1/4 inch grab bar OD Type 304 stainless steel. Provide form and length for grab bar as indicated. Provide concealed mounting flange. Provide grab with peened non-slip surface. Furnish installed bars capable of withstanding a 500 pound vertical load without coming loose from the fastenings and without obvious permanent deformation. Allow 1-1/2 inch space between wall and grab bar.

2.2.2 Mirrors, Glass (MG)

Provide Type I transparent flat type, Class 1-clear glass for mirrors. Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036. Coat glass on one surface with silver coating, copper protective coating, and mirror backing paint. Provide highly adhesive pure silver coating of a thickness which provides reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, free of pinholes or other defects. Provide copper protective coating with pure bright reflective copper, homogeneous without sludge, pinholes or other defects, of proper thickness to prevent "adhesion pull" by mirror backing paint. Provide mirror backing paint with two coats of special scratch and abrasion-resistant paint and baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.2.3 Paper Towel Dispenser (PTD)

Provide center pull towel dispenser constructed of high-impact plastic, surface mounted. Dispenser cover shall be a translcent smoked plastic. Towel capacity shall be medium duty towel roll with 2-ply sheets. Provide government with 4 unused rolls with each dispenser.

2.2.4 Combination Paper Towel Dispenser/Waste Receptacle (PTDWR)

Not requried.

Provide semi-recessed dispenser/receptacle with a capacity of 600 sheets of C-fold, single-fold, or quarter-fold towel. Design waste receptacle to be locked in unit and removable for service. Provide tumbler key locking mechanism. Provide waste receptacle capacity of 12 gallons. Fabricate a minimum 0.03 inch stainless steel welded construction unit with all exposed surfaces having a satin finish. Provide waste receptacle that accepts reusable liner standard for unit manufacturer.

2.2.5 Shower Curtain (SC)

Provide shower curtain, size to suit conditions. Provide anti-bacterial nylon/vinyl fabric curtain. Furnish in white or off-white translucent or opaque.

2.2.6 Shower Curtain Rods (SCR)

Provide Type 304 stainless steel shower curtain rods 1-1/4 inch OD by 0.049 inch minimum straight to meet installation conditions.

2.2.7 Robe Hooks (RH)

Provide Type 304 stainless steel robe hook (towel pin) with 2" x 2" flange and that projects 3 3/8" from wall. (Comparable to Bobrick item B-677.)

2.2.8 Soap Dispenser (SD)

Provide soap dispenser surface mounted, liquid type consisting of a vertical Type 304 stainless steel tank with holding capacity of 40 fluid ounces with a corrosion-resistant all-purpose valve that dispenses liquid soaps, lotions, detergents and antiseptic soaps.

2.2.9 Toilet Tissue Dispenser (TTD)

Provide Type II - surface mounted toilet tissue holder with two rolls of standard tissue mounted horizontally. Provide stainless steel, satin finish cabinet. Dispenser shall have removable spindle that does not require a key or other device to replace roll.

2.2.10 Sanitary Napkin Disposer (SND)

Provide SND constructed of Type 304 stainless steel sanitary napkin disposal with removable leak-proof receptacle for disposable liners. Provide fifty disposable liners of the type standard with the manufacturer. Retain receptacle in cabinet by tumbler lock. Provide disposer with a door for inserting disposed napkins, partition mounted, double access or surface mounted - whichever matches existing conditions.

2.2.11 Sanitary Napkin and Tampon Dispenser (SNTD)

Provide sanitary napkin and tampon dispenser surface mounted. Dispenser, including door of Type 304 stainless steel that dispense both napkins and tampons with a minimum capacity of 20 each. Furnish dispensing mechanism for coin operation, but capable of complimentary dispensing. Provide coin mechanisms with minimum denominations of 10 cents, 25 cents, 50 cents, and free. Hang doors with a full-length corrosion-resistant steel piano hinge and secure with a tumbler lock. Provide keys for coin box different from the door keys.

2.2.12 Baby Diaper Changing Station

Provide if indicated.

Semi-recessed installation. Provide blocking as required by manufacturer, and mount at height as recommended by manufacturer. (Changing surface, when unit is open, should be at approximately 34" to 36" AFF.)

Surface-Mounted Horizontal Design Baby Diaper Changing Station:
1. White color.
2. Materials. FDA approved injection-molded polypropylene.
3. Operation: Concealed pneumatic cylinder providing controlled, slow opening and closing of the changing station bed.
4. Hinge Mechanism: Reinforced full length steel-on-steel hinge.
5. Changing Surface: Contoured, concave and smooth.
6. Safety Straps: Replaceable, snap-lock, nylon protective holding straps.
7. Performance: When mounted to specification, unit tested to 250 lbs or greater and will deflect less than 1 degree from 90 degrees with a 200 lb static load placed in the center of the changing surface.
8. Mounting: Concealed 11 gauge plated steel mounting chassis with 16 inch centers and 6 mounting points the top 2 mounting points feature keyholes for ease of installation units include mounting hardware.
9. Features: No hinge structure exposed on interior or exterior surfaces; two bag hooks.

10. Instruction Graphics: Universal instruction graphics and safety messages in multiple languages.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Provide the same finish for the surfaces of fastening devices exposed after installation as the attached accessory. Provide oval exposed screw heads. Install accessories at the location and height indicated. Protect exposed surfaces of accessories with strippable plastic or by other means until the installation is accepted. After acceptance of accessories, remove and dispose of strippable plastic protection. Coordinate accessory manufacturer's mounting details with other trades as their work progresses. Use sealants for brackets, plates, anchoring devices and similar items in showers (a silicone or polysulphide sealant) as they are set to provide a watertight installation. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work.

#### 3.1.1 Recessed Accessories

Fasten accessories with wood screws to studs, blocking or rough frame in wood construction. Set anchors in mortar in masonry construction. Fasten to metal studs or framing with sheet metal screws in metal construction.

#### 3.1.2 Surface Mounted Accessories

Mount on concealed backplates, unless specified otherwise. Conceal fasteners on accessories without backplates. Install accessories with sheet metal screws or wood screws in lead-lined braided jute, teflon or neoprene sleeves, or lead expansion shields, or with toggle bolts or other approved fasteners as required by the construction. Install backplates in the same manner, or provide with lugs or anchors set in mortar, as required by the construction. Fasten accessories mounted on gypsum board and plaster walls without solid backing into the metal or wood studs or to solid wood blocking secured between wood studs, or to metal backplates or wood blocking secured to metal studs.

### 3.2 CLEANING

Clean material in accordance with manufacturer's recommendations. Do mot use alkaline or abrasive agents. Take precautions to avoid scratching or marring exposed surfaces.

-- End of Section --

# SECTION 10 44 10

# BUILDING ENUMERATION

**01/07**

## PART 1 GENERAL

### 1.1 REFERENCES

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

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

| | |
|---|---|
| NCDOT | (1995) Standard Specifications for Roads and Structures |

### 1.2 BUILDING ENUMERATION

Provide at locations as indicated on building elevations or building floor plan in project drawings. If not shown in drawings, provide a placard for each exterior wall. Coordinate locations with Contracting Officer.

Provide at least four (4) building enumeration placards. If more placards are indicated in drawings, provide number as shown. Coordinate locations with Contracting Officer.

#### 1.2.1 Enumeration

Provide rigidly attached new placards. Install placards after exterior cleaning and painting is completed.

#### 1.2.2 Existing Placards

Remove existing placards and paint the wall surface as specified.

## PART 2 PRODUCTS

### 2.1 NEW PLACARD

Shall be made of aluminum conforming to 6063-T58 which is 1/8-inch thick and of size adequate to provide 1-1/2 inch clear area outside all enumeration.

### 2.2 THE ENTIRE SIDE

Shall be surfaced with a reflective white finish.

### 2.3 NUMERALS AND LETTERS

Shall be solid black, five inches high, conforming to NCDOT, Standard Alphabets Series C.

## 2.4 PAINT

Shall be a product suited for permanent exterior use.

# PART 3 EXECUTION

## 3.1 MOUNTING

Shall be rigid when placed on wall. Four holes 1/4-inch in diameter shall be provided in each sign and used for mounting. Mounting height is recommended at approximately 8 to 10 feet above grade, and shall be a minimum of four feet above grade. Request Contracting Officer's direction on where to mount placards.

-- End of Section --

# SECTION 10 44 30

# ROOM SIGNS

**01/07**

## PART 1 GENERAL

### 1.1 REFERENCES

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

ARCHITECTURAL & TRANSPORTATION BARRIERS COMPLIANCE BOARD (ATBCB)

| | |
|---|---|
| ATBCB ADA TITLE III | (1990) Americans with Disabilities Act - Buildings and Facilities |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | |
|---|---|
| ASTM D 702 | (1981) Cast Methacrylate Plastic Sheets, Rods, Tubes, and Shapes |
| ASTM D 3841 | (1997) Glass-Fiber-Reinforced Polyester Plastic Panels |

U.S. DEPARTMENT OF DEFENSE (DOD)

| | |
|---|---|
| MIL-M-43719 | (Rev. B; Am. 1) Marking Materials and Markers, Adhesive Elastomeric, Pigmented |

### 1.2 SUBMITTALS

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

SD-02 Shop Drawings

Plaque signs

Letters

Submit complete detail drawings, templates, erection and installation details for products listed. Indicate dimensions, construction details, reinforcement, anchorage, and installation with relation to the building construction.

SD-03 Product Data

Adhesive

SD-07 Certificates

Fiber-reinforced polyester

Acrylic sheet

## 1.3 ROOM NUMBERING SCHEME

Room numbering scheme shall match the drawings. After award, the Contractor shall provide the Contracting Officer with a list of the rooms and room numbers and request that the Contracting Officer edit the list to create a final room naming scheme. (Contractor may use the Area room names as stated on drawings as an initial guide to the proposed room names.)

# PART 2 PRODUCTS

Permanent identification signs such as toilet rooms, mechanical rooms, janitor's closet, etc. shall be in accordance wtih ADA Title III with both raised letters and Grade II braille messages. Both letters and braille messages shall be raised a minimum of 1/32 inch. Engraved letters are not acceptable. Letters shall be either sans serif or simple serif, 1 1/2 inches in height and in all capitals. Signs shall be mounted 60 inches from the floor to the center of the sign on the wall adjacent to the latch side of the door. People reading the sign shall be able to stand within 3 inches of the sign without hitting anything or being hit by the door. If this placement is not possible, the sign shall be placed on the nearest adjacent wall. ADA requires an eggshell, matte, or other non-glare finish on permanent identification and directional signs.

Pictograms used as permanent identification signs shall appear in background areas at least 6 inches high and shall be accompanied by tactile letters and braille messages within a different background directly below the pictogram.

The international symbol of accessibility shall be displayed at the entrance of a building that is completely accessible. Non-accessible entrances shall have directions posted to accessible entrances.

Directional signs, unlike permanent identification signs, may include lowercase letters. Characters shall have a width to height ratio between 3:5 and 1:1, and a stroke width to height ratio between 1:5 and 1:10. Overhead signs shall have letters with 3 inch minimum height for capitals and shall be mounted so that the bottom edge is at least 80 inches above the ground.

## 2.1 FIBER-REINFORCED POLYESTER (FRP)

ASTM D 3841, Type II, Grade 1, color: White.

## 2.2 ACRYLIC SHEET

ASTM D 702, Type II, color: White.

## 2.3 VINYL SHEETING FOR GRAPHICS

MIL-M-43719, minimum 0.003 inch film thickness. Provide a pre-coated pressure sensitive adhesive backing. Class 1, or positionable pressure sensitive adhesive backing, Class 3.

## 2.4 FABRICATION AND MANUFACTURE

### 2.4.1 Plaque Signs

ATBCB ADA TITLE III. Provide message panels in sizes to allow 1 1/2-inch minimum clearance on all sides of letters. Panels shall be 1/8 inch thick made from high pressure plastic laminate with integral text raised approximately 1/32" by blasting the non-text area away. Glued-on or "chemically welded" attachment of text is not acceptable. Text shall be approximately 1" tall in block letters without serif with the corresponding Braille text. Letter color and background color must contrast. Colors will be chosen from manufacturer's standard plastic selections. Design panels to be fixed to wall surface with adhesive.

## 2.5 LETTERS

Text shall be raised approximately 1/32" by blasting the non-text area away. Glued-on or "chemically welded" attachment of text is not acceptable. Text shall be approximately 1" tall in block letters without serif. Braille coresponding to the sign text shall also be included. Letter color and background color must contrast. Colors will be chosen from manufacturer's standard selections.

Recommended typeface is Helvetica Medium.

## 2.6 PRESSURE SENSITIVE LETTERS

Ensure that edges and corners of finished letterforms and graphics are true and clean. Do not use letterforms and graphics with rounded positive or negative corners, nicked, cut, or ragged edges.

## 2.7 ADHESIVE FOR MOUNTING PLAQUES

Provide sufficient quantities of manufacturer's recommended adhesive to adhere signs to substrate.

# PART 3 EXECUTION

## 3.1 EXAMINATION

Examine condition of location and surfaces on which signs will be installed. Do not proceed with installation until defects or errors which would result in poor installation have been corrected.

## 3.2 SIGNAGE

Signs must be attached flatly to wall (or door as appropriate). On doors to hazardous areas mount sign on center of door at height specified above. On double doors to hazardous areas mount sign on center of right hand leaf as viewed from side from which access is gained.

Contractor shall provide Contracting Officer with a DOOR SIGN SCHEDULE based on the AREA FINISH SCHEDULE, allowing adequate time for the Contracting Officer to meet with the occupants to review and finalize the schedule.

Quantity of signs:

a. A sign shall be provided for each door. For bid purposes, assume that each area sign has 3 numeric characters on the first line and the area name on the second line. Each sign shall have the area number of the area to be entered into. Toilet rooms shall have the area name and universal pictogram, with the area number beneath.

b. A sign shall be provided at each fire extinguisher cabinet shown on plans with text reading FIRE EXTINGUISHER.

c. At each fire alarm pull station shown on electrical plans provide one sign with text reading FIRE ALARM PULL STATION. Text shall be in two lines.

c. Include three (3) additional signs, assuming each with approximately 24 characters divided into two lines. Text for additional signs and mounting locations will be determined later.

d. Submitt a written list of all signage to Contracting Officer for approval prior to manufacturing signage. Contracting Officer shall return an edited or corrected list to Contractor. Final list may vary from, but shall not exceed, the total of specified quantities and sizes.

## 3.3 INSTALLATION

Install signs with height of plaque centered at 5-feet 0-inches above finished floor closest edge of plaque 8-inches from outside edge of door frame on lock/latch side. Ensure that signs are installed plumb and true, at appropriate mounting heights, and by method shown or specified. Do not install signs on doors until finishes on such surfaces have been applied. Place room numeral signs by each door. Also, place "Men" above room number on each men's room, "Women" above room number on each women's room, and other specified or indicated designations above room numbers as designated.

## 3.4 PROTECTION

Protect work and adjacent work and materials against damage during progress or work until completion. Wrap finished work with paper, polyethylene film, or strippable waterproof tape for shipment and storage and protect from damage during installation.

## 3.5 ADJUST AND CLEAN

Repair damage to signs incurred during installation. Replace signs which cannot be repaired to new condition.

-- End of Section --

# SECTION 10 52 20

# FIRE EXTINGUISHERS AND CABINETS

**01/07**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 1036 (1991; R 1997) Flat Glass

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM P7825 (2002) Approval Guide

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (1998) Potable Fire Extinguishers

UNDERWRITERS LABORATORIES (UL)

UL FPED (2002) Fire Protection Equipment Directory

### 1.2 SYSTEM DESCRIPTION

Provide fire extinguishers and fire extinguisher cabinets or wall mount brackets in accordance with the required and advisory provisions of NFPA 10, and as specified herein. Fire extinguishers shall be UL FPED listed or FM P7825 approved. In the publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears; reference to the "authority having jurisdiction" shall be interpreted to mean the local fire department.

### 1.3 SUBMITTALS

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

SD-03 Product Data

Fire extinguishers

Fire extinguisher cabinets

Submit for each type of fire extinguisher

## 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in the manufacturer's original sealed containers or packages, bearing the manufacturer's name and brand designation. handle and store materials to protect them from damage during the entire construction period. Replace all damaged items with new items.

# PART 2 PRODUCTS

## 2.1 DRY CHEMICAL FIRE EXTINGUISHERS

UL 299. Provide stored pressure multi-purpose dry chemical fire extinguishers, equipped with integral pressure indicating gage, 10 pound nominal charge weight having a minimum fire test rating of 2A:20B:C 20 pounds nominal charge weight having a minimum fire test rating of 4A:30B:C.

## 2.2 FIRE EXTINGUISHER CABINETS

Provide semi-recessed wall-mounted cabinets where indicated. Cabinets shall be prime grade, cold-rolled, reannealed, process-leveled, furniture steel. Fabricate cabinet from 20 gage steel and door and trim from 18 gage steel. Provide fully welded joints ground smooth. Provide at least two anchors or reinforcements spaced approximately 24 inches apart for building in or attaching the cabinets to adjacent construction. Doors shall be flush hollow metal type with fully welded joints ground smooth and full glazed opening. Provide door with continuous hinge, latch, and pull. Hinge door for 180 degree opening. Glass shall conform to ASTM C 1036 and shall be clear, Type II (flat wired glass), Form 1 (wired, polished both sides), Quality q 8 (glazing quality), diamond wire mesh (1/4 inch thick). Factory finish cabinet inside and out with one coat of enamel applied over a primer. Interior finish color shall be white. Exterior finish color shall be red.

If FE is indicated at existing wall provide surface mounted cabinet (not recessed), provide prefinished surface mounted cabinet similar to above.

## 2.3 FIRE EXTINGUISHER WALL MOUNT BRACKETS

Wall mounting brackets, for FE on open hanging brackets for installation without a cabinet, are permitted only where an FE is shown mounted on a column or where specifically noted or indicated in drawings.

# PART 3 EXECUTION

## 3.1 INSTALLATION

Install cabinets and brackets plumb and level. The top of installed extinguishers shall not be more that 5 feet above the finished floor. Provide fire extinguishers fully charged and ready for use.

# SECTION 22 00 00

# PLUMBING, GENERAL PURPOSE

**12/07**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

| | |
|---|---|
| ANSI Z21.22 | (1999; A 2001) Relief Valves for Hot Water Supply Systems |

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

| | |
|---|---|
| ASHRAE 90.1 - IP | (2004; Addendas a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,r,s,t,u,v,x,ak 2006; Supp to Addendas 2006; Errata 2007) Energy Standard for Buildings Except Low-Rise Residential Buildings, I-P Edition |

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

| | |
|---|---|
| ASSE 1001 | (2002) Atmospheric Type Vacuum Breakers |
| ASSE 1011 | (2004; Errata 2004) Hose Connection Vacuum Breakers |
| ASSE 1012 | (2002) Backflow Preventer with Intermediate Atmospheric Vent |
| ASSE 1013 | (2005) Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers |
| ASSE 1020 | (2004; Errata 2004; Errata 2004) Pressure Vacuum Breaker Assembly |

AMERICAN WATER WORKS ASSOCIATION (AWWA)

| | |
|---|---|
| AWWA 10084 | (2005) Standard Methods for the Examination of Water and Wastewater |
| AWWA B300 | (2004) Hypochlorites |
| AWWA B301 | (2004) Liquid Chlorine |
| AWWA C606 | (2006) Grooved and Shouldered Joints |

| | |
|---|---|
| AWWA C651 | (2005; Errata 2005) Standard for Disinfecting Water Mains |
| AWWA C652 | (2002) Disinfection of Water-Storage Facilities |

AMERICAN WELDING SOCIETY (AWS)

| | |
|---|---|
| AWS B2.2 | (1991) Brazing Procedure and Performance Qualification |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME A112.1.2 | (2004) Standard for Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors) |
| ASME A112.19.2M | (2003) Standard for Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals |
| ASME A112.36.2M | (1991; R 2002) Cleanouts |
| ASME B1.20.1 | (1983; R 2006) Pipe Threads, General Purpose (Inch) |
| ASME B16.22 | (2018) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings |
| ASME B31.5 | (2016) Refrigeration Piping and Heat Transfer Components |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM B 117 | (2007) Standing Practice for Operating Salt Spray (Fog) Apparatus |
| ASTM B 32 | (2004) Standard Specification for Solder Metal |
| ASTM B 813 | (2000e1) Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube |
| ASTM B 88 | (2003) Standard Specification for Seamless Copper Water Tube |
| ASTM B 88M | (2005) Standard Specification for Seamless Copper Water Tube (Metric) |
| ASTM C 920 | (2005) Standard Specification for Elastomeric Joint Sealants |
| ASTM D 2564 | (2004) Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems |
| ASTM D 2665 | (2007) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings |

| | |
|---|---|
| ASTM D 2855 | (1996; R 2002) Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings |
| ASTM D 3311 | (2006a) Drain, Waste, and Vent (DWV) Plastic Fittings Patterns |
| ASTM F 409 | (2002) Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings |

COPPER DEVELOPMENT ASSOCIATION (CDA)

| | |
|---|---|
| CDA A4015 | (1994; R 1995) Copper Tube Handbook |

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

| | |
|---|---|
| FCCCHR Manual | (1988e9) Manual of Cross-Connection Control |

INTERNATIONAL CODE COUNCIL (ICC)

| | |
|---|---|
| ICC A117.1 | (2003; R 2004) Standard for Accessible and Usable Buildings and Facilities |
| ICC NCPC | (2006) North Carolina Plumbing Code |

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

| | |
|---|---|
| MSS SP-110 | (1996) Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends |
| MSS SP-58 | (2018) Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation |
| MSS SP-69 | (2003; Notice 2012) Pipe Hangers and Supports - Selection and Application (ANSI Approved American National Standard) |
| MSS SP-73 | (2003) Brazing Joints for Copper and Copper Alloy Pressure Fittings |
| MSS SP-80 | (2003) Bronze Gate, Globe, Angle and Check Valves |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 90A | (2002; Errata 2003; Errata 2005) Standard for the Installation of Air Conditioning and Ventilating Systems |

NSF INTERNATIONAL (NSF)

| | |
|---|---|
| NSF 61 | (2007) Drinking Water System Components - |

Health Effects

PLASTIC PIPE AND FITTINGS ASSOCIATION (PPFA)

PPFA-01 (1998) Plastic Pipe in Fire Resistive Construction

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

PL 93-523 (1974; A 1999) Safe Drinking Water Act

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

PL 102-486 (1992) Residential Energy Efficiency Ratings

UNDERWRITERS LABORATORIES (UL)

UL 499 (2005; Rev thru Mar 2006) Electric Heating Appliances

## 1.2 SUBMITTALS

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

SD-03 Product Data

Fixtures

List of installed fixtures with manufacturer, model, and flow rate.

Flush valve water closets

Countertop lavatories

Water heaters

Backflow prevention assemblies

Interior Hose Bibb

Exterior Wall Faucets

SD-06 Test Reports

Tests, Flushing and Disinfection

Test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, completion and testing of the installed system. Each test report shall indicate the final position of controls.

Test of Backflow Prevention Assemblies.

Certification of proper operation shall be as accomplished in accordance with state regulations by an individual certified by

the state to perform such tests. If no state requirement exists, the Contractor shall have the manufacturer's representative test the device, to ensure the unit is properly installed and performing as intended. The Contractor shall provide written documentation of the tests performed and signed by the individual performing the tests.

SD-07 Certificates

Materials and Equipment

Where equipment is specified to conform to requirements of the ASME Boiler and Pressure Vessel Code, the design, fabrication, and installation shall conform to the code.

SD-10 Operation and Maintenance Data

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

## 1.3 STANDARD PRODUCTS

Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products. Specified equipment shall essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening. 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.

### 1.3.1 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.

### 1.3.2 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.

### 1.3.3 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.

### 1.3.4 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.

1.3.4.1 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."

1.3.4.2 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.

1.4 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.

1.5 PERFORMANCE REQUIREMENTS

1.5.1 Plumbing Fixtures

Water flow and consumption rates shall at a minimum comply with requirements in PL 102-486.

1.6 REGULATORY REQUIREMENTS

Unless otherwise required herein, plumbing work shall be in accordance with ICC NCPC.

1.7 PROJECT/SITE CONDITIONS

The Contractor shall become familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

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 OF EQUIPMENT

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.

# PART 2 PRODUCTS

## 2.1 MATERIALS

Materials for various services shall be in accordance with TABLES I and II. Pipe schedules shall be selected based on service requirements. Pipe fittings shall be compatible with the applicable pipe materials. Pipe threads (except dry seal) shall conform to ASME B1.20.1. Material or equipment containing lead shall not be used in any potable water system. In line devices such as water meters, building valves, check valves, meter stops, valves, fittings and back flow preventers shall comply with PL 93-523 and NSF 61, Section 8. End point devices such as lavatory faucets, supply stops and end point control valves used to dispense water for drinking must meet the requirements of NSF 61, Section 9.

### 2.1.1 Pipe Joint Materials

Solder containing lead shall not be used with copper pipe. Joints shall conform to the following:

a. Coupling for Steel Pipe: AWWA C606.

b. Solder Material: Solder metal shall conform to ASTM B 32.

c. Solder Flux: Flux shall be liquid form, non-corrosive, and conform to ASTM B 813, Standard Test 1.

d. PTFE Tape: PTFE Tape, for use with Threaded Metal or Plastic Pipe.

e. Plastic Solvent Cement for PVC Plastic Pipe: ASTM D 2564 and ASTM D 2855.

### 2.1.2 Miscellaneous Materials

Miscellaneous materials shall conform to the following:

a. Metallic Cleanouts: ASME A112.36.2M.

b. Plumbing Fixture Setting Compound: A preformed flexible ring seal molded from hydrocarbon wax material. The seal material shall be nonvolatile nonasphaltic and contain germicide and provide watertight, gastight, odorproof and verminproof properties.

c. Hypochlorites: AWWA B300.

d. Liquid Chlorine: AWWA B301.

### 2.1.3 Pipe Insulation Material

Insulation shall be as specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

## 2.2 PIPE HANGERS, INSERTS, AND SUPPORTS

Pipe hangers, inserts, and supports shall conform to MSS SP-58 and MSS SP-69.

## 2.3 VALVES

Valves shall be provided on supplies to equipment and fixtures. Valves 2-1/2 inches and smaller shall be bronze with threaded bodies for pipe and solder-type connections for tubing. Pressure ratings shall be based upon the application. Valves shall conform to the following standards:

| Description | Standard |
|---|---|
| Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends | MSS SP-110 |
| Bronze Check Valves | MSS SP-80 |
| Vacuum Relief Valves | ANSI Z21.22 |

### 2.3.1 Exterior Wall Faucets

Wall faucets with vacuum-breaker backflow preventer shall be brass with 3/4 inch male inlet threads, hexagon shoulder, and 3/4 inch hose connection. Faucet handle shall be securely attached to stem.

### 2.3.2 Interior Hose Bibb

Standard: ASME A112.18.1 for sediment faucets. Body material shall be bronze with bronze replacable seat. Supply connections shall be NPS 1/2 threaded or solder-joint inlet. Outlet connection shall be garden-hose thread complying with ASME B1.20.7. Pressure Rating 125 psig. Provide vacuum breaker nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011. Finish shall be chrome or nickel plated. Wheel handle operation.

## 2.4 FIXTURES

Fixtures shall be water conservation type, in accordance with ICC NCPC. Fixtures for use by the physically handicapped shall be in accordance with ICC A117.1. Vitreous china, nonabsorbent, hard-burned, and vitrified throughout the body shall be provided. Porcelain enameled ware shall have specially selected, clear white, acid-resisting enamel coating evenly

applied on surfaces. No fixture will be accepted that shows cracks, crazes, blisters, thin spots, or other flaws. Fixtures shall be equipped with appurtenances such as traps, faucets, stop valves, and drain fittings. Each fixture and piece of equipment requiring connections to the drainage system, except grease interceptors, shall be equipped with a trap. Brass expansion or toggle bolts capped with acorn nuts shall be provided for supports, and polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Fixtures with the supply discharge below the rim shall be equipped with backflow preventers. Internal parts of flush and/or flushometer valves may contain acetal resin, fluorocarbon, nylon, acrylonitrile-butadiene-styrene (ABS) or other plastic material, if the material has provided satisfactory service under actual commercial or industrial operating conditions for not less than 2 years. Plastic in contact with hot water shall be suitable for 180 degrees F water temperature.

### 2.4.1 Flush Valve Water Closets

ASME A112.19.2M, white vitreous china, siphon jet, elongated bowl, floor-mounted, floor outlet. Top of toilet seat height above floor shall be 14 to 15 inches, except 17 to 19 inches for accessible water closets. Provide wax bowl ring including plastic sleeve. Water flushing volume of the water closet and flush valve combination shall not exceed 1.6 gallons per flush. Provide black solid plastic elongated open-front seat. Provide large diameter flush valve including angle control-stop valve, vacuum breaker, tail pieces, slip nuts, and wall plates; exposed to view components shall be chromium-plated or polished stainless steel. Flush valves shall be nonhold-open type. Mount flush valves not less than 11 inches above the fixture. Mounted height of flush valve shall not interfere with the hand rail in ADA stalls.

### 2.4.2 Countertop Lavatories

ASME A112.19.2M, white vitreous china, self-rimming, minimum dimensions of 19 inches wide by 17 inches front to rear, with supply openings for use with top mounted centerset faucets. Furnish template and mounting kit by lavatory manufacturer. Provide aerator with faucet. Water flow rate shall not exceed 0.5 gpm when measured at a flowing water pressure of 60 psi. Mount counter with the top surface 34 inches above floor and with 29 inches minimum clearance from bottom of the counter face to floor. Provide top mounted washerless centerset lavatory faucets.

## 2.5 BACKFLOW PREVENTERS

Backflow preventers shall be approved and listed by the Foundation For Cross-Connection Control & Hydraulic Research. Reduced pressure principle assemblies, double check valve assemblies, atmospheric (nonpressure) type vacuum breakers, and pressure type vacuum breakers shall be tested, approved, and listed in accordance with FCCCHR Manual. Backflow preventers with intermediate atmospheric vent shall conform to ASSE 1012. Reduced pressure principle backflow preventers shall conform to ASSE 1013. Hose connection vacuum breakers shall conform to ASSE 1011. Pipe applied atmospheric type vacuum breakers shall conform to ASSE 1001. Pressure vacuum breaker assembly shall conform to ASSE 1020. Air gaps in plumbing systems shall conform to ASME A112.1.2.

## 2.6 TRAPS

Unless otherwise specified, traps shall be plastic per ASTM F 409. Traps

shall be without a cleanout. The depth of the water seal shall be not less than 2 inches. The interior diameter shall be not more than 1/8 inch over or under the nominal size, and interior surfaces shall be reasonably smooth throughout.

## 2.7 WATER HEATERS

Water heater types and capacities shall be as indicated. Each water heater shall have controls with an adjustable range that includes 90 to 160 degrees F.

### 2.7.1 Electric Instantaneous Water Heaters (Tankless)

UL 499 and UL listed flow switch activated, tankless electric instantaneous water heater for wall mounting below sink or lavatory.

## 2.8 ELECTRICAL WORK

Power wiring and conduit for field installed equipment shall be provided under and conform to the requirements of Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

## 2.9 MISCELLANEOUS PIPING ITEMS

### 2.9.1 Escutcheon Plates

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide chromium-plated on copper alloy plates or polished stainless steel finish in finished spaces. Provide paint finish on plates in unfinished spaces.

### 2.9.2 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide one inch minimum clearance between exterior of piping or pipe insulation, and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of sleeves or core-drilled holes with UL listed fill, void, or cavity material.

#### 2.9.2.1 Sleeves in Masonry and Concrete

Provide steel pipe sleeves or schedule 40 PVC plastic pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.

### 2.9.3 Sleeves Not in Masonry and Concrete

Provide 26 gage galvanized steel sheet or PVC plastic pipe sleeves.

### 2.9.4 Pipe Hangers (Supports)

Provide MSS SP-58 and MSS SP-69, Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

### 2.9.5 Nameplates

Provide 0.125 inch thick melamine laminated plastic nameplates, black matte finish with white center core, for equipment, gages, thermometers, and valves; valves in supplies to faucets will not require nameplates. Accurately align lettering and engrave minimum of 0.25 inch high normal block lettering into the white core. Minimum size of nameplates shall be 1.0 by 2.5 inches. Key nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule.

## PART 3 EXECUTION

## 3.1 GENERAL INSTALLATION REQUIREMENTS

Piping located in air plenums shall conform to NFPA 90A requirements. Plastic pipe shall not be installed in air plenums. Piping located in shafts that constitute air ducts or that enclose air ducts shall be noncombustible in accordance with NFPA 90A. Installation of plastic pipe where in compliance with NFPA may be installed in accordance with PPFA-01. The plumbing system shall be installed complete with necessary fixtures, fittings, traps, valves, and accessories. Water and drainage piping shall be extended 5 feet outside the building, unless otherwise indicated. A gate valve or full port ball valve and drain shall be installed on the water service line inside the building approximately 6 inches above the floor from point of entry. Piping shall be connected to the exterior service lines or capped or plugged if the exterior service is not in place. Sewer and water pipes shall be laid in separate trenches, except as allowed by NCPC. Exterior underground utilities shall be at least 12 inches below the finish grade or as indicated on the drawings. If trenches are closed or the pipes are otherwise covered before being connected to the service lines, the location of the end of each plumbing utility shall be marked with a stake or other acceptable means. Valves shall be installed with control no lower than the valve body.

### 3.1.1 Water Pipe, Fittings, and Connections

#### 3.1.1.1 Utilities

The piping shall be extended to fixtures, outlets, and equipment. The hot-water and cold-water piping system shall be arranged and installed to permit draining. The supply line to each item of equipment or fixture, except faucets, flush valves, or other control valves which are supplied with integral stops, shall be equipped with a shutoff valve to enable isolation of the item for repair and maintenance without interfering with operation of other equipment or fixtures. Supply piping to fixtures, faucets, hydrants, shower heads, and flushing devices shall be anchored to

prevent movement.

3.1.1.2 Cutting and Repairing

The work shall be carefully laid out in advance, and unnecessary cutting of construction shall be avoided. Damage to building, piping, wiring, or equipment as a result of cutting shall be repaired by mechanics skilled in the trade involved.

3.1.1.3 Protection of Fixtures, Materials, and Equipment

Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemicals, and mechanical injury. Upon completion of the work, the fixtures, materials, and equipment shall be thoroughly cleaned, adjusted, and operated. Safety guards shall be provided for exposed rotating equipment.

3.1.1.4 Mains, Branches, and Runouts

Piping shall be installed as indicated. Pipe shall be accurately cut and worked into place without springing or forcing. Structural portions of the building shall not be weakened. Aboveground piping shall run parallel with the lines of the building, unless otherwise indicated. Branch pipes from service lines may be taken from top, bottom, or side of main, using crossover fittings required by structural or installation conditions. Supply pipes, valves, and fittings shall be kept a sufficient distance from other work and other services to permit not less than 1/2 inch between finished covering on the different services. Bare and insulated water lines shall not bear directly against building structural elements so as to transmit sound to the structure or to prevent flexible movement of the lines. Water pipe shall not be buried in or under floors unless specifically indicated or approved. Changes in pipe sizes shall be made with reducing fittings. Use of bushings will not be permitted except for use in situations in which standard factory fabricated components are furnished to accommodate specific accepted installation practice. Change in direction shall be made with fittings, except that bending of pipe 4 inches and smaller will be permitted, provided a pipe bender is used and wide sweep bends are formed. The center-line radius of bends shall be not less than six diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be acceptable.

3.1.1.5 Pipe Drains

Pipe drains indicated shall consist of 3/4 inch hose bibb with renewable seat and ball valve ahead of hose bibb. At other low points, 3/4 inch brass plugs or caps shall be provided. Disconnection of the supply piping at the fixture is an acceptable drain.

3.1.1.6 Expansion and Contraction of Piping

Allowance shall be made throughout for expansion and contraction of water pipe. Each hot-water and hot-water circulation riser shall have expansion loops or other provisions such as offsets, changes in direction, etc., where indicated and/or required. Risers shall be securely anchored as required or where indicated to force expansion to loops. Branch connections from risers shall be made with ample swing or offset to avoid undue strain on fittings or short pipe lengths. Horizontal runs of pipe over 50 feet in length shall be anchored to the wall or the supporting

construction about midway on the run to force expansion, evenly divided, toward the ends. Sufficient flexibility shall be provided on branch runouts from mains and risers to provide for expansion and contraction of piping. Flexibility shall be provided by installing one or more turns in the line so that piping will spring enough to allow for expansion without straining.

3.1.2 Compressed Air Piping (Non-Oil Free)

Compressed air piping shall be installed as specified for water piping and suitable for 125 psig working pressure. Compressed air piping shall have supply lines and discharge terminals legibly and permanently marked at both ends with the name of the system and the direction of flow.

3.1.3 Joints

Installation of pipe and fittings shall be made in accordance with the manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted. Joints shall be made up with fittings of compatible material and made for the specific purpose intended.

3.1.3.1 Threaded

Threaded joints shall have American Standard taper pipe threads conforming to ASME B1.20.1. Only male pipe threads shall be coated with graphite or with an approved graphite compound, or with an inert filler and oil, or shall have a polytetrafluoroethylene tape applied.

3.1.3.2 Unions and Flanges

Unions, flanges and mechanical couplings shall not be concealed in walls, ceilings, or partitions. Unions shall be used on pipe sizes 2-1/2 inches and smaller; flanges shall be used on pipe sizes 3 inches and larger.

3.1.3.3 Copper Tube and Pipe

a. Brazed. Brazed joints shall be made in conformance with AWS B2.2, MSS SP-73, and CDA A4015 with flux and are acceptable for all pipe sizes. Copper to copper joints shall include the use of copper-phosphorus or copper-phosphorus-silver brazing metal without flux. Brazing of dissimilar metals (copper to bronze or brass) shall include the use of flux with either a copper-phosphorus, copper-phosphorus-silver or a silver brazing filler metal.

b. Soldered. Soldered joints shall be made with flux and are only acceptable for piping 2 inches and smaller. Soldered joints shall conform to ASME B31.5 and CDA A4015. Soldered joints shall not be used in compressed air piping between the air comppressor and the receiver.

3.1.3.4 Plastic Pipe

PVC pipe shall have joints made with solvent cement elastomeric.

3.1.4 Dissimilar Pipe Materials

Connections between ferrous and non-ferrous copper water pipe shall be

made with dielectric unions or flange waterways. Dielectric waterways shall have temperature and pressure rating equal to or greater than that specified for the connecting piping. Waterways shall have metal connections on both ends suited to match connecting piping. Dielectric waterways shall be internally lined with an insulator specifically designed to prevent current flow between dissimilar metals. Dielectric flanges shall meet the performance requirements described herein for dielectric waterways. Connecting joints between plastic and metallic pipe shall be made with transition fitting for the specific purpose.

### 3.1.5 Pipe Sleeves and Flashing

Pipe sleeves shall be furnished and set in their proper and permanent location.

#### 3.1.5.1 Sleeve Requirements

Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. Sleeves are not required for supply, drainage, waste and vent pipe passing through concrete slab on grade, except where penetrating a membrane waterproof floor. A modular mechanical type sealing assembly may be installed in lieu of a waterproofing clamping flange and caulking and sealing of annular space between pipe and sleeve. The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve using galvanized steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolt shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe and sleeve involved. Sleeves shall not be installed in structural members, except where indicated or approved. Rectangular and square openings shall be as detailed. Each sleeve shall extend through its respective floor, or roof, and shall be cut flush with each surface, except for special circumstances. Pipe sleeves passing through floors in wet areas such as mechanical equipment rooms, lavatories, kitchens, and other plumbing fixture areas shall extend a minimum of 4 inches above the finished floor. Unless otherwise indicated, sleeves shall be of a size to provide a minimum of 1/4 inch clearance between bare pipe or insulation and inside of sleeve or between insulation and inside of sleeve. Sleeves in bearing walls and concrete slab on grade floors shall be steel pipe or cast-iron pipe. Sleeves in nonbearing walls or ceilings may be steel pipe, cast-iron pipe, galvanized sheet metal with lock-type longitudinal seam, or plastic. Except as otherwise specified, the annular space between pipe and sleeve, or between jacket over insulation and sleeve, shall be sealed as indicated with sealants conforming to ASTM C 920 and with a primer, backstop material and surface preparation as specified in Section 07 92 00 JOINT SEALANTS. The annular space between pipe and sleeve, between bare insulation and sleeve or between jacket over insulation and sleeve shall not be sealed for interior walls which are not designated as fire rated. Sleeves through below-grade walls in contact with earth shall be recessed 1/2 inch from wall surfaces on both sides. Annular space between pipe and sleeve shall be filled with backing material and sealants in the joint between the pipe and masonry wall as specified above. Sealant selected for the earth side of the wall shall be compatible with dampproofing/waterproofing materials that are to be applied over the joint

sealant. Pipe sleeves in fire-rated walls shall conform to the requirements in Section 07 84 00 FIRESTOPPING.

3.1.5.2 Flashing Requirements

Pipes passing through roof shall be installed per the roof manufacturers recommendations.

3.1.5.3 Pipe Penetrations of Slab on Grade Floors

Where pipes, fixture drains, floor drains, cleanouts or similar items penetrate slab on grade floors, a groove 1/4 to 1/2 inch wide by 1/4 to 3/8 inch deep shall be formed around the pipe, fitting or drain. The groove shall be filled with a sealant as specified in Section 07 92 00 JOINT SEALANTS.

3.1.5.4 Pipe Penetrations

Provide sealants for all pipe penetrations. All pipe penetrations shall be sealed to prevent infiltration of air, insects, and vermin.

3.1.6 Fire Seal

Where pipes pass through fire walls, fire-partitions, fire-rated pipe chase walls or floors above grade, a fire seal shall be provided as specified in Section 07 84 00 FIRESTOPPING.

3.1.7 Supports

3.1.7.1 General

Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while still supporting the load. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying, and undue strain. Piping subjected to vertical movement when operating temperatures exceed ambient temperatures shall be supported by variable spring hangers and supports or by constant support hangers. In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for an individual pipe in the multiple pipe run. Threaded sections of rods shall not be formed or bent.

3.1.7.2 Pipe Hangers, Inserts, and Supports

Installation of pipe hangers, inserts and supports shall conform to MSS SP-58 and MSS SP-69, except as modified herein.

a. Types 5, 12, and 26 shall not be used.

b. Type 3 shall not be used on insulated pipe.

c. Type 18 inserts shall be secured to concrete forms before concrete is placed. Continuous inserts which allow more adjustment may be used if they otherwise meet the requirements for type 18 inserts.

d. Type 19 and 23 C-clamps shall be torqued per MSS SP-69 and shall have both locknuts and retaining devices furnished by the

manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.

e. Type 20 attachments used on angles and channels shall be furnished with an added malleable-iron heel plate or adapter.

f. Type 24 may be used only on trapeze hanger systems or on fabricated frames.

g. Type 39 saddles shall be used on insulated pipe 4 inches and larger when the temperature of the medium is 60 degrees F or higher. Type 39 saddles shall be welded to the pipe.

h. Type 40 shields shall:

(1) Be used on insulated pipe less than 4 inches.

(2) Be used on insulated pipe 4 inches and larger when the temperature of the medium is 60 degrees F or less.

(3) Have a high density insert for all pipe sizes. High density inserts shall have a density of 8 pcf or greater.

i. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves. Operating temperatures in determining hanger spacing for PVC or CPVC pipe shall be 120 degrees F for PVC and 180 degrees F for CPVC. Horizontal pipe runs shall include allowances for expansion and contraction.

j. Vertical pipe shall be supported at each floor, except at slab-on-grade, at intervals of not more than 15 feet nor more than 8 feet from end of risers, and at vent terminations. Vertical pipe risers shall include allowances for expansion and contraction.

k. Type 35 guides using steel, reinforced polytetrafluoroethylene (PTFE) or graphite slides shall be provided to allow longitudinal pipe movement. Slide materials shall be suitable for the system operating temperatures, atmospheric conditions, and bearing loads encountered. Lateral restraints shall be provided as needed. Where steel slides do not require provisions for lateral restraint the following may be used:

(1) On pipe 4 inches and larger when the temperature of the medium is 60 degrees F or higher, a Type 39 saddle, welded to the pipe, may freely rest on a steel plate.

(2) On pipe less than 4 inches a Type 40 shield, attached to the pipe or insulation, may freely rest on a steel plate.

(3) On pipe 4 inches and larger carrying medium less that 60 degrees F a Type 40 shield, attached to the pipe or insulation, may freely rest on a steel plate.

l. Pipe hangers on horizontal insulated pipe shall be the size of the outside diameter of the insulation. The insulation shall be continuous through the hanger on all pipe sizes and applications.

m. Where there are high system temperatures and welding to piping is not desirable, the type 35 guide shall include a pipe cradle, welded to the guide structure and strapped securely to the pipe. The pipe shall be separated from the slide material by at least 4 inches or by an amount adequate for the insulation, whichever is greater.

n. Hangers and supports for plastic pipe shall not compress, distort, cut or abrade the piping, and shall allow free movement of pipe except where otherwise required in the control of expansion/contraction.

#### 3.1.7.3 Structural Attachments

Attachment to building structure concrete and masonry shall be by cast-in concrete inserts, built-in anchors, or masonry anchor devices. Inserts and anchors shall be applied with a safety factor not less than 5. Supports shall not be attached to metal decking. Supports shall not be attached to the underside of concrete filled floor or concrete roof decks unless approved by the Contracting Officer. Masonry anchors for overhead applications shall be constructed of ferrous materials only.

### 3.1.8 Pipe Cleanouts

Pipe cleanouts shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required. A cleanout installed in connection with cast-iron soil pipe shall consist of a long-sweep 1/4 bend or one or two 1/8 bends extended to the place shown. An extra-heavy cast-brass or cast-iron ferrule with countersunk cast-brass head screw plug shall be caulked into the hub of the fitting and shall be flush with the floor. Cleanouts in connection with other pipe, where indicated, shall be T-pattern, 90-degree branch drainage fittings with cast-brass screw plugs, except plastic plugs shall be installed in plastic pipe. Plugs shall be the same size as the pipe up to and including soil and waste stacks, at the foot of interior downspouts, on each connection to building storm drain where interior downspouts are indicated, and on each building drain outside the building. Cleanout tee branches may be omitted on stacks in single story buildings with slab-on-grade construction or where less than 18 inches of crawl space is provided under the floor. Cleanouts on pipe concealed in partitions shall be provided with chromium plated bronze, nickel bronze, nickel brass or stainless steel flush type access cover plates. Round access covers shall be provided and secured to plugs with securing screw. Square access covers may be provided with matching frames, anchoring lugs and cover screws. Cleanouts in finished walls shall have access covers and frames installed flush with the finished wall. Cleanouts installed in finished floors subject to foot traffic shall be provided with a chrome-plated cast brass, nickel brass, or nickel bronze cover secured to the plug or cover frame and set flush with the finished floor. Heads of fastening screws shall not project above the cover surface. Where cleanouts are provided with adjustable heads, the heads shall be plastic.

## 3.2 WATER HEATERS AND HOT WATER STORAGE TANKS

### 3.2.1 Connections to Water Heaters

Connections of metallic pipe to water heaters shall be made with dielectric unions or flanges.

## 3.3 FIXTURES AND FIXTURE TRIMMINGS

Polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Angle stops, straight stops, stops integral with the faucets, or concealed type of lock-shield, and loose-key pattern stops for supplies with threaded, sweat or solvent weld inlets shall be furnished and installed with fixtures. Where connections between copper tubing and faucets are made by rubber compression fittings, a beading tool shall be used to mechanically deform the tubing above the compression fitting. Exposed traps and supply pipes for fixtures and equipment shall be connected to the rough piping systems at the wall, unless otherwise specified under the item. Floor and wall escutcheons shall be as specified. Drain lines and hot water lines of fixtures for handicapped personnel shall be insulated and do not require polished chrome finish. Plumbing fixtures and accessories shall be installed within the space shown.

### 3.3.1 Fixture Connections

Where space limitations prohibit standard fittings in conjunction with the cast-iron floor flange, special short-radius fittings shall be provided. Connections between earthenware fixtures and flanges on soil pipe shall be made gastight and watertight with a closet-setting compound or neoprene gasket and seal. Use of natural rubber gaskets or putty will not be permitted. Fixtures with outlet flanges shall be set the proper distance from floor or wall to make a first-class joint with the closet-setting compound or gasket and fixture used.

### 3.3.2 Flushometer Valves

Flushometer valves shall be secured to prevent movement by anchoring the long finished top spud connecting tube to wall adjacent to valve with approved metal bracket. Flushometer valves for water closets shall be installed 39 inches above the floor, except at water closets intended for use by the physically handicapped where flushometer valves shall be mounted at approximately 30 inches above the floor and arranged to avoid interference with grab bars. In addition, for water closets intended for handicap use, the flush valve handle shall be installed on the wide side of the enclosure.

### 3.3.3 Backflow Prevention Devices

Plumbing fixtures, equipment, and pipe connections shall not cross connect or interconnect between a potable water supply and any source of nonpotable water. Backflow preventers shall be installed where indicated and in accordance with at all other locations necessary to preclude a cross-connect or interconnect between a potable water supply and any nonpotable substance. In addition backflow preventers shall be installed at all locations where the potable water outlet is below the flood level of the equipment, or where the potable water outlet will be located below the level of the nonpotable substance. Backflow preventers shall be located so that no part of the device will be submerged. Backflow preventers shall be of sufficient size to allow unrestricted flow of water to the equipment, and preclude the backflow of any nonpotable substance into the potable water system. Bypass piping shall not be provided around backflow preventers. Access shall be provided for maintenance and testing. Each device shall be a standard commercial unit.

### 3.3.4 Access Panels

Access panels shall be provided for concealed valves and controls, or any item requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced, maintained, or replaced.

### 3.3.5 Traps

Each trap shall be placed as near the fixture as possible, and no fixture shall be double-trapped. Traps installed on cast-iron soil pipe shall be cast iron. Traps installed on steel pipe or copper tubing shall be recess-drainage pattern, or brass-tube type. Traps installed on plastic pipe may be plastic conforming to ASTM D 3311. Traps for acid-resisting waste shall be of the same material as the pipe.

## 3.4 ESCUTCHEONS

Escutcheons shall be provided at finished surfaces where bare or insulated piping, exposed to view, passes through floors, walls, or ceilings, except in boiler, utility, or equipment rooms. Escutcheons shall be fastened securely to pipe or pipe covering and shall be satin-finish, corrosion-resisting steel, polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or setscrew.

## 3.5 PAINTING

Painting of pipes, hangers, supports, and other iron work, either in concealed spaces or exposed spaces, is specified in Section 09 90 00 PAINTS AND COATINGS.

### 3.5.1 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.

#### 3.5.1.1 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 B 117, 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.

## 3.6 TESTS, FLUSHING AND DISINFECTION

### 3.6.1 Plumbing System

The following tests shall be performed on the plumbing system in accordance with , except that the drainage and vent system final test shall include the smoke test. The Contractor has the option to perform a peppermint test in lieu of the smoke test. If a peppermint test is chosen, the Contractor must submit a testing procedure to the Contracting Officer for approval.

a. Drainage and Vent Systems Test. The final test shall include a smoke test.

b. Building Sewers Tests.

c. Water Supply Systems Tests. (Pressure tests shall use water - do not use air pressure)

#### 3.6.1.1 Test of Backflow Prevention Assemblies

Backflow prevention assembly shall be tested using gauges specifically designed for the testing of backflow prevention assemblies. Gauges shall be tested annually for accuracy in accordance with the University of Southern California's Foundation of Cross Connection Control and Hydraulic Research or the American Water Works Association Manual of Cross Connection (Manual M-14). Report form for each assembly shall include, as a minimum, the following:

| | |
|---|---|
| Data on Device | Data on Testing Firm |
| Type of Assembly | Name |
| Manufacturer | Address |
| Model Number | Certified Tester |
| Serial Number | Certified Tester No. |
| Size | Date of Test |
| Location | |
| Test Pressure Readings | Serial Number and Test Data of Gauges |

If the unit fails to meet specified requirements, the unit shall be repaired and retested.

### 3.6.2 Defective Work

If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials. Caulking of screwed joints or holes will not be acceptable.

### 3.6.3 System Flushing

#### 3.6.3.1 During Flushing

Before operational tests or disinfection, potable water piping system shall be flushed with hot potable water. Sufficient water shall be used to produce a water velocity that is capable of entraining and removing debris in all portions of the piping system. This requires simultaneous operation of all fixtures on a common branch or main in order to produce a flushing velocity of approximately 4 fps through all portions of the

piping system. In the event that this is impossible due to size of system, the Contracting Officer (or the designated representative) shall specify the number of fixtures to be operated during flushing. Contractor shall provide adequate personnel to monitor the flushing operation and to ensure that drain lines are unobstructed in order to prevent flooding of the facility. Contractor shall be responsible for any flood damage resulting from flushing of the system. Flushing shall be continued until entrained dirt and other foreign materials have been removed and until discharge water shows no discoloration.

3.6.3.2 After Flushing

System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced. After flushing and cleaning, systems shall be prepared for testing by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building due to the Contractor's failure to properly clean the piping system shall be repaired by the Contractor. When the system flushing is complete, the hot-water system shall be adjusted for uniform circulation. Flushing devices and automatic control systems shall be adjusted for proper operation according to manufacturer's instructions. Comply with ASHRAE 90.1 - IP for minimum efficiency requirements.

3.6.4 Operational Test

Upon completion of flushing and prior to disinfection procedures, the Contractor shall subject the plumbing system to operating tests to demonstrate satisfactory installation, connections, adjustments, and functional and operational efficiency. Such operating tests shall cover a period of not less than 8 hours for each system and shall include the following information in a report with conclusion as to the adequacy of the system:

a. Time, date, and duration of test.

b. Water pressures at the most remote and the highest fixtures.

c. Operation of each fixture and fixture trim.

d. Operation of each valve, hydrant, and faucet.

e. Temperature of each domestic hot-water supply.

f. Operation of each vacuum breaker and backflow preventer.

3.6.5 Disinfection

After operational tests are complete, the entire domestic hot- and cold-water distribution system shall be disinfected. System shall be flushed as specified, before introducing chlorinating material. The chlorinating material shall be hypochlorites or liquid chlorine. Except as herein specified, water chlorination procedure shall be in accordance with AWWA C651 and AWWA C652. The chlorinating material shall be fed into the water piping system at a constant rate at a concentration of at least 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the main with a hypochlorinator, or liquid chlorine injected into the main through a solution-feed chlorinator , shall be used. If after the 24 hour and 6 hour holding periods, the residual solution

contains less than 25 ppm and 50 ppm chlorine respectively, flush the piping and tank with potable water, and repeat the above procedures until the required residual chlorine levels are satisfied. The system including the tanks shall then be flushed with clean water until the residual chlorine level is reduced to less than one part per million. During the flushing period each valve and faucet shall be opened and closed several times. Samples of water in disinfected containers shall be obtained from several locations selected by the Contracting Officer. The samples of water shall be tested for total coliform organisms (coliform bacteria, fecal coliform, streptococcal, and other bacteria) in accordance with AWWA 10084. The testing method used shall be either the multiple-tube fermentation technique or the membrane-filter technique. Disinfection shall be repeated until tests indicate the absence of coliform organisms (zero mean coliform density per 100 milliliters) in the samples for at least 2 full days. The system will not be accepted until satisfactory bacteriological results have been obtained.

## 3.7 WASTE MANAGEMENT

Place materials defined as hazardous or toxic waste in designated containers. Return solvent and oil soaked rags for contaminant recovery and laundering or for proper disposal. Close and seal tightly partly used sealant and adhesive containers and store in protected, well-ventilated, fire-safe area at moderate temperature. Place used sealant and adhesive tubes and containers in areas designated for hazardous waste. Separate copper and ferrous pipe waste in accordance with the Waste Management Plan and place in designated areas for reuse.

## 3.8 POSTED INSTRUCTIONS

Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the systems.

## 3.9 TABLES

TABLE I
PIPE AND FITTING MATERIALS FOR
DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

| | | SERVICE | | | |
|---|---|---|---|---|---|
| Item # | Pipe and Fitting Materials | A | B | C | D |
| 1 | Polyvinyl Chloride plastic drain, waste and vent pipe and fittings, ASTM D 2665, | X | X | X | X |

SERVICE:

A - Underground Building Soil, Waste and Storm Drain
B - Aboveground Soil, Waste, Drain In Buildings
C - Underground Vent

TABLE I
PIPE AND FITTING MATERIALS FOR
DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

| | | SERVICE | | | |
|---|---|---|---|---|---|
| Item # | Pipe and Fitting Materials | A | B | C | D |

D - Aboveground Vent

TABLE II
PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

| | | SERVICE | | |
|---|---|---|---|---|
| Item No. | Pipe and Fitting Materials | A | B | C |
| 1 | Seamless copper water tube, ASTM B 88, ASTM B 88M | X** | X** | X*** |
| 2 | Wrought copper and bronze solder-joint pressure fittings, ASME B16.22 for use with Item 1 | X | X | X |

A - Cold Wat0r Service Aboveground
B - Hot and Cold Water Distribution 180 degrees F Maximum Aboveground
C - Cold Water Service Belowground
Indicated types are minimum wall thicknesses.
** - Type L - Hard
*** - Type K - Hard temper with brazed joints only or type K-soft temper without joints in or under floors

-- End of Section --

# SECTION 23 03 00.00

# BASIC MECHANICAL MATERIALS AND METHODS
04/17

## 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 B117 | (2016) Standard Practice for Operating Salt Spray (Fog) Apparatus |

INTERNATIONAL CODE COUNCIL (ICC)

| | |
|---|---|
| ICC IFGC | (2018) International Fuel Gas Code |
| ICC IMC | (2018) International Mechanical Code |
| ICC IPC | (2018) International Plumbing Code |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| NEMA MG 1 | (2016; SUPP 2016) Motors and Generators |
| NEMA MG 11 | (1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors |

### 1.2 SUBMITTALS

Government approval is required for all submittals.

### 1.3 RELATED REQUIREMENTS

This section applies to all sections of Divisions: 21, FIRE SUPPRESSION; 22, PLUMBING; and 23, HEATING, VENTILATING, AND AIR CONDITIONING of this project specification, unless specified otherwise in the individual section.

### 1.4 QUALITY ASSURANCE

#### 1.4.1 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 must have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use must include applications of equipment and materials under similar circumstances and of similar size. The product must have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

### 1.4.2 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.

### 1.4.3 Service Support

The equipment items must 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 must 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.

### 1.4.4 Manufacturer's Nameplate

For each item of equipment, provide 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.

### 1.4.5 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "must" 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.

#### 1.4.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract documents, advisory provisions must be considered mandatory, the word "should" is interpreted as "must." Reference to the "code official" must be interpreted to mean the "Contracting Officer." For Navy owned property, references to the "owner" must be interpreted to mean the "Contracting Officer." For leased facilities, references to the "owner" must be interpreted to mean the "lessor." References to the "permit holder" must be interpreted to mean the "Contractor."

#### 1.4.5.2 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, must be applied appropriately by the Contracting Officer as authorized by his administrative cognizance and the FAR.

## 1.5 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.

## 1.6 ELECTRICAL REQUIREMENTS

Furnish motors, controllers, disconnects and contactors with their respective pieces of equipment. Motors, controllers, disconnects and contactors must conform to and have electrical connections provided under Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Controllers and contactors shall have a maximum of 120 volt control circuits, and must have auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work must be included under the section that specified that motor or equipment. Power wiring and conduit for field installed equipment must be provided under and conform to the requirements of Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

### 1.6.1 Motor Voltage

Provide motors rated for the voltage supplied. Motors shall be suitable for use at 90% to 110% of the nominal voltage and shall have a service factor of at least 1.1 at that nominal voltage.

### 1.6.2 Single Phase Motor Efficiency

Unless otherwise specified, single-phase fractional-horsepower alternating-current motors must be high efficiency types corresponding to the applications listed in NEMA MG 11.

### 1.6.3 Poly Phase Motor Efficiency

Unless other specified polyphase squirrel-cage induction motors must be premium efficiency with continuous ratings that meet or exceed energy efficient ratings in accordance with Table 12-12 of NEMA MG 1

### 1.6.4 Three-Phase Motor Protection

Provide controllers for motors rated three horsepower 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.

## 1.7 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 must be thoroughly familiar with all parts of the installation and must be trained in operating theory as well as practical operation and maintenance work.

Instruction must 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 must 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.

## 1.8 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.

## 1.9 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.

### 1.9.1 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). The contractor shall prepare and submit a VAV/TAB Room Number List for each VAV/Tab model installed in a single building. Only one Maximo Equipment Inventory Update form is required for each model of VAV or TAB in a single building.

#### 1.9.1.1 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.

### 1.9.2 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).

### 1.9.3 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 Manufacturer's Recommendations

All material and equipment shall be installed in accordance with the manufacturer's recommendations for the intended purpose. Use the more stringent methods when manufacturer's recommendations, and plan & specification requirements differ. The contractor shall notify the government of any conflicts between manufacturer's recommendations and plans & specification requirements.

### 3.2 International Construction Codes

All material, equipment and installation shall be in accordance with the ICC IFGC, ICC IPC, and ICC IMCunless noted otherwise on the drawings and/or specifications. The contractor shall notify the government of any conflicts between ICC code requirements and contract requirements.

### 3.3 PAINTING OF NEW EQUIPMENT

New equipment painting must be factory applied or shop applied, and must be as specified herein, and provided under each individual section.

#### 3.3.1 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 must withstand 500 hours in a salt-spray fog test. Salt-spray fog test must be in accordance with ASTM B117, and for that test the acceptance criteria must be as follows: immediately after completion of the test, the paint must show no signs of blistering, wrinkling, or cracking, and no loss of adhesion; and the specimen must 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 must 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 must be designed for the temperature service.

3.3.2 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 must 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 must 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 must 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 1 mil; and two coats of enamel applied to a minimum dry film thickness of 1 mil per coat.

b. Temperatures Between 120 and 400 Degrees F: Metal surfaces subject to temperatures between 120 and 400 degrees F must 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 must receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.

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)_____

-- End of Section --

# SECTION 23 05 92

# TESTING/ADJUSTING/BALANCING: SMALL HEATING/VENTILATING/COOLING SYSTEMS

**04/17**

## 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.

ASSOCIATED AIR BALANCE COUNCIL (AABC)

| | |
|---|---|
| AABC MN-1 | (2002; 6th ed) National Standards for Total System Balance |

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

| | |
|---|---|
| NEBB PROCEDURAL STANDARDS | (2015) Procedural Standards for TAB (Testing, Adjusting and Balancing) Environmental Systems |

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

| | |
|---|---|
| SMACNA 1780 | (2002) HVAC Systems - Testing, Adjusting and Balancing, 3rd Edition |

### 1.2 DESCRIPTION OF WORK

The work includes testing, adjusting, and balancing (TAB) of heating, ventilating, and cooling (HVAC) air distribution systems including equipment and ducts which are located within, on, under, between, and adjacent to buildings.

#### 1.2.1 Air Distribution Systems

Systems shall be tested, adjusted, and balanced (TAB'd) in compliance with this section. Obtain Contracting Officer's written approval before applying insulation to exterior of air distribution systems under Section 23 07 00, "Insulation for Mechanical Systems."

### 1.3 DEFINITIONS

a. Field check group: One or more systems of the same basic type; the subgroup of a "field check group" is a "system."

b. Out-of-tolerance data: Pertains only to field checking of certified TAB report. The term is defined as a measurement taken during field checking which does not fall within the range of plus 5 to minus 5 percent of the design for a specific parameter.

## 1.4 SUBMITTALS

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

SD-06 Test Reports

TAB Report

### 1.4.1 TAB Report

Submit TAB report with any/all known deficiencies in operation, performance, or air flow are clearly identified. The report shall be reported in the specified format including the following data:

a. Report Format: Submit completed report forms for each of the following; as a minimum, report all data as contained on standard NEBB PROCEDURAL STANDARDS, AABC MN-1, OR SMACNA 1780 report forms as contained within the referenced standards:

(1) Air Systems

(a) Fan report for exhaust fans.

(b) Duct traverse exhaust ducts.

(c) DX cooling coils - report entering/leaving, wet/dry bulb temperatures and energy transferred.

(d) Heating coils, DX - report entering/leaving dry bulb temperatures and energy transferred.

(e) Unit heaters- report entering/leaving dry bulb temperatures and energy transferred.

The report shall be neatly bound with a waterproof cover. It shall contain a table of contents, with each page numbered. All report data shall be typed - handwritten data will not be acceptable.

b. Temperatures: On each TAB report form reporting TAB work accomplished on HVAC thermal energy transfer equipment, include the indoor and outdoor dry bulb temperature range and indoor and outdoor wet bulb temperature range within the TAB data was recorded.

c. Instruments: List the types of instruments actually used to measure the TAB data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date.

## 1.5 QUALITY ASSURANCE

### 1.5.1 Modifications of References

Accomplish work in accordance with referenced publications of AABC or NEBB except as modified by this section. In the references referred to herein, consider the advisory or recommended provisions to be mandatory, as though the word "shall" had been substituted for the words "should" or "could" or

"may" wherever they appear. Interpret reference to the "authority having jurisdiction," the "Administrative Authority," the "Owner," or the "Design Engineer" to mean the "Contracting Officer."

## PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

### 3.1 TAB PROCEDURES

#### 3.1.1 TAB Field Work

Test, adjust, and balance the listed HVAC systems to the state of operation indicated on and specified in the contract design documents. Air systems shall be proportionately balanced and reported in the TAB report. Provide instruments and consumables required to accomplish the TAB work. Conduct TAB work, on the listed HVAC systems in conformance with the AABC MN-1, or NEBB PROCEDURAL STANDARDS, except as modified by this section:

a. Workmanship: Conduct TAB work on specified HVAC systems until measured parameters are within plus or minus 5 percent of the design values, that is, the values specified or indicated on the contract documents, except exhaust shall be plus 0 percent/minus 5 percent.

#### 3.1.2 Data From TAB Field Work

After all TAB work has been completed, prepare a handwritten, pre-final TAB report using all report forms complete as specified for the final TAB report. Except as approved otherwise by the Contracting Officer, in writing, the TAB work and the TAB report shall be considered incomplete until the TAB work is accomplished to within the accuracy range specified in the paragraph titled "Workmanship."

#### 3.1.3 Quality Assurance For TAB Field Work

##### 3.1.3.1 Field Check

Verbally notify the Contracting Officer that the field check of the pre-final, handwritten report can commence; give this verbal notice 48 hours in advance of when the field check of the pre-final report can commence. Do not schedule the field check of the pre-final report until the TAB work is accomplished to within the accuracy range specified in the paragraph titled "Workmanship" or written approval of the deviations from the requirements has been received from the Contracting Officer.

a. Recheck: During field check the Contractor shall recheck, in the presence of the Contracting Officer, random selections of all reported data recorded in the pre-final report.

b. Areas of Recheck: Points and areas of recheck shall be selected by the Contracting Officer.

c. Procedures: Measurements and test procedures shall be the same as was used for forming basis of the pre-final report.

d. Recheck Selections: Selections for recheck will not exceed 25 percent of the total number of reported data entries tabulated in the pre-final report.

3.1.3.2 Retests

If random tests reveal a measured value which is an out-of-tolerance quantity, the report is subject to disapproval at the Contracting Officers' discretion. In the event the report is disapproved, all systems shall be readjusted and tested; new data recorded; a new pre-final report submitted; and a new field check conducted at no additional cost to the Government.

3.1.3.3 Out-of-Tolerance Quantity

Out-of-tolerance quantity pertains to field checking of the pre-final report. The term is defined as measurement taken during field checking which does not fall within the range of plus 5 to minus 5 percent of the reported value for the specific parameter.

3.1.3.4 Report Acceptance

On completion, and approval, of the pre-final report field check, the Contractor shall prepare, assemble, and submit the final certified TAB report in the required format for final review/approval.

3.2 MARKING OF SETTINGS

Permanently mark the settings of HVAC adjustment devices including valves, splitters, and dampers so that adjustment can be restored if disturbed at any time. The permanent markings shall indicate the settings on the adjustment devices which result in the data reported on the submitted certified TAB report.

3.3 MARKING OF TEST PORTS

The TAB team shall permanently and legibly mark and identify the location points of the duct test ports. If the ducts have exterior insulation, these markings shall be made on the exterior side of the duct insulation. The location of test ports shall be shown on the as-built mechanical drawings with dimensions given where the test port is covered by exterior insulation.

-- End of Section --

# SECTION 23 07 00

# INSULATION OF MECHANICAL SYSTEMS

**03/11**

## 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 in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A167 | (2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip |
| ASTM B209 | (2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate |
| ASTM C 1136 | (1995) Flexible, Low permeance Vapor Retarders for Thermal Insulation |
| ASTM C177 | (2013) Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus |
| ASTM C195 | (2007; R 2013) Standard Specification for Mineral Fiber Thermal Insulating Cement |
| ASTM C534/C534M | (2016) Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form |
| ASTM C547 | (2017) Standard Specification for Mineral Fiber Pipe Insulation |
| ASTM C591 | (2013) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation |
| ASTM C916 | (2014) Standard Specification for Adhesives for Duct Thermal Insulation |
| ASTM E84 | (2018a) Standard Test Method for Surface Burning Characteristics of Building Materials |
| ASTM E96/E96M | (2016) Standard Test Methods for Water Vapor Transmission of Materials |

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

| | |
|---|---|
| FS L-P-535 | (Rev. E; Notice 2) Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) and Poly(Vinyl Chloride-Vinyl Acetate), Rigid |

U.S. DEPARTMENT OF DEFENSE (DOD)

| | |
|---|---|
| MIL-A-3316 | (1987; Rev C; Am 2 1990) Adhesives, Fire-Resistant, Thermal Insulation |
| MIL-C-19565 | (Rev. C; Am. 1) Coating Compounds, Thermal Insulation, Fire- and Water-Resistant, Vapor Barrier |
| MIL-C-20079 | (Rev. H) Cloth, Glass: Tape, Textile Glass; and Thread, Glass and Wire-Reinforced Glass |
| MIL-A-24179 | (1969; Rev A; Am 2 1980; Notice 1 1987) Adhesive, Flexible Unicellular-Plastic Thermal Insulation |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 255 | (2006; Errata 2006) Standard Method of Test of Surface Burning Characteristics of Building Materials |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 723 | (2018) UL Standard for Safety Test for Surface Burning Characteristics of Building Materials |

## 1.2 SYSTEM DESCRIPTION

Provide field-applied insulation for piping systems which are located within, on, under, and adjacent to buildings; and for plumbing piping systems.

### 1.2.1 Piping Systems

Obtain Contracting Officer's written approval of HVAC water distribution systems under Section 23 05 92, "Testing/Adjusting/Balancing: Small Heating/Ventilating/Cooling Systems" before applying field-applied insulation to HVAC water distribution systems. At the Contractor's option and with Contracting Officer's written approval, the piping systems may be insulated before systems are tested, adjusted, and balanced (TAB'd). Piping insulation shall terminate immediately adjacent to each valve or device.

## 1.3 DEFINITIONS

### 1.3.1 Finished Spaces

Spaces used for habitation or occupancy where rough surfaces are plastered, panelled, or otherwise treated to provide a pleasing appearance.

1.3.2 Unfinished Spaces

Spaces used for storage or work areas where appearance is not a factor, such as unexcavated spaces and crawl space.

1.3.3 Concealed Spaces

Spaces out of sight. For example, above ceilings; below floors; between double walls; furred-in areas; pipe and duct shafts; and similar spaces.

1.3.4 Exposed

Open to view. For example, pipe running through a room and not covered by other construction.

1.3.5 Fugitive Treatments

Treatment subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, and heat. Fugitive materials are entrapped materials that can cause deterioration, such as solvents and water vapor.

1.3.6 Outside

Open to view up to 5 feet beyond the exterior side of walls, above the roof, and unexcavated or crawl spaces.

1.3.7 Conditioned Space

An area, room or space normally occupied and being heated or cooled for human habitation by any equipment.

1.4 SUBMITTALS

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

SD-03 Product Data

Piping insulation

Piping insulation finishes

Accessory materials

Adhesives, sealants, and coating compounds

1.5 QUALITY ASSURANCE

Every package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to the project site shall have the manufacturer's stamp or label attached giving name of manufacturer, brand and description of material. Insulation packages and containers shall be asbestos-free.

1.6 FLAME-SPREAD AND SMOKE-DEVELOPED RATINGS

In accordance with NFPA 255, ASTM E84 or UL 723, the materials on interior of the building shall have a flame-spread rating of not more than 25 and a

smoke-developed rating of not more than 150 interior to the bulding.

1.6.1 Materials Tests

Test factory-applied materials as assembled. Field-applied materials may be tested individually. Use no fugitive or corrosive treatments to impart flame resistance. UL label or satisfactory certified test report from a testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. Flame-proofing treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.

1.6.2 Materials Exempt From Fire-Resistant Rating

Nylon anchors.

PART 2 PRODUCTS

2.1 PIPING INSULATION

Piping systems, except buried pipe requiring insulation, types of insulation required, and insulation thickness shall be as listed in Tables I herein. Unless otherwise specified, insulate all fittings, flanges, and valves, except valve stems, hand wheels, and operators. Provide factory premolded, precut, or field-fabricated insulation of the same thickness and conductivity as insulation on adjacent piping. Insulation exterior shall be factory cleanable, grease resistant, non-flaking and non-peeling. Pipe insulation shall conform to the referenced publications.

2.1.1 Polyisocyanurate Insulation

ASTM C591, Type I. Supply the insulation with a factory applied vapor retarder/barrier that complies with Section 23 07 00 INSULATION OF MECHANICAL SYSTEMS. The insulation and all covering must pass the flame spread index of 25 and the smoke developed index of 50 when tested in accordance with ASTM E84.

2.1.2 Flexible Unicellular Insulation

2.1.2.1 Recommended Adhesive

ASTM C534/C534M. Provide adhesive as recommended by insulation manufacturer or conforming with MIL-A-24179, Type II, Class 1.

2.1.2.2 Polyolefin thermoplastic

Polyolefin thermoplastic meets ASTM C534/C534M, except density.

2.1.2.3 Adhesive For Finishing Flexible Unicellular Insulation

MIL-A-3316, Class 1, Grade A.

2.1.3 Mineral Fiber

ASTM C547, Class I.

### 2.1.4 Piping Insulation Finishes

#### 2.1.4.1 All-Purpose Jacket

Provide a factory applied all-purpose jacket when field applied jacketing is not specified. All purpose jackets shall include integral vapor barrier as required by service. Provide jackets in exposed locations with a white surface suitable for field painting. Allow a maximum water vapor permeance of 0.05 perm in accordance with ASTM E96/E96M, a puncture resistance of not less than 50 Beach units, and a minimum tensile strength of 35 pounds-force per inch of width in accordance with ASTM D828.

#### 2.1.4.2 Vapor-Barrier Material

ASTM C 1136. Resistant to flame, moisture penetration, and mold growth. Provide vapor-barrier material on pipe insulation as required in Table I.

#### 2.1.4.3 Metal Jackets

a. Aluminum Jackets: ASTM B209, Temper H14, minimum thickness of 27 gage (0.016 inch), with factory-applied polyethylene and kraft paper moisture barrier on inside surface. Provide smooth surface jackets for jacket outside diameters less than 8 inches. Provide corrugated surface jackets for jacket outside diameters 8 inches and larger. Provide stainless steel bands, minimum width of 0.5 inch. Provide factory prefabricated aluminum covers for insulation on fittings, valves and flanges.

## 2.2 ADHESIVES, SEALANTS, AND COATING COMPOUNDS

### 2.2.1 Insulation and Vapor Barrier Adhesive

Provide ASTM C916, Type I or Type II adhesive for securing insulation to metal surfaces and for vapor barrier lap only in building interior. Provide Type I when an adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will pass the edge-burning test is required. Provide Type II when an adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will not pass the edge-burning test is required.

### 2.2.2 Lagging Adhesive

MIL-A-3316, Class 1, for bonding fibrous glass cloth to unfaced fibrous glass insulation.

### 2.2.3 Mineral Fiber Insulation Cement

ASTM C195, thermal conductivity 0.85 maximum at 200 degrees F mean when tested in accordance with ASTM C177.

### 2.2.4 Vapor Barrier Coating

MIL-C-19565, Type II, indoor only above surface temperature 60 degrees F, color white.

### 2.2.5 Weatherproof Coating

For outside applications provide a weatherproof coating recommended by the manufacturer of the insulation and jackets.

2.2.6 Flexible Unicellular Insulation Adhesive

MIL-A-24179, Type II, Class 1 or Type III.

2.3 ACCESSORY MATERIALS

2.3.1 Staples

ASTM A167, Type 304 or 316 stainless steel outside-clinch type.

2.3.2 Bands for Metal Jackets

3/8-inch minimum width; 0.26 gage stainless steel or 0.24 gage aluminum.

2.3.3 PVC Pipe Fitting Cover

FS L-P-535, Composition A, Type II, Grade GU, factory premolded, one-piece.

PART 3 EXECUTION

3.1 PREPARATION

Do not insulate materials until system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and dried. Modify insulation to avoid obstruction with valve handles and other such items. Allow adequate space for pipe expansion. Install insulation with jackets drawn tight and cement down on longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings. Extend surface finishes to protect surfaces, ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping. Provide a moisture and vapor seal where insulation terminates against metal hangers, anchors and other projections through the insulation on surfaces for which a vapor seal is specified. Keep insulation dry during application of finish. Bevel and seal the edges of exposed insulation.

3.2 PIPING INSULATION

3.2.1 Mineral Fiber Pipe Insulation

Place sections of insulation around the pipe and joints tightly butted into place. The jacket laps shall be drawn tight and smooth. Secure jacket with fire resistant adhesive factory applied self sealing lap, or stainless steel outward clinching staples spaced not over 4 inches on centers and 1/2 inch minimum from edge of lap. Cover circumferential joints with butt strips, not less than 3 inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1 1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Apply staples to both edges of the butt strips. Patch damaged jacket material by wrapping a strip of jacket material around the pipe and cementing, stapling, and coating as specified for butt strips. Extend the patch not less than 1 1/2 inches past the break in both directions. At penetrations, fill the voids with the vapor barrier coating for outside service. Seal with a brush coat of the same coating.

### 3.2.2 Flexible Unicellular Insulation

Bond cuts, butt joints, ends, and longitudinal joints with adhesive, miter 90-degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral fiber insulation inerts and sheet metal sleeves. Insulate flanges, unions, valves, and fittings in accordance with manufacturer's published instructions. Tape all butt joints with adhesive backed insulation tape. On elastomeric insulation (Rubatex, Armorflex) located outside provide weather covering as follows:

(1) Coat entire surface of insulation with MIL-A-3316

(2) While the adhesive is tacky, apply a layer of MIL-C-20079 glass cloth. Stretch tightly and overlap all joints by a minimum of 2-inches. Glass cloth at elbows and fittings shall be mitered.

(3) Apply a final coat of MIL-A-3316 adhesive.

### 3.2.3 Polyisocyanurate

Secure outer most layer of insulation with metal bands 12-inch on center. If a factory installed all service jacket is used, the metal bands shall be applied to the outside of the all service jacket. If two or more layers are applied, the inner layers may be secured with fiber reinforced tape. For cold piping all joints both longitudinal and circumferential shall be sealed. Use the manufacturer's recommended cement or sealant. Apply all-purpose jacket, vapor barrier if required by Table I. Elbows shall be four piece miter if field fabricated. Pre-manufactured elbows can be held in place with metal bands. All elbows shall be finished as follows: Apply a skim coat of hydraulic setting cement directly to the insulation. When dry, apply a flooding coat of adhesive over the hydraulic setting cement. Press a layer of MIL-C-20079 glass cloth or tape into adhesive and seal laps and edges with adhesive. Coat cloth with adhesive cut at a ratio of one part water to five parts adhesive in color other than white for the purpose of visual inspection to ensure sizing of entire surface. Factory-fabricated removable and reusable insulated covers shall be provided for all valves, unions and other devices. The insulation cover shall be reusable without the need for special material or tools. Insulation shall be two piece molded cellular to fit the valve or device. Flexible unicellular insulation may be used in lieu of molded cellular insulation.

### 3.2.4 Hangers and Anchors

Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide galvanized steel shields protection saddles. Band and secure insulation protection shields without damaging pipe insulation. Where shields are used on pipes 2 inches and larger, provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 8 pcf) or other approved material of the same thickness as adjacent insulation. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation with vapor barrier coating, Type II or for exterior work, manufacturer's recommended weatherproof coating, as applicable. Where protection saddles

are used, fill all voids with the same insulation material as used on the adjacent pipe.

3.2.5 Sleeves and Wall Chases

Where penetrating interior walls, extend a metal jacket 2 inches out on either side of the wall and secure on each end with a band. Where penetrating exterior walls, extend the metal jackets through the sleeve to a point 2 inches beyond the interior surface of the wall.

3.2.6 Unions, Valves and Fittings for Hot Piping

Unions, Valves, and Fittings Insulation for Hot Piping: Factory fabricated removable and reusable insulation covers may be used. For inside domestic hot water; exposed hot water piping and drains in handicap areas, place factory premolded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the union, valve, and fitting abutting the adjoining pipe insulation. If nesting size insulation is used, overlap 2 inches or one pipe diameter, whichever is larger. Use insulating cement to fill voids. Elbows insulated using segments shall have not less than three segments per elbow. Place and joint the segments with manufacturer's recommended water-vapor resistant, fire retardant, and adhesive appropriate for the temperature limit of the service. Upon completion of installation of insulation, apply two coats lagging adhesive with glass tape embedded between coats. Overlap tape seams one inch. Extend adhesive onto adjoining insulation not less than two inches. The total dry film thickness shall be not less than 1/16 inch. Where unions are indicated not to be insulated, taper the insulation to the union at a 45 degree angle. Coat the insulation and all purpose jacket with two coats of lagging adhesive and with glass tape embedded between coats. The total dry film thickness shall be not less than 1/16 inch. At the option of the Contractor, factory premolded one-piece PVC fitting covers may be provided in lieu of two coats of adhesive with tape embedded between coats. Factory premolded field-fabricated segment or blanket insert insulation shall be provided under the fitting covers. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling, taping with PVC vapor barrier tape, or with metal or plastic tacks made for securing PVC fitting covers. Do not provide PVC fitting covers where exposed to the weather. Provide PVC fitting covers only in ambient temperatures below 150 degrees F.

3.2.7 Piping Exposed to Weather

3.2.7.1 Metal Jackets

Install over the insulation. Metal jackets shall have side and end lap at least 2 inches wide with the cut edge of the side tap turned inside one inch to provide a smooth edge. Overlap the jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9-inch centers or with screws at not more than 5-inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating recommended by the insulation manufacturer for weatherproofing.

3.2.7.2 Valves, Fittings, and Accessories

Insulate and finish as specified for the applicable service. Apply two coats of vapor barrier mastic for cold service recommended by the

insulation manufacturer. Embed glass tape in the first coat. Overlap tape not less than one inch and the adjoining metal jacket not less than 2 inches.

## 3.3 PAINTING AND IDENTIFICATION

Paint in accordance with Section 09 90 00, "Paints and Coatings." Piping identification shall be as specified in other sections.

## 3.4 FIELD INSPECTION

Visually inspect to ensure that materials provided conform to specifications. Inspect installations progressively for compliance with requirements.

TABLE I

Piping Insulation Wall Thickness

| Service | Material | Tube And Pipe Size (Inches) 1/4-1 1/4 | 1 1/2-3 | 3 1/2-5 | 6-& Larger | Vapor Barrier Required |
|---|---|---|---|---|---|---|
| Domestic Cold Water, Drains | Polyisocyanurate | 1 | 1 | 1 | 1 | Yes |
| Refrigerant Piping | Flexible Unicellular | 3/4 (1.5) | 3/4 (1.5) | 1.5 (2.0) | 1.5 (2.0) | Yes |
| Domestic Hot Water | Mineral Fiber | 1 | 1 | 1.5 | 1.5 | No |

NOTE: Thickness in parenthesis are for:

(1) Cold piping - outside locations.

==========

-- End of Section --

# SECTION 23 73 33

# HEATING, VENTILATING, AND COOLING 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.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. (AMCA)

| | |
|---|---|
| AMCA 204 | (2005; R 2012) Balance Quality and Vibration Levels for Fans |

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

| | |
|---|---|
| ANSI Z83.8/CSA 2.6 | (2016; Errata 2017) Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters, and Gas-Fired Duct Furnaces |

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

| | |
|---|---|
| ARI 210/240 | (1994) Unitary Air-Conditioning and Air-Source Heat Pump Equipment |
| ARI 7l0 | (1995) Liquid-Line Driers |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME B16.3 | (2016) Malleable Iron Threaded Fittings, Classes 150 and 300 |
| ASME B16.11 | (2016) Forged Fittings, Socket-Welding and Threaded |
| ASME B16.22 | (2018) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings |
| ASME B16.23 | (2011) Cast Copper Alloy Solder Joint Drainage Fittings - DWV |
| ASME B16.26 | (2013) Standard for Cast Copper Alloy Fittings for Flared Copper Tubes |
| ASME B16.39 | (2014) Standard for Malleable Iron Threaded Pipe Unions; Classes 150, 250, and 300 |
| ASME B31.1 | (2016; Errata 2016) Power Piping |
| ASME B31.5 | (2016) Refrigeration Piping and Heat Transfer Components |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A53/A53M | (2018) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| ASTM A106 | (1999el) Seamless Carbon Steel Pipe for High-Temperature Service |
| ASTM A525 | (1991; Rev. B) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process |
| ASTM A653/A653M | (2001a) Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock-Forming Quality |
| ASTM B280 | (1999el) Seamless Copper Tube for Air Conditioning and Refrigeration Field Service |
| ASTM B306 | (1999) Copper Drainage Tube (DWV) |

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

| | |
|---|---|
| MSS SP-58 | (2018) Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation |
| MSS SP-69 | (2003; Notice 2012) Pipe Hangers and Supports - Selection and Application (ANSI Approved American National Standard) |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

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

| | |
|---|---|
| SMACNA 1966 | (2005) HVAC Duct Construction Standards Metal and Flexible, 3rd Edition |
| SMACNA 1972 CD | (2012) HVAC Air Duct Leakage Test Manual - 2nd Edition |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 705 | (2004; Reprint Dec 2013) Standard for Power Ventilators |

## 1.2 SYSTEM DESCRIPTION

Provide heating, ventilating, and cooling (HVAC) systems complete and ready for operation. HVAC systems include equipment, ducts, and piping which is located within, on, under, and adjacent to buildings.

## 1.3 SUBMITTALS

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

SD-03 Product Data

Pipe hangers and supports

Flexible pipe connectors

Diffusers, registers, and grilles

Valves

Pipe and fittingsSidewall Propeller Fans

Square In-Line Centrifugal Fans

Mini-Split Heat Pump Systems

Gas-Fired Unit Heater

SD-08 Manufacturer's Instructions

Installation manual

SD-10 Operation and Maintenance Data

Sidewall Propeller Fans, Data Package 2

Square In-Line Centrifugal Fans, Data Package 2

Mini-Split Heat Pump Systems, Data Package 3

Gas-Fired Unit Heater, Data Package 2

### 1.3.1 Installation Manual

Provide for each item of equipment.

# PART 2 PRODUCTS

## 2.1 EQUIPMENT

Dehydrate, purge, and charge refrigerant circuit with refrigerant and oil at factory. Factory oil and refrigerant charge shall be full amount required for operation, if within limits permitted by the Department of Transportation; otherwise, a holding charge shall be furnished. Field charging, where only a holding charge is shipped, shall be accomplished without breaking permanent refrigerant connections. Equipment using R-11, R-12, R-13, R-113, R-114, R-115, R-500, or R-502 as a refrigerant will not

be permitted. Refrigerants shall have an Ozone Depletion Factor (ODF) of 0.05 or less. The ODF shall be in accordance with the "Montreal Protocol On Substances That Deplete The Ozone Layer," September 1987, sponsored by the United Nations Environment Program. Refrigerants that operate any where in the cycle below 20 psia will not be permitted. Efficiency of equipment shall meet the minimum's of Table 15701-1.

### 2.1.1 Mini-Split Heat Pump Systems

Provide units factory assembled, designed, tested, and rated in accordance with ARI 210/240. System shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wired remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.

a. Outdoor Unit Cabinet: The casing shall be fabricated of galvanized steel, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating in manufacturer's standard color. Assembly hardware shall be cadmium plated. Provide unit with two (2) steel mounting feet, traverse mounted across the cabinet base pan, welded mount, providing four (4) slotted mounting holes. Assembly shall withstand lateral wind gust up to 155 MPH.

b. Outdoor Unit Fan: The unit shall be furnished with a direct drive, high performance propeller type fan. The condenser fan motor shall be a variable speed, direct current (DC) motor and shall have permanently lubricated bearings. Fan speed shall be switch automatically according to the number of operating indoor units and the compressor operating frequency. The fan motor shall be mounted with vibration isolation. The fan shall be provided with a raised guard to prevent contact with moving parts. The outdoor unit shall have horizontal discharge airflow.

c. Outdoor Unit Coil: The outdoor unit coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing. The coil shall be protected with an integral guard. Refrigerant flow from the outdoor unit to the indoor units shall be independently controlled by means of individual electronic linear expansion valves for each indoor unit. Outdoor unit shall be pre-charged with sufficient R-410a refrigerant for up to thirty three (33) feet of refrigerant piping. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84. All refrigerant connections between outdoor and indoor units shall be flare type.

d. Outdoor Unit Compressor: The compressor shall be a high performance, hermetic, inverter driven, variable speed, dual rotary type. The compressor motor shall be direct current (DC)

type equipped with a factory supplied and installed inverter drive package. The outdoor unit shall be equipped with a suction side refrigerant accumulator. The compressor shall be equipped with an internal thermal overload. The outdoor unit must have the ability to operate over the full capacity range with a maximum height difference of 40 feet and have refrigerant tubing length of 65 feet. The compressor shall be mounted to avoid the transmission of vibration.

e. Outdoor Unit Electrical: The unit electrical power shall be voltage as indicated in schedule. The outdoor unit shall be controlled by the microprocessors located in the indoor unit and in the outdoor unit communicating system status, operation, and instructions digitally over A-Control - a system directing that the indoor unit be powered directly from the outdoor unit using a 3-wire, 14 ga. AWG connection plus ground. The outdoor unit shall be equipped with Pulse Amplitude Modulation (PAM) compressor inverter drive control.

f. Indoor Unit Cabinet: The casing shall have a smooth front, white finish. Provide a separate, metal installation-plate that secures the indoor unit firmly to the wall. The installation-plate shall be securely attached to the wall using appropriate anchor method. Installing contractor shall determine the best method and be responsible for proper mounting of the installation plate to the wall.

g. Indoor Unit Fan: The indoor unit fan shall be an assembly with a line-flow fan direct driven by a single motor. The fan shall be statically and dynamically balanced and be powered by a motor with permanently lubricated bearing. Manual adjustable guide vanes shall be provided with the ability to change the airflow from side to side (left to right).Provide an integral, motorized, multi-position, horizontal air sweep flow louver. Unit shall be capable of five (5) positions plus Auto and Swing, controlled from the remote controller. The indoor fan shall operate at one of four (4) speeds. All speeds shall be selected from the remote controller.

h. Indoor Unit Filter: Return air shall be filtered by means of washable filter.

i. Indoor Unit Coil: The indoor unit coil shall be of nonferrous construction with smooth plate fins on copper tubing. All tube joints shall be brazed with phoscopper or silver alloy. The coils shall be pressure tested at the factory. A sloped, corrosion resistant condensate pan with drain shall be provided under the coil. An drain pan level switch shall be provided and installed on the condensate pan to prevent condensate from overflowing.

j. Indoor Unit Electrical: The unit electrical power shall be voltage as indicated in schedule. The system shall be equipped with a system directing that the indoor unit be powered directly from the outdoor unit.

k. System Control: Provide indoor unit with a wired remote controller mounted where indicated on plans. The wired remote controller shall be approximately 5" x 5" in size and white in color with a LCD display.

2.1.2 Gas-Fired Unit Heater

ANSI Z83.8/CSA 2.6 and AGA label.

a. Casing: Minimum 22 gage steel or aluminum. Provide removable access panels.

b. Heat Exchanger: Minimum 20 gage all-welded steel construction with corrosion-resistant aluminum finish.

c. Burners: Die-formed, slot ports, and steel construction with aluminum paint.

d. Draft Diverter: All-welded steel construction and an integral part of each heat exchanger section. Allows backdrafts to bypass burner assembly without affecting normal operation.

e. Controls: Consisting of a combination pressure regulator, main shutoff valve, pilot cock, pilot safety switch for 100 percent shutoff, high temperature limit switch, and time-delay fan switch. Include power and control connections in an integral junction box.

f. Venting: Indoor, separated combustion, power vented.

g. Efficiency: Minimum steady state efficiencies shall be 78 percent at maximum rated capacity and 75 percent at minimum rated capacity that is provided and allowed by the controls.

2.1.3 Sidewall Propeller Fans

Direct drive, axial type sidewall fans shall be provided as follows:

a. Housing: Galvanized-steel sheet with flanged edges and integral orifice ring, with baked-enamel finish coat applied after assembly.

b. Fan Wheels: For less than 500 CFM, formed-steel blades riveted to heavy-gauge steel spider bolted to cast-iron hub. For greater than 500 CFM, Replaceable, aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.

c. Fan Drive: Direct-drive motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

d. Dampers: Seacoast construction, counterbalanced, parallel-blade, backdraft dampers factory set to close when fan stops.

e. Motor-Side Back Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.

f. Wall Sleeve: Galvanized steel to match fan and accessory size.

2.1.4 Square In-line Centrifugal Fans

Fan shall be duct mounted, direct driven centrifugal square inline.

a. Certification: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by UL 705. Fan shall bear the AMCA

certified ratings seal for sound and air performance.

b. Construction: The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene gasketing. Housing shall be pre-drilled to accommodate universal mounting feet for vertical or horizontal installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM and static pressure. Unit shall be shipped in ISTA certified transit tested packaging.

c. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA 204, balance quality and vibration levels for fans.

d. Motor: Motor shall be an electronically commutated motor rated for continuous duty and furnished either with internally mounted potentiometer speed controller or with leads for connection to 0-10 VDC external controller.

## 2.2 ELECTRICAL

### 2.2.1 Electrical Motors, Controllers, Contactors, and Disconnects

Furnish with respective pieces of equipment. Motors, controllers, contactors, and disconnects shall conform to Section 26 20 00, "Interior Wiring Systems." Provide electrical connections under Section, 26 20 00, "Interior Wiring Systems." Provide controllers and contactors with maximum of 120-volt control circuits, and auxiliary contacts for use with controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of providing additional electrical service and related work shall be included under this section.

### 2.2.2 Electrical Work

Provide under Section 26 20 00, "Interior Wiring Systems."

## 2.3 METAL DUCT SYSTEMS

Provide shop-fabricated, zinc-coated steel ducts conforming to ASTM A525 or ASTM A653/A653M coating designation G60. Fabricate, construct, brace, reinforce, install, support, and seal ducts and accessories, and test ducts in accordance with SMACNA 1966 and SMACNA 1972 CD. Cover duct transverse joints with single component synthetic rubber type compound suitable for use with passivated coating on zinc-coated steel. Lap joints in direction of flow. Provide ducts straight and smooth on inside with neatly finished airtight joints. Provide air supply and return openings in ducts with air diffusers, registers, or grilles.

### 2.3.1 Flexible Duct Connectors

Provide airtight flexible duct connectors at duct connections to each air-conditioning unit, air-handling unit, exhaust fan, and ventilating fan. Support connectors at each end with metal angle frame bands, securely bolt

in place. Provide not less than 20 ounce glass fabric duct connectors coated on both sides with neoprene.

### 2.3.2 Diffusers, Registers, and Grilles

Provide factory-fabricated metal units with edges rolled or rounded where exposed to view, and factory primed with white enamel finish. Provide each diffuser and register with factory-fabricated, group-operated, adjustable, opposed-blade, air-volume-control dampers, key or screwdriver operated from the face of unit without the use of a tool. Provide each unit with rubber or plastic installation gaskets. Diffusers in same room shall have same face design.

a. Diffusers: Provide round, square, or rectangular diffusers as indicated. Ceiling diffusers shall be designed to deliver air in a horizontal direction. Provide baffles or other devices as required for proper air distribution pattern.

b. Registers: Provide double deflection supply registers arranged to control air direction, throw, and drop. Exhaust and return air registers shall have single set of nondirectional face bars or vanes having the same appearance as supply registers. Provide face bars or vanes spaced not more than 0.75 inch on center and not less than 0.62 inch depth.

c. Grilles: Provide as specified for registers without air-volume-control dampers.

## 2.4 PIPING SYSTEMS

Provide the following pipe and fittings.

### 2.4.1 Copper Tubing Piping Systems

Provide copper tubing for the following piping systems, except water piping sizes larger than 4 inches shall be copper tubing or steel piping.

a. Cold drain piping from drain pans.

### 2.4.2 Copper Cold Drain Piping

Provide copper tubing in accordance with paragraph entitled "Copper Tubing" for piping sizes one inch and smaller. Provide ASTM B306 copper tubing and ASME B16.23 solder joint fittings for piping sizes larger than one inch. In lieu of copper tubing, 1.25 inch Schedule 40 polyvinyl chloride (PVC) plastic pipe, fittings, and solvent cement may be provided.

### 2.4.3 Copper Refrigerant Tubing

Provide ASTM B280, cleaned, dehydrated, and sealed. Provide ASME B16.22 solder joint refrigerant fittings and adapters. Provide silver brazing alloy solder and silver brazing alloy flux. During brazing operations bleed a small amount of dry oil-free nitrogen continuously through the refrigerant tubing. Provide ASME B16.26 flared fittings.

### 2.4.4 Steel Piping Systems

Provide steel piping for the following piping systems.

a. Gas piping.

2.4.4.1 Steel Pipe

Provide ASTM A53/A53M Type E or Type S, or ASTM A106 steel pipe. Provide Weight Class STD or Schedule No. 40 black steel pipe for welding end connections.

2.4.4.2 Steel Pipe Fittings

Provide ASME B16.3 or ASME B16.11 threaded fittings, and ASME B16.39 threaded unions.

2.4.4.3 Steel Pipe Unions

Provide ASME B16.39, Class 150, unions with threaded end connections on one side of threaded valve in steel piping systems.

2.4.5 Valves

Valves shall have flanged end connections, except valves smaller than 2.5 inches may have threaded end connections with a union on one side of the valve. Solder end connections may be used for connections between copper alloy valves and copper tubing.

2.4.5.1 Ball Valves

Full port design, copper alloy body, except sizes 2.5 inches and larger shall be cast-iron body. Valves shall have two-position lever handles. Ball valves may be provided in lieu of gate valves.

2.5 PIPING ACCESSORIES

2.5.1 Pipe Hangers and Supports

Provide MSS SP-58 and MSS SP-69, Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

2.5.2 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide one-inch minimum clearance between exterior of piping or pipe insulation, and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal

both ends of sleeves or core-drilled holes with UL listed fill, void, or cavity material.

2.5.2.1 Sleeves in Masonry and Concrete

Provide steel pipe sleeves or schedule 40 PVC plastic pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.

2.5.2.2 Sleeves not in Masonry and Concrete

Provide 26 gage galvanized steel sheet or PVC plastic pipe sleeves.

2.5.3 Flexible Pipe Connectors

Provide flexible bronze or stainless steel piping connectors with single braid where indicated. Connectors shall be suitable for the intended service.

2.5.4 Sight Glass and Refrigerant Drier

ARI 7l0. Provide in refrigerant liquid piping.

2.5.5 Escutcheon Plates

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide polished stainless steel plates or chromium-plated finish on copper alloy plates in finished spaces. Provide paint finish on metal plates in unfinished spaces.

2.6 ACCESS DOORS FOR VALVES

Provide factory-prefabricated and primed flush face steel access doors including steel door frame for with continuous hinges and turn-screw-operated latch. Provide door frame installation in plaster and masonry walls. Furnish doors under this section; install doors under appropriate section of this specification.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 HVAC System

Installation of HVAC system including equipment, materials, installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with ASME B31.1, ASME B31.5, NFPA 70, and in accordance with the manufacturer's recommendations.

3.2 PIPING

Test, inspect, and approve piping before burying, covering, or concealing. Provide fittings for changes in direction of piping and for connections.
Make changes in piping sizes through tapered reducing fittings; bushings will not be permitted. Install valves with stems horizontal or above. Provide unions at valves and connections to equipment; unions are not

required in copper tubing piping systems.

a. Threaded connections: Provide Teflon pipe thread paste on male threads.

b. Pipe hangers and supports: Provide additional pipe hangers at concentrated loads.

c. Piping to receive insulation: Provide temporary wood spacers between the pipe hangers and supports, and the pipe in order to properly slope the piping and establish final elevations. Provide temporary wood spacers of same thickness as insulation to be provided under Section 23 07 00, "Insulation of Mechanical Systems." Support metal piping as follows.

MAXIMUM SPACING (FEET)

| Nominal Pipe Size (inches) | One and under | 1.25 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Copper Tubing | 6 | 7 | 8 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Steel Pipe | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 16 | 17 |

d. Cleaning of piping: Keep interior and ends of new piping and existing piping affected by Contractor's operations, cleaned of water and foreign matter during installation by using plugs or other approved methods. When work is not in progress, securely close open ends of pipe and fittings to prevent entry of water and foreign matter. Inspect piping before placing into position.

e. Demolition: Remove materials so as not to damage materials which are to remain. Replace existing work damaged by Contractor's operations with new work of same construction.

## 3.3 ADJUSTMENTS

Adjust controls and equipment so as to give satisfactory operation.

## 3.4 INSTRUCTING OPERATING PERSONNEL

Upon completion of work and at time designated by Contracting Officer, provide services of competent technician for period of not less than one 8-hour working day for instruction of Government operating personnel in proper operation and maintenance of equipment.

## 3.5 FIELD QUALITY CONTROL

Upon completion and before final acceptance of work, test each system in service to demonstrate compliance with the contract requirements. Adjust controls and balance systems prior to final acceptance of completed systems. Test controls through every cycle of operation. Test safety controls to demonstrate performance of required function. Correct defects in work provided by Contractor and repeat tests. Furnish fuel, water, electricity, instruments, connecting devices, and personnel for tests. Flush and clean piping before placing in operation. Clean equipment, piping, strainers, ducts, and filters.

3.5.1 Piping Systems Except for Refrigerant Piping

Before insulating, hydrostatically test each new piping system at not less than 188 psig; except pneumatically test fuel piping system at not less than 5 psig for tank and 50 psig for piping. Maintain pressure for 2 hours with no leakage or reduction in gage pressure. Obtain approval before applying insulation.

3.5.2 Refrigerant Piping

Perform following when field piping connections are provided.

a. Pressure test: Test refrigerant piping using dry, oil-free nitrogen, and prove tight to pressures directed by equipment manufacturer. Maintain pressure for 2 hours with no leakage or reduction in gage pressure

b. Evacuation: Using high vacuum pump and certified micron gage, reduce absolute pressure on both sides of system simultaneously to to levels directed by equipment manufacturer. After reaching this point charge system with proper refrigerant until pressure of zero psig is obtained. Repeat evacuation-charging procedure for two more cycles, totaling to three evacuation-charging cycles. On final evacuation, secure pump and maintain recommended microns for 2 hours before charging with required final refrigerant.

3.5.3 Equipment

3.5.3.1 Field Testing

Test each item of equipment in operation for continuous period of not less than 24 hours under every condition of operation in accordance with each equipment manufacturer's recommendation. Verify that the equipment operating parameters are within limits recommended by the manufacturer.

3.5.4 Additional Field Testing

Provide testing, adjusting, and balancing (TAB) of ducts, piping, and equipment under Section 23 05 92, "Testing/Adjusting/Balancing: Small Heating/Ventilating/Cooling Systems."

3.5.5 Testing and Balancing

Balance airflow in accordance with SMACNA and flows indicated. Submit written certificate to report the following:

a. Exhaust fan data, and actual voltage and ampere consumption.

b. Exhaust fan cfm.

-- 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 | (2000) 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 | (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code |
| IEEE C57.12.28 | (2014) Standard for Pad-Mounted Equipment - Enclosure Integrity |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| NEMA ICS 6 | (1993; R 2011) Enclosures |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

### 1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 26, "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 208/120 volts secondary, three phase, four wire.

## 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. 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

Comply with the requirements of Section 01 78 23, "Operation and Maintenance Data" and the technical sections.

#### 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. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

## 1.9 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

a. When the enclosure integrity of such equipment is specified to be in accordance with IEEE C57.12.28, such as for pad-mounted transformers, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPSO710D72 or approved equal.

## 1.10 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

### 1.10.1 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.

## 1.11 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.

## 1.12 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 23, "Mechanical."

## 1.13 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.

### 1.13.1 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). The contractor shall prepare and submit a VAV/TAB Room Number List for each VAV/Tab model installed in a single building. Only one Maximo Equipment Inventory Update form is required for each model of VAV or TAB in a single building.

#### 1.13.1.1 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.

1.13.1.2 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).

1.13.1.3 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.

3.1.2 Field Applied

Paint electrical equipment as required to match finish of adjacent

surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

## 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.

## 3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

-- End of Section --

# SECTION 26 08 00

# APPARATUS INSPECTION AND TESTING
**08/08**

## PART 1 GENERAL

### 1.1 REFERENCES

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

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

| | |
|---|---|
| NETA ATS | (2017; Errata 2017) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems |

### 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

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Acceptance tests and inspections

SD-07 Certificates

Qualifications of organization, and lead engineering technician

Acceptance test and inspections procedure

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Qualifications

Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and generation equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first tier subcontractor. No work required by this section of the specification shall be performed by a second tier subcontractor.

a. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials, devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with NETA ATS.

b. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

1.4.2 Acceptance Tests and Inspections Reports

Submit certified copies of inspection reports and test reports. Reports shall include certification of compliance with specified requirements, identify deficiencies, and recommend corrective action when appropriate. Type and neatly bind test reports to form a part of the final record. Submit test reports documenting the results of each test not more than 10 days after test is completed.

1.4.3 Acceptance Test and Inspections Procedure

Submit test procedure reports for each item of equipment to be field tested at least 45 days prior to planned testing date. Do not perform testing until after test procedure has been approved.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 ACCEPTANCE TESTS AND INSPECTIONS

Testing organization shall perform acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the manufacturer's recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Contracting Officer shall be notified at least 14 days in advance of when tests will be conducted by the testing organization. Perform acceptance tests and inspections on applicable equipment and systems specified in the following sections:

a. Section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION

3.2 SYSTEM ACCEPTANCE

Final acceptance of the system is contingent upon satisfactory completion of acceptance tests and inspections.

3.3 PLACING EQUIPMENT IN SERVICE

A representative of the approved testing organization shall be present when equipment tested by the organization is initially energized and

placed in service.

-- End of Section --

# SECTION 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) Hard-Drawn Copper Wire |
| ASTM B 8 | (1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| NEMA C80.1 | (1994) Rigid Steel Conduit - Zinc Coated |
| NEMA C80.3 | (1994) Electrical Metallic Tubing - Zinc Coated (EMT) |
| NEMA FU 1 | (2002) Low Voltage Cartridge Fuses |
| NEMA ICS 1 | (2000) Industrial Control and Systems General Requirements |
| NEMA ICS 2 | (2000; Errata 2006; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V |
| NEMA ICS 6 | (1993; R 2011) Enclosures |
| NEMA KS 1 | (2001) Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum) |
| NEMA TC 14 | (2002) Filament-Wound Reinforced Thermosetting Resin Conduit (RTRC) and Fittings |
| NEMA TC 2 | (1998) Electrical Polyvinyl Chloride (PVC) Tubing and Conduit |
| NEMA TC 3 | (1999) PVC Fittings for Use with Rigid PVC Conduit and Tubing |
| NEMA VE 1 | (2002) Metal Cable Tray Systems |

| | |
|---|---|
| NEMA WD 1 | (1999) General Color Requirements for Wiring Devices |
| NEMA WD 6 | (2002) Wiring Devices - Dimensional Specifications |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 1 | (2000) Flexible Metal Conduit |
| UL 1242 | (2000; R 2001, Bul. 2002) Intermediate Metal Conduit |
| UL 1449 | (1996; R 2002) Transient Voltage Surge Suppressors |
| UL 1660 | (2000; R 2002, Bul. 2002) Liquid-Tight Flexible Nonmetallic Conduit |
| UL 198C | (1986; R 1998) High-Interrupting-Capacity Fuses, Current-Limiting Types |
| UL 198E | (1988; R 1988) Class R Fuses |
| UL 198H | (1988; R 1993) Class T Fuses |
| UL 20 | (2000; R 2002, Bul. 2002) General-Use Snap Switches |
| UL 360 | (1996; R 2001, Bul. 2002) Liquid-Tight Flexible Steel Conduit |
| UL 44 | (1999; R 2002, Bul. 2002) Thermoset-Insulated Wires and Cables |
| UL 467 | (2013; Reprint Jun 2017) UL Standard for Safety Grounding and Bonding Equipment |
| UL 486A | (1997; R 2001, Bul. 2002, 2003) Wire Connectors and Soldering Lugs for Use with Copper Conductors |
| UL 486B | (1997; R 2001, Bul. 2002, 2003) Wire Connectors for Use with Aluminum Conductors |
| UL 486C | (2000; R 2002) Splicing Wire Connectors |
| UL 489 | (2002; R 2002, Bul. 2003) Molded-Case Circuit Breakers, Molded-Case Switches, |

| | |
|---|---|
| | and Circuit-Breaker Enclosures |
| UL 498 | (2001; R 2002) Attachment Plugs and Receptacles |
| UL 5 | (1996; R 2001) Surface Metal Raceways and Fittings |
| UL 50 | (2015) UL Standard for Safety Enclosures for Electrical Equipment, Non-Environmental Considerations |
| UL 508 | (1999; R 2002, Bul. 2003) Industrial Control Equipment |
| UL 510 | (2017) UL Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape |
| UL 514A | (1996; R 2001, Bul. 2002) Metallic Outlet Boxes |
| UL 514B | (1997; R 2002, Bul. 2002) Fittings for Cable and Conduit |
| UL 514C | (2014; Reprint Nov 2018) UL Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers |
| UL 6 | (2007; Reprint Sep 2019) UL Standard for Safety Electrical Rigid Metal Conduit-Steel |
| UL 651 | (1995; R 2002) Schedule 40 and 80 Rigid PVC Conduit |
| UL 797 | (2000; Bul. 2002) Electrical Metallic Tubing |
| UL 83 | (2017) UL Standard for Safety Thermoplastic-Insulated Wires and Cables |
| UL 943 | (1993; R 2002, Bul. 2002) Ground-Fault Circuit-Interrupters |

## 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-02 Shop Drawings

Panelboards

Cable trays

SD-03 Product Data

Receptacles

Circuit breakers

Switches

Motor controllers

Manual motor starters

Surge protective devices

SD-06 Test Reports

600-volt wiring test

Grounding system test

Ground-fault receptacle test

SD-07 Certificates

Fuses

SD-09 Manufacturer's Field Reports

SD-10 Operation and Maintenance Data

Electrical Systems, Data Package 5

Submit operation and maintenance data in accordance with Section 01 78 00, "Closeout Submittals" and as specified herein.

## 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. Single line diagram of the "as-built" building electrical system.

b. Schematic diagram of electrical control system (other than HVAC, covered elsewhere).

c. 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

Shall conform to the following:

### 2.2.1 Rigid Metallic Conduit

#### 2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

NEMA C80.1, UL 6.

### 2.2.2 Rigid Nonmetallic Conduit

PVC Type EPC-40, and EPC-80 in accordance with NEMA TC 2,UL 651 in accordance with NEMA TC 14.

### 2.2.3 Intermediate Metal Conduit (IMC)

UL 1242, zinc-coated steel only.

### 2.2.4 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797, NEMA C80.3.

### 2.2.5 Flexible Metal Conduit

UL 1.

#### 2.2.5.1 Liquid-Tight Flexible Metal Conduit, Steel

UL 360.

### 2.2.6 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B.

#### 2.2.6.1 Fittings for Rigid Metal Conduit and IMC

Threaded-type. Split couplings unacceptable.

#### 2.2.6.2 Fittings for EMT

Steel compression type.

### 2.2.7 Fittings for Rigid Nonmetallic Conduit

NEMA TC 3, UL 514B.

2.2.8 Liquid-Tight Flexible Nonmetallic Conduit

UL 1660.

2.3 SURFACE RACEWAY

2.3.1 Surface Metal Raceway

UL 5, two-piece painted steel, totally enclosed, snap-cover type. Surface Metal Raceway shall be screwed or bolted to the wall, stick on type is not allowed.

2.4 CABLE TRAYS

NEMA VE 1. Cable trays shall form a wireway system, and shall be of nominal 6 inch depth. Cable trays shall be constructed of steel that has been zinc-coated after fabrication. Trays shall include splice and end plates, dropouts, and miscellaneous hardware. Edges, fittings, and hardware shall be finished free from burrs and sharp edges. Fittings shall have not less than load-carrying ability of straight tray sections and shall have manufacturer's minimum standard radius. Radius of bends shall be 12 inches.

2.4.1 Ladder-Type Cable Trays

Of nominal 18 inch width with maximum rung spacing of 6 inches.

2.5 OUTLET BOXES AND COVERS

UL 514A, cadmium- or zinc-coated, if ferrous metal. UL 514C, if nonmetallic.

2.6 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.7 WIRES AND CABLES

Wires and cables 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.

2.7.1 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.

2.7.1.1 Equipment Manufacturer Requirements

When manufacturer's equipment requires copper conductors at the

terminations or requires copper conductors to be provided between components of equipment, provide copper conductors or splices, splice boxes, and other work required to satisfy manufacturer's requirements.

2.7.1.2 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; and for Class 3 low-energy, remote-control, alarm and signal circuits, No. 22 AWG.

2.7.2 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

2.7.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THWN/THHN conforming to UL 83 or Type XHHW conforming to UL 44, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits shall be Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.7.4 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.

2.8 SPLICES AND TERMINATION COMPONENTS

UL 486A and UL 486B, as applicable, 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.

2.9 DEVICE PLATES

Provide UL listed, one-piece device plates for outlets to suit the devices installed. For metal outlet boxes, plates on unfinished walls shall be of zinc-coated sheet steel or cast metal having round or beveled edges. Plates on finished walls shall be satin finish stainless steel or brushed-finish aluminum, minimum 0.03 inch thick. Screws shall be

machine-type with countersunk heads in color to match finish of plate. Sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed and UL listed for "wet locations."

## 2.10 SWITCHES

### 2.10.1 Toggle Switches

NEMA WD 1, UL 20, single pole, double pole, three-way, and four-way, totally enclosed with bodies of thermoplastic and/or thermoset plastic and mounting strap with grounding screw. Handles shall be Grey thermoplastic. Wiring terminals shall be screw-type, side-wired. Contacts shall be silver-cadmium and contact arm shall be one-piece copper alloy. Switches shall be rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.

### 2.10.2 Disconnect Switches

NEMA KS 1. Provide heavy duty-type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches. Fused switches shall utilize Class R fuseholders and fuses, unless indicated otherwise. Switches serving as motor-disconnect means shall be horsepower rated. Provide switches in NEMA 4X and NEMA 1 enclosure as indicated on drawings per NEMA ICS 6.

## 2.11 RECEPTACLES

UL 498, hard use, heavy-duty, grounding-type. Ratings and configurations shall be as indicated. Bodies shall be of Grey as per NEMA WD 1. Face and body shall be thermoplastic supported on a metal mounting strap. Dimensional requirements shall be per NEMA WD 6. Provide screw-type, side-wired wiring terminals. Connect grounding pole to mounting strap. The receptacle shall contain triple-wipe power contacts and double or triple-wipe ground contacts.

### 2.11.1 Weatherproof Receptacles

Provide in cast metal box with gasketed, weatherproof, cast-metal cover plate and gasketed cap over each receptacle opening. Provide caps with a spring-hinged flap. Receptacle shall be UL listed for use in "wet locations with plug in use."

### 2.11.2 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Device shall be capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A GFI devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

## 2.12 PANELBOARDS

### 2.12.1 Circuit Breakers

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 are unacceptable.

2.12.1.1 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.

2.12.1.2 Circuit Breakers for HVAC Equipment

Circuit breakers for HVAC equipment having motors (group or individual) shall be marked for use with HACR type and UL listed as HACR type.

## 2.13 FUSES

NEMA FU 1. Provide complete set of fuses for each fusible switch. Time-current characteristics curves of fuses serving motors or connected in series with circuit breakers or other circuit protective devices shall be coordinated for proper operation. Submit coordination data for approval. Fuses shall have voltage rating not less than circuit voltage.

2.13.1 Cartridge Fuses, Current Limiting Type (Class R)

UL 198E, Class RK-1 and RK-5 time-delay type. Associated fuseholders shall be Class R only.

2.13.2 Cartridge Fuses, Current Limiting Type (Classes J, L, and CC)

UL 198C, Class J for zero to 600 amperes, Class L for 601 to 6,000 amperes, and Class CC for zero to 30 amperes.

2.13.3 Cartridge Fuses, Current Limiting Type (Class T)

UL 198H, Class T for zero to 1,200 amperes, 300 volts; and zero to 800 amperes, 600 volts.

## 2.14 MOTOR CONTROLLERS

UL 508, NEMA ICS 1, and NEMA ICS 2, . Controllers shall have thermal overload protection in each phase and shall have one spare normally open and one spare normally closed auxiliary contact. Magnetic-type motor controllers shall have undervoltage protection when used with momentary-contact pushbutton stations or switches and shall have undervoltage release when used with maintained-contact pushbutton stations or switches. When used with pressure, float, or similar automatic-type or maintained-contact switch, controller shall have hand/off/automatic selector switch. Connections to selector switch shall be such that only normal automatic regulatory control devices are bypassed when switch is in "hand" position. Safety control devices, such as low and high pressure cutouts, high temperature cutouts, and motor overload protective devices, shall be connected in motor control circuit in "hand" and "automatic" positions. Control circuit connections to hand/off/automatic selector switch or to more than one automatic regulatory control device shall be made in accordance with indicated or manufacturer's approved wiring diagram. For each motor not in sight of controller or where controller disconnecting means is not in sight of motor location and driven machinery location, controller disconnecting means shall be capable of being locked in open position. Overload protective devices shall provide adequate protection to motor windings; be thermal inverse-time-limit type; and include manual reset-type pushbutton on outside of motor controller case.

Cover of combination motor controller and manual switch or circuit breaker shall be interlocked with operating handle of switch or circuit breaker so that cover cannot be opened unless handle of switch or circuit breaker is in "off" position. .

2.14.1 Enclosures for Motor Controllers

NEMA ICS 6.

2.15 MANUAL MOTOR STARTERS (MOTOR RATED SWITCHES)

Single, Double and Three pole designed for surface mounting with overload protection .

2.16 TELEPHONE SYSTEM

Provide system of telephone wire-supporting structures, including: conduits with pull wires surface mounted raceway, terminal boxes, outlet and junction boxes andother accessories for telephone outlets. Additional requirements are in Section 27 10 00, "Structured Telecommunications Cabling and Pathway System."

2.16.1 Outlet Boxes for Telephone System

Standard type, as specified herein. Mount flush in finished walls at height specified for outlet receptacles. Outlet boxes for wall-mounted telephones shall be 5 inch square by 2 7/8 in deep; mounted at heightas indicated.

2.16.2 Cover Plates

Modular telephone type with same finish specified for receptacle and switch cover plates.

2.16.3 Conduit Sizing

Conduit for single outlets shall be minimum of 1 in and for multiple outlets minimum of one inch. Size conduits for telephone risers to telephone cabinets, junction boxes, distribution centers, and telephone service, as indicated.

2.16.4 Backboards

Interior grade plywood, 3/4 in thick, 4 by 8 ft minimum . Paint with gray fire resistant paint.

2.16.5 Terminal Cabinets

Construct of zinc-coated sheet steel. Cabinets shall be constructed with interior dimensions not less than those indicated. Trim shall be fitted with hinged door and flush catch. Doors shall provide maximum-size openings to the box interiors. Boxes shall be provided with 5/8 in backboard having a two-coat insulating varnish finish. Match trim, hardware, doors, and finishes to lighting panelboards.

2.17 GROUNDING AND BONDING EQUIPMENT

UL 467. Ground rods shall be copper-clad steel, with minimum diameter of 3/4 in and minimum length of 10 ft.

## 2.18 NAMEPLATES

Provide as specified in Section 26 00 00, "Basic Electrical Materials and Methods."

## 2.19 FIRESTOPPING MATERIALS

Provide firestopping around electrical penetrations in accordance with Section 07 84 00, "Firestopping."

## 2.20 SURGE PROTECTIVE DEVICES

Provide parallel type surge protective devices which comply with UL 1449 at the service entrance panelboard. Provide surge protectors in a NEMA 1 enclosure per NEMA ICS 6. Provide the following modes of protection:

FOR SINGLE PHASE AND THREE PHASE WYE CONNECTED SYSTEMS-
Each phase to neutral ( L-N )
Neutral to ground ( N-G )
Phase to ground ( L-G )

Surge protective devices at the service entrance shall have a minimum surge current rating of 80,000 amperes per mode minimum . The maximum line to neutral (L-N) Suppressed Voltage Rating (SRV) shall be:

500V for 208Y/120V, three phase system

The minimum MCOV (Maximum Continuous Operating Voltage) rating shall be:

300/150V for 208Y/120V, three phase system

EMI/RFI filtering shall be provided for each mode with the capability to attenuate high frequency noise. Minimum attenuation shall be 20db.

# PART 3 EXECUTION

## 3.1 INSTALLATION

Electrical installations shall conform to requirements of NFPA 70 and to requirements specified herein.

### 3.1.1 Overhead Service

Overhead service conductors into buildings shall terminate at service entrance fittings or weatherhead outside building. Overhead service conductors and support bracket for overhead conductors are included in the Section 33 71 01, "Overhead Transmission and Distribution."

### 3.1.2 Wiring Methods

Provide insulated conductors installed in rigid steel conduit, or rigid nonmetallic conduit, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor shall be separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size shall be 1/2 in in diameter for low voltage lighting and power circuits.

3.1.2.1 Restrictions Applicable to EMT

a. Do not install underground.

b. Do not encase in concrete, mortar, grout, or other cementitious materials.

c. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.

d. Do not use in hazardous areas.

e. Do not use outdoors.

f. Do not use in fire pump rooms.

3.1.2.2 Restrictions Applicable to Nonmetallic Conduit

a. PVC Schedule 40 and PVC Schedule 80

(1) Do not use in areas where subject to severe physical damage, including but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.

(2) Do not use in hazardous (classified) areas.

(3) Do not use in fire pump rooms.

(4) Do not use in penetrating fire-rated walls or partitions, or fire-rated floors.

(5) Do not use above grade, except where allowed in this section for rising through floor slab or indicated otherwise.

3.1.2.3 Restrictions Applicable to Flexible Conduit

Use only as specified in paragraph entitled "Flexible Connections."

3.1.2.4 Service Entrance Conduit, Overhead

Rigid steel or IMC from service entrance to service entrance fitting or weatherhead outside building.

3.1.2.5 Underground Conduit Other Than Service Entrance

Plastic-coated rigid steel; plastic-coated steel IMC; PVC, Type EPC-40 Plastic coating shall extend minimum 6 in above floor.

3.1.3 Conduit Installation

Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 in away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be

visible after completion of project.

3.1.3.1 Conduit Through Floor Slabs

Where conduits rise through floor slabs, curved portion of bends shall not be visible above finished slab.

3.1.3.2 Conduit Support

Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. 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. Holes cut to depth of more than 1 1/2 in in reinforced concrete beams or to depth of more than 3/4 in in concrete joints shall not cut main reinforcing bars. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems shall be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Installation shall be coordinated with above-ceiling mechanical systems to assure maximum accessibility to all systems. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. For conduits greater than 2 1/2 in inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

3.1.3.3 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.

3.1.3.4 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.

3.1.3.5 Telephone and Signal System Conduits

Refer to Section 27 10 00, "Structured Telecommunications Cabling and Pathway System."

3.1.3.6 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts where

required by NFPA 70, 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.

3.1.3.7 Stub-Ups

Provide conduits stubbed up through concrete floor 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.

3.1.3.8 Flexible Connections

Provide flexible steel conduit between 3 and 6 ft in length for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size shall be 1/2 in diameter. Provide liquidtight flexible nonmetallic conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

3.1.4 Cable Tray Installation

Install and ground per NFPA 70, Article 318. Install cable trays parallel with or at right angles to ceilings, walls, and structural members. Support in accordance with manufacturer recommendations but at not more than 6 ft intervals. Adjacent cable tray sections shall be bonded together by connector plates of an identical type as the cable tray sections. For grounding of cable tray system provide No. 2 AWG bare copper wire throughout cable tray system, and bond to each section, except use No. 1/0 aluminum wire if cable tray is aluminum. Terminate cable trays 10 in from both sides of smoke and fire partitions. Conductors run through smoke and fire partitions shall be installed in 4 in rigid steel conduits with grounding bushings, extending 12 in beyond each side of partitions. Seal conduit on both ends to maintain smoke and fire ratings of partitions. Provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

3.1.5 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 cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, when surface mounted on interior walls exposed up to 7 ft above floors and walkways, or when installed in hazardous areas and when specifically indicated. Boxes in other locations shall be sheet steel, except that aluminum boxes may be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic conduit system. Each box shall have volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures shall be minimum 4 in square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved. Boxes for use in masonry-block or tile walls

shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; fixtures shall be readily removable for access to boxes unless ceiling access panels are provided. Support boxes and pendants for surface-mounted fixtures on suspended ceilings independently of ceiling supports. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 in from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

#### 3.1.5.1 Boxes

Boxes for use with raceway systems shall be minimum 1 1/2 in deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets shall be minimum 4 in square, except that 4 by 2 in boxes may be used where only one raceway enters outlet. Telephone outlets shall be minimum of 5 in square by 2 7/8 in deep.

#### 3.1.5.2 Pull Boxes

Construct of at least minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

### 3.1.6 Mounting Heights

Mount panelboards, enclosed circuit breakers, and disconnecting switches so height of operating handle at its highest position is maximum 78 in above floor. Mount lighting switches and receptacles as indicated. Measure mounting heights of wiring devices and outlets to center of device or outlet.

### 3.1.7 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.

### 3.1.8 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.

3.1.9 Covers and Device Plates

Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 in. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.

3.1.10 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated walls, partitions, floors, or ceilings in accordance with Section 07 84 00, "Firestopping."

3.1.11 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 and nonmetallic raceways, telephone system grounds, and neutral conductor of wiring systems. Make ground connection at main service equipment, and extend grounding conductor to point of entrance of metallic water service. Make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water service grounding system with additional made electrode in compliance with NFPA 70. Make ground connection to driven ground rods on exterior of building. Interconnect all grounding media in or on the structure to provide a common ground potential. This shall include electrical service, telephone system grounds, as well as underground metallic piping systems. Interconnection to the gas line shall be made on the customer's side of the meter. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

3.1.11.1 Resistance

Maximum resistance-to-ground of grounding system shall not exceed 5 ohms under dry conditions. Where resistance obtained exceeds 5 ohms, contact Contracting Officer for further instructions.

3.1.11.2 Telephone Service

Provide main telephone service equipment ground consisting of separate ground wire, No. 6 AWG, in conduit between equipment backboard and readily accessible grounding connection. Equipment end of ground wire shall consist of coiled length at least twice as long as terminal cabinet or backboard height.

3.1.12 Equipment Connections

Provide power wiring for the connection of motors and 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.

### 3.1.13 Repair of Existing Work

Repair of existing work, demolition, and modification of existing electrical distribution systems shall be performed as follows:

#### 3.1.13.1 Workmanship

Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, 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.

#### 3.1.13.2 Existing Concealed Wiring to be Removed

Existing concealed wiring to be removed shall be disconnected from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.

#### 3.1.13.3 Removal of Existing Electrical Distribution System

Removal of existing electrical distribution system equipment shall include equipment's associated wiring, including conductors, cables, exposed conduit, surface metal raceways, boxes, and fittings, back to equipment's power source as indicated.

#### 3.1.13.4 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.

### 3.1.14 Surge Protective Devices

Connect the surge protective devices in parallel to the power source, keeping the conductors as short and straight as practically possible.

## 3.2 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 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.

### 3.2.3 Ground-Fault Receptacle Test

Test ground-fault receptacles with a "load" (such as a plug in light) to

verify that the "line" and "load" leads are not reversed.

### 3.2.4 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

-- End of Section --

SECTION 26 51 00.00 22

INTERIOR LIGHTING
**08/12**

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.

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A641/A641M | (2009a) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire |
| ASTM B117 | (2016) Standard Practice for Operating Salt Spray (Fog) Apparatus |

GREEN SEAL (GS)

| | |
|---|---|
| GC-12 | (1997) Occupancy Sensors |

ILLUMINATING ENGINEERING SOCIETY (IES)

| | |
|---|---|
| IESNA HB-10 | (2011) IES Lighting Handbook, 10th Edition |
| IESNA LM-79 | (2008) Electrical and Photometric Measurements of Solid-State Lighting Products |
| IESNA LM-80 | (2008) Measuring Lumen Maintenance of LED Light Sources |

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE 100 | (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms |
| IEEE C2 | (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code |
| IEEE C62.41.2 | (2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| ANSI/IEC 60529 | (2004) Degrees of Protection Provided by Enclosures (IP Code) |
| NEMA ANSLG C78.377 | (2008) American National Standard for electric lamps— Specifications for the Chromaticity of Solid State Lighting Products |

| | |
|---|---|
| ANSI C82.77 | Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment |
| NEMA 250 | (2008) Enclosures for Electrical Equipment (1000 Volts Maximum) |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 101 | (2012; Amendment 1 2012) Life Safety Code |
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)

| | |
|---|---|
| FCC Part 15 | Radio Frequency Devices (47 CFR 15) |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 1310 | (2005) Standard for Safety Class 2 Power Units - Fifth Edition; Reprint with revisions through and including September 30, 2010 |
| UL 1598 | (2008; Reprint Jan 2010) Luminaires |
| UL 8750 | (2009) Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products - First Edition |
| UL 924 | (2006; Reprint Feb 2011) Standard for Emergency Lighting and Power Equipment |

## 1.2 RELATED REQUIREMENTS

Materials not considered to be lighting equipment or lighting fixture accessories are specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Lighting fixtures and accessories mounted on exterior surfaces of buildings are specified in this section.

## 1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

b. Average life is the time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

c. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IESNA LM-80.

d. Total harmonic distortion (THD) is the root mean square (RMS) of all the harmonic components divided by the total fundamental current.

## 1.4 SYSTEM DESCRIPTION

### 1.4.1 Lighting Control System

Provide lighting control system as indicated. Lighting control equipment shall include, if indicated: control modules, power packs, dimming ballasts, occupancy sensors, and light level sensors.

## 1.5 SUBMITTALS

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

Data, drawings, and reports shall employ the terminology, classifications, and methods prescribed by the IESNA HB-10, as applicable, for the lighting system specified.

SD-01 Preconstruction Submittals

Photometric PlanLED Luminaire Warranty

SD-02 Shop Drawings

LED Luminaire drawings

SD-03 Product Data
LED Luminaires

Exit signs

Emergency lighting equipment

Occupancy sensors

SD-06 Test Reports

LED Luminaire - IESNA LM-79 Test Report

LED Light Source - IESNA LM-80 Test Report

Operating test

Submit test results as stated in paragraph entitled "Field Quality Control."

SD-07 Certificates

Luminaire Useful Life Certificate

Submit certification from the manufacturer indicating the expected useful life of the luminaires provided. The useful life shall be directly correlated to the IESNA LM-80 test data, adjusted for the thermal properties of manufacturer's luminaire, and adjusted for

local average ambient operating conditions.

SD-10 Operation and Maintenance Data

Lighting Control System, Data Package 5

Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA and as specified herein, showing all light fixtures, control modules, control zones, occupancy sensors, power packs, schematic diagrams and all interconnecting control wire, conduit, and associated hardware.

## 1.6 QUALITY ASSURANCE

### 1.6.1 Drawing Requirements

#### 1.6.1.1 LED Luminaire Drawings

Include dimensions, accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, and candlepower distribution data shall accompany shop drawings.

### 1.6.2 Photometric Plan

For LED luminaires, provide computer-generated photometric analysis of the "designed to" values for the "end of useful life" of the luminaire installation using a light loss factor of 0.7. Submittal shall include the following:

a. Horizontal illuminance measurements at finished grade, taken at maximum of every 10 feet.

b. Vertical illuminance measurements at 5 feet above finished grade.

c. Minimum and maximum footcandle level.

d. Average maintained footcandle level.

e. Maximum to minimum ratio for horizontal illuminance only.

### 1.6.3 LED Luminaire - IESNA LM-79 Test Report

Submit test report on manufacturer's standard production model luminaire. Submittal shall include all photometric and electrical measurements, as well as all other pertinent data outlined under "14.0 Test Report" in IESNA LM-79.

### 1.6.4 LED Light Source - IESNA LM-80 Test Report

Submit report on manufacturer's standard production LED package, array, or module. Submittal shall include:

a. Testing agency, report number, date, type of equipment, and LED light source being tested.

b. All data required by IESNA LM-80.

1.6.4.1 Test Laboratories

Test laboratories for the IESNA LM-79 and IESNA LM-80 test reports shall be one of the following:

a. National Voluntary Laboratory Accreditation Program (NVLAP) accredited for solid-state lighting testing as part of the Energy-Efficient Lighting Products laboratory accreditation program.

b. One of the qualified labs listed on the Department of Energy - Energy Efficiency & Renewable Energy, Solid-State Lighting web site.

c. A manufacturer's in-house lab that meets the following criteria:

1. Manufacturer has been regularly engaged in the design and production of high intensity discharge roadway and area luminaires and the manufacturer's lab has been successfully certifying these fixtures for a minimum of 15 years.

2. Annual equipment calibration including photometer calibration in accordance with National Institute of Standards and Technology.

1.6.5 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.6.6 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.6.6.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.6.2 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

## 1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

### 1.7.1 LED Luminaire Warranty

Provide Luminaire Useful Life Certificate.

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.

a. Provide a written five year on-site replacement warranty for material, fixture finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.

   1. Finish warranty shall include warranty against failure and against substantial deterioration such as blistering, cracking, peeling, chalking, or fading.

   2. Material warranty shall include:

      (a) All power supply units (drivers).

      (b) Replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.

b. Warranty period must begin on date of beneficial occupancy. Contractor shall provide the Contracting Officer signed warranty certificates prior to final payment.

# PART 2 PRODUCTS

## 2.1 LED LUMINAIRES

UL 1598, ANSI C82.77 and UL 8750. Provide luminaires as indicated in luminaire schedule and plates or details on project plans. Provide luminaires complete with light sources of quantity, type, and wattage indicated. All luminaires of the same type shall be provided by the same manufacturer. Details, shapes, and dimensions are indicative of the general type desired, but are not intended to restrict selection to luminaires of a particular manufacturer. Luminaires of similar designs, light distribution and brightness characteristics, and of equal finish and quality will be acceptable as approved.

### 2.1.1 General Requirements

a. LED luminaire housings shall be die cast or extruded aluminum.

b. LED luminaires shall be rated for operation within an ambient temperature range of minus 22 degrees F to 122 degrees F.

c. Luminaires shall be UL listed for wet locations per UL 1598 where indicated. Optical compartment for LED luminaires shall be sealed and

rated a minimum of IP65 per ANSI/IEC 60529.

d. LED luminaires shall produce a minimum efficacy of 60 lumens per watt driven at a maximum 600 mA, tested per IESNA LM-79. Theoretical models of initial raw LED lumens per watt are not acceptable.

e. Luminaires shall have IES distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans per IESNA HB-10.

f. Housing finish shall be baked-on enamel, anodized, or baked-on powder coat paint. Finish shall be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.

g. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.

h. The finish color shall be as indicated in the luminaire schedule or detail on the project plans.

i. Luminaire lenses shall be constructed of clear OR frosted tempered glass or UV-resistant acrylic.

j. Incorporate modular electrical connections, and construct luminaires to allow replacement of all or any part of the optics, heat sinks, power supply units, ballasts, surge suppressors and other electrical components using only a simple tool, such as a manual or cordless electric screwdriver.

k. Luminaires shall have a nameplate bearing the manufacturer's name, address, model number, date of manufacture, and serial number securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.

l. All factory electrical connections shall be made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

2.1.2 LED Light Sources

a. Correlated Color Temperature (CCT) shall be in accordance with NEMA ANSLG C78.377:

Nominal CCT: 3500 degrees K: 3465 plus or minus 245 degrees K

b. Color Rendering Index (CRI) shall be:

Greater than or equal to 80 for 3000 - 3500 degrees K light sources.

c. Color Consistancy:

Manufacturer shall utilize a maximum 4-step MacAdam ellipse binning tolerance for color consistancy of LEDs used in luminaires.

2.1.3 LED Power Supply Units (Drivers)

UL 1310. LED Power Supply Units shall meet the following requirements:

a. Minimum efficiency shall be 85 percent.

b. Drive current per LED shall not exceed 600 mA, plus or minus 10 percent.

c. Shall be rated to operate between ambient temperatures of minus 22 degrees F and 104 degrees F.

d. Shall be designed to operate on the voltage system to which they are connected, typically ranging from 120 V to 480 V nominal.

e. Operating frequency shall be: 50 or 60 Hz.

f. Power Factor (PF) shall be greater than or equal to 0.90.

g. Total Harmonic Distortion (THD) current shall be less than or equal to 20 percent.

h. Shall meet requirements of FCC Part 15 (47 CFR 15), Class B.

i. Shall be RoHS-compliant.

j. Shall be mounted integral to luminaire. Remote mounting of power supply is not allowed.

k. Power supplies in luminaires shall be UL listed with a sound rating of A.

m. Shall be equipped with over-temperature protection circuit that turns light source off until normal operating temperature is achieved.

### 2.1.4 Surge Protection

Provide surge protection integral to luminaire to meet "C Low" waveforms as defined in IEEE C62.41.2, Scenario 1 Location Category C.

## 2.2 RECESS- AND FLUSH-MOUNTED FIXTURES

Provide type that can be relamped from the bottom. Access to ballast shall be from the bottom. Trim for the exposed surface of flush-mounted fixtures shall be as indicated.

## 2.3 SUSPENDED FIXTURES

Provide hangers capable of supporting twice the combined weight of fixtures supported by hangers. Provide with swivel hangers to ensure a plumb installation. Hangers shall be cadmium-plated steel with a swivel-ball tapped for the conduit size indicated. Hangers shall allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer to limit swinging. Single-unit suspended fixtures shall have twin-stem hangers. Multiple-unit or continuous row fluorescent fixtures shall have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end. Rods shall be a minimum 0.18 inch diameter.

## 2.4 SWITCHES

### 2.4.1 Toggle Switches

Provide toggle switches as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

## 2.5 EXIT SIGNS

UL 924, NFPA 70, and NFPA 101. Exit signs shall be self-powered type. Exit signs shall use no more than 5 watts.

### 2.5.1 Self-Powered LED Type Exit Signs (Battery Backup)

Provide with automatic power failure device, test switch, pilot light, integral self-testing module and fully automatic high/low trickle charger in a self-contained power pack. Battery shall be sealed electrolyte type, shall operate unattended, and require no maintenance, including no additional water, for a period of not less than 5 years. LED exit sign shall have emergency run time of 1 1/2 hours (minimum). The light emitting diodes shall have rated lamp life of 70,000 hours (minimum).

## 2.6 EMERGENCY LIGHTING EQUIPMENT

UL 924, NFPA 70, and NFPA 101. Provide lamps in wattage indicated.

### 2.6.1 Emergency Lighting Unit

Provide as indicated. Emergency lighting units shall be rated for 12 volts, except units having no remote-mounted lamps and having no more than two unit-mounted lamps may be rated 6 volts. Provide integral self-testing module.

## 2.7 SELF-TESTING MODULE

Self-testing module for exit signs and emergency lighting equipment shall perform the following functions:

a. Continuous monitoring of charger operation and battery voltage with visual indication of normal operation and of malfunction.

b. Monthly discharge cycling of battery with monitoring of transfer circuit function, battery capacity and emergency lamp operation with visual indication of malfunction. The battery capacity test may be conducted by using a synthetic load.

c. Manual test switch to simulate a discharge test cycle.

d. Module shall have low voltage battery disconnect (LVD) and brown-out protection circuit.

## 2.8 OCCUPANCY SENSORS

UL listed. Comply with GC-12. Occupancy sensors and power packs shall be designed to operate on the voltage indicated. Sensors and power packs shall have circuitry that only allows load switching at or near zero current crossing of supply voltage. Occupancy sensor mounting as indicated. Sensor shall have an LED occupant detection indicator. Sensor shall have adjustable sensitivity and adjustable delayed-off time range of

5 minutes to 15 minutes. Wall mounted sensors shall match the color of adjacent wall plates as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, ceiling mounted sensors shall be white. Ceiling mounted sensors shall have 360 degree coverage unless otherwise indicated.

c. Ultrasonic/Infrared Combination Sensor

## 2.9 SUPPORT HANGERS FOR LIGHTING FIXTURES IN SUSPENDED CEILINGS

### 2.9.1 Wires

ASTM A641/A641M, galvanized regular coating, soft temper, 0.1055 inches in diameter (12 gage).

## 2.10 EQUIPMENT IDENTIFICATION

### 2.10.1 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

### 2.10.2 Labels

Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires shall be clearly marked for operation of specific light sources and ballasts according to proper lamp type. The following lamp characteristics shall be noted in the format "Use Only _____":

a. Light source tube diameter code (e.g. T-4, T-5, T-8), tube quantity configuration (e.g. twin, quad, triple), base type (e.g. G24q-2, GX 24 q-4), and nominal wattage for fluorescent and compact fluorescent luminaires.

c. Start type (e.g. programmed-start, rapid-start, instant-start) for fluorescent and compact fluorescent luminaires.

e. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

All markings related to lamp type shall be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place. Ballasts shall have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

## 2.11 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

# PART 3 EXECUTION

## 3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

### 3.1.1 Lamps

Lamps of the type, wattage, and voltage rating indicated shall be delivered to the project in the original cartons and installed just prior to project completion. Lamps installed and used for working light during construction shall be replaced prior to turnover to the Government if more than 15 percent of their rated life has been used. Lamps shall be tested for proper operation prior to turn-over and shall be replaced if necessary with new lamps from the original manufacturer.

### 3.1.2 Lighting Fixtures

Set lighting fixtures plumb, square, and level with ceiling and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved drawings. Installation shall meet requirements of NFPA 70. Mounting heights specified or indicated shall be to the bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed. Recessed and semi-recessed fixtures shall be independently supported from the building structure by a minimum of four wires per fixture and located near each corner of each fixture.

### 3.1.3 Suspended Fixtures

Suspended fixtures shall be provided with 45 degree swivel hangers so that they hang plumb and shall be located with no obstructions within the 45 degree range in all directions. The stem, canopy and fixture shall be capable of 45 degree swing. Pendants, or chains 4 feet or longer excluding fixture shall be braced to prevent swaying using three cables at 120 degree separation. Fixture finishes shall be free of scratches, nicks, dents, and warps, and shall match the color and gloss specified. Pendants shall be finished to match fixtures. Aircraft cable shall be stainless steel. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown. Maximum distance between suspension points shall be 10 feet or as recommended by the manufacturer, whichever is less.

### 3.1.4 Exit Signs and Emergency Lighting Units

Wire exit signs and emergency lighting units ahead of the switch to the normal lighting circuit located in the same room or area.

### 3.1.5 Photocell Switch Aiming

Aim switch according to manufacturer's recommendations.

### 3.1.6 Occupancy Sensor

Provide quantity of sensor units indicated as a minimum. Provide additional units to give full coverage over controlled area. Full coverage shall provide hand and arm motion detection for office and administration type areas and walking motion for industrial areas, warehouses, storage rooms and hallways. Locate the sensor(s) as indicated and in accordance with the manufacturer's recommendations to maximize energy savings and to avoid nuisance activation and deactivation due to sudden temperature or airflow changes and usage.

## 3.2 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in Section 09 90 00 PAINTS AND COATINGS.

## 3.3 FIELD QUALITY CONTROL

Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test to show that equipment operates in accordance with requirements of this section.

### 3.3.1 Occupancy Sensor

Test sensors for proper operation. Observe for light control over entire area being covered.

-- End of Section --

# SECTION 27 10 00

# BUILDING TELECOMMUNICATIONS CABLING SYSTEM
06/17

## 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 D709 | (2017) Standard Specification for Laminated Thermosetting Materials |

ELECTRONIC COMPONENTS INDUSTRY ASSOCIATION (ECIA)

| | |
|---|---|
| ECIA EIA/ECA 310-E | (2005) Cabinets, Racks, Panels, and Associated Equipment |

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE 100 | (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms |

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

| | |
|---|---|
| ICEA S-83-596 | (2016) Indoor Optical Fiber Cables |
| ICEA S-90-661 | (2012) Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cables for Use in General Purpose and LAN Communications Wiring Systems Technical Requirements |

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

| | |
|---|---|
| NECA/BICSI 568 | (2006) Standard for Installing Building Telecommunications Cabling |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| ANSI/NEMA WC 66 | (2013) Performance Standard for Category 6 and Category 7 100 Ohm Shielded and Unshielded Twisted Pairs |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

| | |
|---|---|
| TIA-1152 | (2009) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling |
| TIA-455-21 | (1988a; R 2012) FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices |
| TIA-492AAAA | (2009b) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers |
| TIA-526-14 | (2015c) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant |
| TIA-526-7 | (2015a) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant |
| TIA-568-C.0 | (2009; Add 1 2010; Add 2 2012) Generic Telecommunications Cabling for Customer Premises |
| TIA-568-C.1 | (2009; Add 2 2011; Add 1 2012) Commercial Building Telecommunications Cabling Standard |
| TIA-568-C.2 | (2009; Errata 2010; Add 2 2014; Add 1 2016) Balanced Twisted-Pair Telecommunications Cabling and Components Standards |
| TIA-568-C.3 | (2008; Add 1 2011) Optical Fiber Cabling Components Standard |
| TIA-569 | (2015d) Commercial Building Standard for Telecommunications Pathways and Spaces |
| TIA-570 | (2012c) Residential Telecommunications Infrastructure Standard |
| TIA-606 | (2012b; Add 1 2015) Administration Standard for the Telecommunications Infrastructure |
| TIA-607 | (2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises |
| TIA/EIA-598 | (2014d) Optical Fiber Cable Color Coding |
| TIA/EIA-604-3 | (2004b; R 2014) Fiber Optic Connector Intermateability Standard (FOCIS), Type SC and SC-APC, FOCIS-3 |

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)

| | |
|---|---|
| FCC Part 68 | Connection of Terminal Equipment to the Telephone Network (47 CFR 68) |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 1286 | (2008; Reprint Feb 2015) Office Furnishings |
| UL 1666 | (2007; Reprint Jun 2012) Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts |
| UL 444 | (2008; Reprint Apr 2015) Communications Cables |
| UL 467 | (2013; Reprint Jun 2017) UL Standard for Safety Grounding and Bonding Equipment |
| UL 50 | (2015) UL Standard for Safety Enclosures for Electrical Equipment, Non-Environmental Considerations |
| UL 514C | (2014; Reprint Nov 2018) UL Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers |
| UL 969 | (2017; Reprint Mar 2018) UL Standard for Safety Marking and Labeling Systems |
| UL 2043 | (2013) Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces |

## 1.2 RELATED REQUIREMENTS

Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES, Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and Section 33 82 00 TELECOMMUNICATIONS, OUTSIDE PLANT (OSP) apply to this section with additions and modifications specified herein.

Contact Camp Lejeune Base Telephone (aka Telecommunications Support Division or TSD)for special requirements on classified service cabling and color, unofficial service, under slab cabling, using water block, and any item not covered in this document.

Buildings with Special Network Requirements such as Classified networks, other government agencies (Navy NMCfI, Navy Medical, DLA, VA. Etc.), Marine Corps Community Services, Commercial ISP's, and CATV may require additional guidance outside this specification. Controlled or Restricted Access Areas may contain Classified networks Classified networks may require shielded twisted pair, specific separation, distinct colored components, and shall be in accordance with current CNSSAM TEMPEST 1-13, RED/BLACK Separation documentation. In these cases contact Telecommunications Support Division G-6 MCIEAST-MCB CAMLEJ for additional guidance at (910) 451-9439 or (910) 451-3100.

Contact AHJ for special requirements on classified service, unofficial service, under slab cabling, using water block, and any item not covered in this document.

## 1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in TIA-568-C.1, TIA-568-C.2, TIA-568-C.3, TIA-569, TIA-606 and IEEE 100 and herein.

### 1.3.1 Main Distribution Frame (MDF)

A physical structure at a central location for terminating permanent backbone cables to interconnect with service provider (SP) equipment at the activity minimum point of presence. The MDF generally includes vendor specific components to support voice and data circuits, building surge protector assemblies, main cross connect blocks, equipment support frames, and fire rated plywood backboard. Depending upon local site conditions, the MDF, BDF and EF may be the same space.

### 1.3.2 Building Distribution Frame (BDF)

A structure with terminations for connecting backbone, campus, and horizontal cabling. The BDF generally includes a cross connect, equipment support frame or lockable terminal cabinet, cable supports, and fire rated plywood backboard. The BDF shall include building protector assemblies when used for campus backbone or SP cabling. Also known as a (BD).

### 1.3.3 Intermediate Distribution Frame (IDF)

An intermediate termination point for horizontal wiring and cross connections within telecommunications rooms. Shall be connected to MDF with both fiber and copper. Secure Internet Protocol (SIPR) vault or cabinet is considered an IDF. Also known as a (FD).

### 1.3.4 Communications Room (CR)

An enclosed space for telecommunications equipment, terminations, and cross connect wiring for horizontal cabling. Also known as (TR), (CR), and IT Room. Terms are used interchangeably in this section and are considered to have the same meaning.

### 1.3.5 Campus Distributor (CD)

A distributor from which the campus backbone cabling emanates. (International expression for main cross-connect (MC). Also known as Central Office (CO) or Area Distribution Node (ADN)).

### 1.3.6 Building Distributor (BD)

A distributor in which the building backbone (customer owned outside plant) cables terminate and at which connections to the campus backbone cables may be made. (International expression for intermediate cross-connect (IC).)

### 1.3.7 Floor Distributor (FD)

A distributor used to connect horizontal cable and cabling subsystems or equipment. (International expression for horizontal cross-connect (HC)).

1.3.8 Telecommunications Room (TR)

An enclosed space for housing telecommunications equipment, cable, terminations, and cross-connects. The room is the recognized cross-connect between the backbone cable and the horizontal cabling. Also known as a (CR), and IT Room.

1.3.9 Entrance Facility (EF) (Telecommunications) (can be same as the MDF)

An entrance to the building for both private and public network service cables (including wireless) including the entrance point at the building wall and continuing to the equipment room.

1.3.10 Equipment Room (ER) (Telecommunications) (can be same as communications room)

An environmentally controlled centralized space for telecommunications equipment that serves the occupants of a building. Equipment housed therein is considered distinct from a telecommunications room because of the nature of its complexity.

1.3.11 Open Cable

Cabling that is not run enclosed in a raceway as defined by NFPA 70. This refers to cabling that is "open" to the space in which the cable has been installed and is therefore exposed to the environmental conditions associated with that space, such as wire basket tray, cable tray, J-hooks, D-rings, or bridal rings. D rings should only be used in the communications room for cable management and J-hooks/bridal rings shall not be used.

1.3.12 Open Office

A floor space division provided by furniture, moveable partitions, or other means instead of by building walls, normally over 100 square feet.

1.3.13 Pathway

A physical infrastructure utilized for the placement and routing of telecommunications cable. Also known as raceway.

1.4 SYSTEM DESCRIPTION

The building telecommunications cabling and pathway system shall include permanently installed backbone and horizontal cabling, horizontal and backbone pathways, service entrance facilities, work area pathways, telecommunications outlet assemblies, conduit, raceway, and hardware for splicing, terminating, and interconnecting cabling necessary to transport telephone data, and other communications systems (including LAN A/V, intercom, PA, CATV, CCTV, and WiFi) between equipment items in a building. The horizontal system shall be wired in a star topology from the telecommunications work area to the floor distributor/IDF or building distributor/MDF or campus distributor or communications room at the center or hub of the star. The backbone cabling and pathway system includes intrabuilding and interbuilding interconnecting cabling, pathway, and terminal hardware. The intrabuilding backbone provides connectivity from the floor distributors to the building distributors or to the campus distributor and from the building distributors to the campus distributor

as required. The backbone system shall be wired in a star topology with the campus distributor (Area Distribution Node) at the center or hub of the star. The interbuilding backbone system provides connectivity between the campus distributors and is specified in Section 33 82 00 TELECOMMUNICATIONS OUTSIDE PLANT (OSP). Provide telecommunications pathway systems referenced herein as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. The telecommunications contractor must coordinate with MCB CL Base Telephone (TSD) concerning access to and configuration of telecommunications spaces. The telecommunications contractor may be required to coordinate work effort within the telecommunications spaces with the electrical sub and general contractor, ROICC and MCI East G-6 Telecommunications Support Division (TSD).

## 1.5 SUBMITTALS

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

SD-02 Shop Drawings

Telecommunications drawings

Telecommunications Space Drawings

In addition to Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES, provide shop drawings in accordance with paragraph SHOP DRAWINGS.

SD-03 Product Data

Telecommunications cabling (backbone and horizontal)

Patch panels

Telecommunications outlet/connector assemblies

Equipment support frame

Connector blocks

Submittals shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Include performance and characteristic curves. Submittals shall also include applicable federal, military, industry, and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified in paragraph REGULATORY REQUIREMENTS and as required in Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES.

SD-06 Test Reports

Telecommunications cabling testing

SD-07 Certificates

Telecommunications Contractor Qualifications

Key Personnel Qualifications

Manufacturer Qualifications

Test plan

SD-09 Manufacturer's Field Reports

Factory reel tests

SD-10 Operation and Maintenance Data

Telecommunications cabling and pathway system Data Package 5

SD-11 Closeout Submittals

Record Documentation

### 1.5.1 Additional Submittal Requirements

All submittals of material, equipment and design must be approved by the Telecommunications Support Division (TSD) prior to installing any telecommunications wiring, equipment, or power to support communications.

## 1.6 QUALITY ASSURANCE

### 1.6.1 Shop Drawings

In exception to Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES, submitted plan drawings shall be a minimum of 11 by 17 inches in size using a minimum scale of 1/8 inch per foot. 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. Submittals shall include the nameplate data, size, and capacity. Submittals shall also include applicable federal, military, industry, and technical society publication references.

#### 1.6.1.1 Telecommunications Drawings

Provide Registered Communications Distribution Designer (RCDD) approved, drawings in accordance with TIA-606. The identifier for each termination and cable shall appear on the drawings. Drawings shall depict final telecommunications installed wiring system infrastructure in accordance with TIA-606. The drawings should provide details required to prove that the distribution system shall properly support connectivity from the EF telecommunications and ER telecommunications, CD's, BD's, and FD's to the telecommunications work area outlets. Provide a plastic laminated schematic of the as-installed telecommunications cable system showing cabling, CD's, BD's, FD's, and the EF and ER for telecommunications keyed to floor plans by room number. Mount the laminated schematic in the EF telecommunications space as directed by the Contracting Officer. The following drawings shall be provided as a minimum:

a. T1 - Layout of complete building per floor - Building Area/Serving

Zone Boundaries, Backbone Systems, and Horizontal Pathways. Layout of complete building per floor. The drawing indicates location of building areas, serving zones, vertical backbone diagrams, telecommunications rooms, access points, pathways, grounding system, and other systems that need to be viewed from the complete building perspective.

b. T2 - Serving Zones/Building Area Drawings - Drop Locations and Cable Identification (ID'S). Shows a building area or serving zone. These drawings show drop locations, telecommunications rooms, dedicated electrical, access points and detail call outs for common equipment rooms and other congested areas.

c. T4 - Typical Detail Drawings - Faceplate Labeling, Firestopping, Americans with Disabilities Act (ADA), Safety, Department of Transportation (DOT). Detailed drawings of symbols and typicals such as faceplate labeling, faceplate types, faceplate population installation procedures, detail racking, and raceways.

#### 1.6.1.2 Telecommunications Space Drawings

Provide T3 drawings in accordance with TIA-606 that include telecommunications rooms plan views, pathway layout (cable tray, racks, ladder-racks, etc.), mechanical/electrical layout, and cabinet, rack, backboard and wall elevations. Drawings shall show layout of applicable equipment including incoming cable stub or connector blocks, building protector assembly, outgoing cable connector blocks, mechanical/electrical, patch panels and equipment spaces and cabinet/racks. Drawings shall include a complete list of equipment and material, equipment rack details, proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operation. Drawings may also be an enlargement of a congested area of T1 or T2 drawings.

### 1.6.2 Telecommunications Contractor Qualifications

Work under this section shall be performed by and the equipment shall be provided by the approved telecommunications contractor and key personnel. Qualifications shall be provided for: the telecommunications system contractor, the telecommunications system installer, and the supervisor (if different from the installer). A minimum of 30 days prior to installation, submit documentation of the experience of the telecommunications contractor and of the key personnel.

#### 1.6.2.1 Telecommunications Contractor

The telecommunications contractor shall be a firm which is regularly and professionally engaged in the business of the applications, installation, and testing of the specified telecommunications systems and equipment. The telecommunications contractor shall demonstrate experience in providing successful telecommunications systems within the past 3 years of similar scope and size. Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for the telecommunications contractor. Also IAW Section on QC Specialists; a Telecommunications Systems QC Specialist may be required on site, full time with 10 years minimum experience in telecom installation and experience. Specialist shall be very familiar with UFGS Divisions 27, 28, 33 concerning communications systems work and installation.

1.6.2.2 Key Personnel

Provide key personnel who are regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. There may be one key person or more key persons proposed for this solicitation depending upon how many of the key roles each has successfully provided. Each of the key personnel shall demonstrate experience in providing successful telecommunications systems within the past 3 years.

Supervisors and installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel.

In lieu of BICSI certification, supervisors and installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for each of the key personnel. Documentation for each key person shall include at least two successful system installations provided that are equivalent in system size and in construction complexity to the telecommunications system proposed for this solicitation. Include specific experience in installing and testing telecommunications systems and provide the names and locations of at least two project installations successfully completed using optical fiber and copper telecommunications cabling systems. All of the existing telecommunications system installations offered by the key persons as successful experience shall have been in successful full-time service for at least 18 months prior to the issuance date for this solicitation. Provide the name and role of the key person, the title, location, and completed installation date of the referenced project, the referenced project owner point of contact information including name, organization, title, and telephone number, and generally, the referenced project description including system size and construction complexity.

Indicate that all key persons are currently employed by the telecommunications contractor, or have a commitment to the telecommunications contractor to work on this project. All key persons shall be employed by the telecommunications contractor at the date of issuance of this solicitation, or if not, have a commitment to the telecommunications contractor to work on this project by the date that the bid was due to the Contracting Officer.

Note that only the key personnel approved by the Contracting Officer in the successful proposal shall do work on this solicitation's telecommunications system. Key personnel shall function in the same roles in this contract, as they functioned in the offered successful experience. Any substitutions for the telecommunications contractor's key personnel requires approval from The Contracting Officer.

1.6.2.3 Minimum Manufacturer Qualifications

Cabling, equipment and hardware manufacturers shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of

components which comply with TIA-568-C.1, TIA-568-C.2 and TIA-568-C.3.

1.6.3 Test Plan

Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the components and accessories for each cable type specified, 60 days prior to the proposed test date. Include procedures for certification, validation, sample report, and testing.

1.6.4 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70, manufacturer recommendations/installation manual, best known industry practices, and industry standards, unless more stringent requirements are specified or indicated.

1.6.5 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section. Modification of manufacturer's standard products such as painting faceplates is not authorized.

1.6.5.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.5.2 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 DELIVERY AND STORAGE

Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for telecommunications cabling and equipment placed in storage.

## 1.8 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 0 to 60 degrees C 32 to 140 degrees F and in the range of 0 to 95 percent relative humidity, noncondensing. All telecommunications spaces shall follow TIA-569 design.

## 1.9 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

## 1.10 MAINTENANCE

### 1.10.1 Operation and Maintenance Manuals

Commercial off the shelf manuals shall be furnished for operation, installation, configuration, and maintenance of products provided as a part of the telecommunications cabling and pathway system, Data Package 5. Submit operations and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA and as specified herein not later than 2 months prior to the date of beneficial occupancy. In addition to requirements of Data Package 5, include the requirements of paragraphs TELECOMMUNICATIONS DRAWINGS, TELECOMMUNICATIONS SPACE DRAWINGS, and RECORD DOCUMENTATION. Ensure that these drawings and documents depict the as-built configuration. Also provide copies of all telecommunications manuals to TSD.

### 1.10.2 Record Documentation

Provide T5 drawings including documentation on cables and termination hardware in accordance with TIA-606. T5 drawings shall include schedules to show information for cut-overs and cable plant management, patch panel layouts and cover plate assignments, cross-connect information and connecting terminal layout as a minimum. T5 drawings shall be provided in hard copy format and on electronic media (PDF and AutoCAD 2016 format). Provide the following T5 drawing documentation as a minimum:

a. Cables - A record of installed cable shall be provided in accordance with TIA-606. The cable records shall include only the required data fields in accordance with TIA-606. Include manufacture date of cable with submittal.

b. Termination Hardware - A record of installed patch panels, cross-connect points, distribution frames, terminating block arrangements and type, and outlets shall be provided in accordance with TIA-606. Documentation shall include the required data fields as a minimum in accordance with TIA-606.

# PART 2 PRODUCTS

## 2.1 COMPONENTS

Components shall be UL or third party certified. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations, submit proof of such compliance. The label or listing by the specified organization will be

acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. 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. Provide a complete system of telecommunications cabling and pathway components using star topology. Provide support structures and pathways, complete with outlets, cables, connecting hardware and telecommunications cabinets/racks. Cabling and interconnecting hardware and components for telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70 and conform to the requirements specified herein.

## 2.2 TELECOMMUNICATIONS PATHWAY

Provide telecommunications pathways in accordance with TIA-569 and as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Provide system furniture pathways in accordance with UL 1286.

### 2.2.1 Pathways Aboard Camp Lejeune Greater Area, Including MCAS New River

Pathway shall be conduit, cable tray, or modular access flooring that provides protection for cabling. Under floor duct, free laying and wireway shall not be used. Cantilever-type center hung tray or Poke-Thru devices shall not be used. J-hooks/D-rings/bridal rings and other open face type cable pathways are not authorized except in minor renovations or to continue like existing system. Provide grounding and bonding as required by TIA-607. Cable tray wiring shall comply with NFPA 70. All conduits entering the communications room shall be grouped and consolidated. Conduits can be "Home Run" or stubbed to cable tray using approved pull boxes after every 180 degrees of bends or every 100 feet. All homerun conduits shall have insulated bonding bushings in the TR, and shall extend down from the ceiling to within 3 to 4 inches of the ladder rack, or 3 to 6 inches onto the backboard, and shall be bonded to the TMGB or TGB by a minimum 6 AWG green sheathed, copper stranded bonding conductor. All penetrations will be sealed in accordance with code (fire-stopping). A minimum of two 3 inch conduits overhead will be installed between the main communications room and other communication rooms (IDFs); if installed below slab they are considered OSP and will have a minimum of three 4-inch pathways; refer to Section 33 82 00 TELECOMMUNICATIONS, OUTSIDE PLANT (OSP). Distribution Enclosures shall not be used as a pull box and will only be approved for their intended use.

### 2.2.2 Work area Pathways

Comply with TIA-569, except minimum 1 1/4 inch diameter conduit shall be used. System furniture pathways shall comply with UL 1286. In system furniture that blocks access to or is distant from the communications wall outlets, each system furniture desk/cubical shall be equipped with listed manufacturer telecommunication raceway and outlets. All system furniture outlets shall be extended from a consolidation point (CP) to the system furniture outlet locations, and shall comply with TIA-568-C.1 through TIA-568-C.3. When office reconfiguration will be frequent, a multi-user terminal outlet assembly (MUTOA) may be used in lieu of a CP.

### 2.2.3 Pull Boxes

Pull boxes shall be constructed of galvanized sheet steel with

screw-fastened covers. Size pull boxes per TIA-569, except a 5 inches wide by 5 inches in length by 2 7/8 inches deep telecommunications box may be used for individual 1 1/4 inch diameter conduit runs. Provide pull boxes where length of conduit exceeds 100 feet or where more than 180 degree of cumulative bends occur. Align conduit ends on opposite sides of pull boxes as a straight pull through. Provide pull boxes in straight lengths of conduit only; direction changes in pull boxes are authorized. Electrical pull points, LC, LB, condulets, distribution enclosures, and splice boxes, are not pull boxes and are not authorized.

### 2.2.4 Consolidation Points

Consolidation Points (CP) shall be used when system furniture will be installed. CP's shall not support more than 12 work areas. CP's shall be centrally located permanent area, near the work area served, fully accessible, and should be located at least 50 feet from the FD when used for balanced twisted pair cabling. CP's shall be installed per TIA-569, except a S210 interface is required.

## 2.3 TELECOMMUNICATIONS OUTLET BOXES

Communications outlet boxes shall be placed in all work areas and any areas that can be converted to work areas. Work areas shall have an outlet connection within 6 feet' . Recommended practice is 6" to the left or right of (the outside edge of) each electrical outlet box in workable office areas or any area that could be converted into workable office area such as a large storage closet. Conference rooms should have one floor box and one box just above the ceiling. All administrative areas shall have a minimum of one ceiling mounted outlet box every 5,000 square feet of open administrative space for wireless LAN deployment. Additional boxes may be required where building composition prohibits wireless LAN coverage.Boxes shall be standard type 5 inches square by 2-7/8 inches deep with 1-1/4 inch diameter knock-outs, with a double gang to single gang reducer ring. Mount flush on finished walls/ceilings or just above ceiling tile for grid ceilings, height indicated by drawings. Outlet boxes for wall-mounted telephones shall be mounted at ADA required height. Outlet boxes for work counter area shall be mounted at a height 48 inches above finished floor, or other appropriate height as required. Install outlet boxes for security cameras, televisions, wall monitors, etc. at height indicated in drawings. Outlet boxes installed in floor shall be communications floor boxes large enough to support a surge of users with proper cable protection and ports that are in multiples of 4 and not parallel to the floor. For raised access flooring, boxes shall be below the floor with an access cover flush with the floor. Tombstones or boxes below floor that require removal of the floor panels to access are not allowed. Floor boxes and under slab cabling should not be used on the first floor or in wet areas; tele electric poles or furniture managed pathways fed from above the wet area should be used. Multi-user Telecommunications Outlet Assembly i.e. Multi-User Terminal Outlet Assemblies (MUTOA) should be placed where best suited for open office spaces may be frequently reconfigured.

## 2.4 TELECOMMUNICATIONS CABLING

Cabling shall be UL listed for the application and shall comply with TIA-568-C.0, TIA-568-C.1, TIA-568-C.2, TIA-568-C.3 and NFPA 70. Provide a labeling system in accordance with the manufacturer and local AHJ guidance for cabling as required by TIA-606 and UL 969. Confirm labeling is compatible with Camp Lejeune requirements. Ship cable on reels or in

boxes bearing manufacture date for unshielded/shielded twisted pair (UTP/STP) in accordance with ICEA S-90-661 and optical fiber cables in accordance with ICEA S-83-596 for all cable used on this project. Cabling manufactured more than 12 months prior to date of installation shall not be used.

2.4.1 Backbone Cabling

2.4.1.1 Backbone Copper

Copper backbone and riser cable shall be solid conductor, 24 AWG, 100 ohm, 25 to 100 -pair, Category 3, UTP, in accordance with ICEA S-90-661, TIA-568-C.1, TIA-568-C.2 and UL 444, formed into 25 pair binder groups covered with a gray thermoplastic jacket and overall metallic shield if required for additional protection. Cable shall be imprinted with manufacturers name or identifier, flammability rating, gauge of conductor, transmission performance rating (category designation) at regular length marking intervals in accordance with ICEA S-90-661. Sufficient pair count of CAT 3 or 5, as required shall be installed between the MDF and each of the IDF's. Provide plenum (CMP), riser (CMR), or non-jell filled indoor/outdoor communications rated cabling in accordance with NFPA 70. Substitution of a higher rated cable shall be permitted in accordance with NFPA 70. If under slab it is considered Outside Plant shall be installed per Section 33 82 00 TELECOMMUNICATIONS, OUTSIDE PLANT (OSP) with proper surge protection at both ends.

2.4.1.2 Backbone Optical Fiber

Provide in accordance with ICEA S-83-596, TIA-568-C.3, UL 1666 and NFPA 70. Cable shall be imprinted with fiber count, fiber type and aggregate length at regular intervals not to exceed 40 inches.

Provide the number of strands indicated, (but not less than 12 strands between the main telecommunication room and each of the other telecommunication rooms or secure racks), of single-mode(OS1), tight buffered fiber optic cable.

Provide tight buffered fiber optic multimode, 62.5/125-um diameter(OM1) cable, conforming to TIA-492AAAA as indicated (but not less than 12 strands of multimode between the main communication room and each of the other communications rooms and secure racks).

Provide plenum (OFNP), riser (OFNR), or general purpose (OFN or OFNG) rated non-conductive, fiber optic cable in accordance with NFPA 70. Substitution of a higher rated cable shall be permitted in accordance with NFPA 70. The cable cordage jacket, fiber, unit, and group color shall be in accordance with TIA/EIA-598.

Provide plenum (OFNP), riser (OFNR), or general purpose (OFN or OFNG) rated non-conductive, fiber optic cable in accordance with NFPA 70. Substitution of a higher rated cable shall be permitted in accordance with NFPA 70. The cable cordage jacket, fiber, unit, and group color shall be in accordance with TIA/EIA-598.

2.4.2 Horizontal Cabling

Provide horizontal cable in compliance with NFPA 70 and performance characteristics in accordance with TIA-568-C.1.

2.4.2.1 Horizontal Copper

Provide a minimum of four horizontal copper cables to each work area outlet (faceplate), minimum size 24 AWG conductors, 100 ohm, Category 6 or 6A, with green thermoplastic jacket for all unclassified outlets (color and cable type for classified services shall be in accordance with current CNSSAM TEMPEST RED/BLACK Installation documentation including Table 1 below) in accordance with TIA-568-C.2, UL 444, ANSI/NEMA WC 66, ICEA S-90-661. Cable shall be imprinted with manufacturers name or identifier, flammability rating, gauge of conductor, transmission performance rating (category designation) and length marking at regular intervals in accordance with ICEA S-90-661. Provide plenum (CMP), riser (CMR), or general purpose (CM or CMG) communications rated cabling in accordance with NFPA 70. Substitution of a higher rated cable shall be permitted in accordance with NFPA 70. Cables installed in conduit within and under slabs are not recommended but can be used if approved by local AHJ and shall be UL listed and labeled for wet locations in accordance with NFPA 70. Contact AHJ for special requirements on classified service, unofficial service, under slab cabling, using water block, and any item not covered in this document.
Communications CAT 6 twisted pair shall have a minimum of 12 inches of available slack at the communications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall be maintained. All communications work area outlet boxes should have 4 cables to a double gang box (no rough in or empty conduit for future use allowed).

Table 1 - (U/FOUO) Cable Color Scheme

| Classification Level | Cable Color |
|---|---|
| Unclassified | Green |
| Collateral Confidential | Blue |
| Collateral Secret | Red |
| Collateral Top Secret | Orange |
| Special Category | Yellow |

2.4.2.2 Horizontal Optical Fiber

Provide optical fiber horizontal cable in accordance with ICEA S-83-596 and TIA-568-C.3. Cable shall be tight buffered, multimode, 62.5.125-um diameter, OM1 or single-mode, 8/125-um diameter, OS1. Cable shall be imprinted with manufacturer, flammability rating and fiber count at regular intervals not to exceed 40 inches.

Provide plenum (OFNP), riser (OFNR), or general purpose (OFN or OFNG) rated non-conductive, fiber optic cable in accordance with NFPA 70. Substitution of a higher rated cable shall be permitted in accordance with NFPA 70. Cables installed in conduit within and under slabs shall be UL listed and labeled for wet locations in accordance with NFPA 70. The cable jacket shall be of single jacket construction with color coding of cordage jacket, fiber, unit, and group in accordance with TIA/EIA-598.

2.4.3 Work Area Cabling (Equipment Cables)

2.4.3.1 Work Area Copper

Provide work area copper cable in accordance with TIA-568-C.2, with a green thermoplastic jacket for unclassified services (classified color code shall be in accordance with current CNNSSAM TEMPEST RED/BLACK Installation documentation and Section 2.4.2.1 of this specification).

2.4.3.2 Work Area Optical Fiber

Provide optical work area cable in accordance with TIA-568-C.3.

2.5 TELECOMMUNICATIONS SPACES

Provide connecting hardware and termination equipment in the telecommunications entrance facility and telecommunication equipment rooms to facilitate installation as shown on design drawings for terminating and cross-connecting permanent cabling. Provide telecommunications interconnecting hardware color coding in accordance with TIA-606.

Space shall be a minimum 8' x 10' unless a local waiver is provided by the AHJ (authority having jurisdiction) which is the Telecommunications Support Division (TSD) aboard Camp Lejeune. Communications room could be much larger depending on building size, usable square footage served, and customer requirements. Communications rooms shall be centrally located unless there are multiple Communication rooms, and then each room should be centrally located within the area served. Communications Rooms shall not share or be on a wet wall. Generally, the space should be sized to approximately 1.1 percent of the area it serves. For example, a 10,000 sq feet (929 sq m) area should be served by a minimum of one 10 ft x 11 feet (3 m x 3.4 m) Communications room. Access to Rooms shall be from a common area such as a hallway and door shall swing out. Additional/Multiple communications rooms are required if the usable floor space to be served exceeds 10,000 square feet, or the cable length between the horizontal cross-connect and the communications outlet, including slack and vertical distance, exceeds 295 feet. Multiple communications rooms and IDFs shall be stacked and connected by a minimum of two way 3-inch conduits overhead. If under slab it is considered Outside Plant and 3 way 4" shall be used per Section 33 82 00 TELECOMMUNICATIONS, OUTSIDE PLANT (OSP) with proper surge protection at both ends. The minimum clear height in the room shall be 2.4 m (8 ft) without obstructions. The height between the finished floor and the lowest point of the ceiling should be a minimum of 3 m (10 ft) to accommodate overhead pathways. The flooring shall be sealed concrete to reduce dust and static electricity; no carpet or VCT tile. Two separate dedicated 20 amp electrical outlet will be installed above or behind but not attached to each communications equipment rack. Dedicated outlets and conduits shall be installed on the longest farthest wall from the door, same wall as the communications backboard. OSP conduits shall be to the far left of the communications backboard while facing it. There should not be an electrical panel within the communications room unless it serves only the room, and it should be located as close to the door as possible. The room requires a lockable door keyed or key padded to restrict access to MCIEAST-MCB G-6 personnel only. Room shall not have any windows or skylights. At least one wall, where the point of presence is located, and two adjacent walls should be covered with fire rated plywood backboard for mounting equipment;

additional boards may be needed for mounting additional equipment. Light, as measured within the communications room, should be a minimum of 500 lx (50 foot-candles). Lighting design should seek to minimize shadows within the telecommunications room (minimum two light fixtures). Equipment not related to the support of the communications room (e.g., piping, ductwork, pneumatic tubing) shall not be installed in, pass through, or enter the telecommunications room. Equipment related to the support of the communications room (e.g., piping, ductwork, HVAC drains, dedicated power) shall be installed in support of the communications equipment and not pose a drip/moisture/trip hazard and be usable as intended.

2.5.1 Backboards

Provide void-free, interior grade A-C plywood 3/4 inch thick 4 by 8 feet as indicated. Backboards shall be fire rated by manufacturing process. Fire stamp shall be clearly visible. Backboards shall be provided on a minimum of one telecom wall, two adjacent walls, and anywhere mounting is needed in the telecommunication spaces.

2.5.2 Equipment Support Frame

Provide in accordance with ECIA EIA/ECA 310-E and UL 50. Steel construction shall be treated to resist corrosion.

a. Bracket, wall mounted (for buildings with very low jack/pair count and no secured electronic equipment requirement), 8 gauge aluminum minimum. Provide hinged bracket compatible with 19 inches panel mounting and must be in a secured communications room.

b. Racks, wall or floor mounted modular type, 16 gauge steel construction minimum, treated to resist corrosion. Provide rack with vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug and a surge protected power strip with 6 duplex 20 amp receptacles. Racks shall be large enough to support all telephone/data equipment required plus 25 percent spare and shall have a maximum of 7' height. Rack shall be compatible with 19 inches panel mounting and must be in a secured communications room.

c. Cabinets, freestanding modular type, 16 gauge steel or 11 gauge aluminum construction minimum, treated to resist corrosion. Cabinet shall have removable and lockable side panels, front and rear doors, and have adjustable feet for leveling. All cabinets shall be keyed to current TSD key and large enough to support all telephone/data equipment required in the building plus 25% for future expansion. Dedicated electrical outlets should be installed within the cabinet. A backboard for mounting equipment is still needed when a cabinet is installed. Cabinet shall be mounted to the far right of the board to allow space for OSP cable, lightning protection, and bus bar to be installed on the board's far left. Dedicated power shall be within the cabinet on the backboard. Cabinet shall be vented in the roof and rear door. Cabinet shall have cable access in the roof and base and be compatible with 19 inches panel mounting. Provide cabinet with grounding bar, 550 CFM fan with filter and a surge protected power strip with 6 duplex 20 amp receptacles. All cabinets shall be keyed alike.

d. Cabinets, wall-mounted modular type, 16 gauge steel or 11 gauge aluminum construction minimum, treated to resist corrosion. Cabinet shall have lockable front and rear doors, louvered side panels, 250 CFM

fan, ground lug, and top and bottom cable access. Cabinets shall be no smaller than 24"W X 48"H X 30"D, shall be keyed to current TSD key, and large enough to support all telephone/data equipment required in the building plus 25% for future expansion. Dedicated electrical outlets should be installed within the cabinet. A backboard for mounting equipment is still needed when a cabinet is installed. Cabinet shall be mounted to the far right of the board to allow space for OSP cable, lightning protection, and bus bar to be installed on the board's far left. Cabinet shall be compatible with 19 inches panel mounting. All cabinets shall be keyed alike. A surge protected power strip with 6 duplex 20 amp receptacles shall be provided within the cabinet.

### 2.5.3 Connector Blocks

Voice riser shall be terminated on angled insulation displacement connector (IDC), Type 110, 50 pair, 89D style mounted blocks, compatible with industry standard 110 blade punch down tool, designed for Category 3 and higher systems. Provide 50 pair blocks for the number of riser and backbone cables terminated plus 25 percent spare. Also provide sufficient blocks for cross connects for all IDFs. Blocks shall be mounted on an 89D style bracket on a frame, in rack or in cabinet.

### 2.5.4 Building Protector Assemblies

Building protector assembly is required on all OSP cables and shall have 710 type connector blocks for connection to the exterior cable at full capacity. M150-66 type IDC for connection to the voice cross connect blocks. 110 type IDC is not approved on building protector assembly. For Central office Area Distribution Nodes a R399 type central office protector shall be used.

### 2.5.5 Cable Guides

Provide cable guides specifically manufactured for the purpose of routing cables, wires and patch cords horizontally and vertically on 19 inches equipment racks, cabinets, and telecommunications backboards. Cable guides of ring or bracket type devices mounted on rack, cabinet, panels, and backboard for horizontal cable management and individually mounted for vertical cable management. Mount cable guides with screws, or nuts and lockwashers. Cable guides are not to be used outside of the communications room.

### 2.5.6 Patch Panels

Provide capacity for the number of horizontal and backbone cables terminated on the panel plus 25 percent spare. Provide factory terminated SC type SM optical fiber patch cables and factory terminated CAT 6 stranded copper patch cables for patch panels. Provide patch cords as complete assemblies of various appropriate lengths and with matching connectors and sheath color matched to network in Section 2.4.2.1. Provide fiber optic patch cables with crossover orientation in accordance with TIA-568-C.3. Patch cords shall meet minimum performance requirements specified in TIA-568-C.1, TIA-568-C.2 and TIA-568-C.3 for cables, cable length and hardware specified. Classified service may require shielded jack sets and panels as approved by AHJ.

2.5.6.1 Modular to 110 Block Patch Panel

Provide in accordance with TIA-568-C.1 and TIA-568-C.2. Panels shall be third party verified and shall comply with ANSI/TIA Category 6/6A requirements. Panel shall be constructed of 0.09 inches minimum aluminum and shall be cabinet/rack mounted and compatible with an ECIA EIA/ECA 310-E 19 inches equipment rack. Panel shall support connectors that comply with ANSI/TIA-568-C.2, Category 6 UTP requirements Connectors/Outlets shall be UL2043 listed, non-keyed, compatible with RJ-45 and RJ-11 plugs, glass-reinforced nylon housing, pass through mounting from the front or rear of the patch panel, with enclosed IDC termination and color-coded for both T568A and T568B wiring. Connectors shall be color matched to network type in Section 2.4.2.1 unless specified otherwise and approved by AHJ Each outlet/connector shall be terminated T568A. The rear of each panel shall have incoming cable strain-relief and routing guides. DO NOT USE ZIP TIES ON STRAIN-RELIEF GUIDES. Panels shall have each port factory numbered and be equipped with laminated plastic nameplates above each port. Labeling shall comply with Section 3.2 of this specification.

2.5.6.2 Fiber Optic Patch Panel

Provide panel for maintenance and cross-connecting of optical fiber cables. Panel shall be constructed of 16 or 18 gauge steel or 11 gauge aluminum minimum and shall be cabinet/rack mounted and compatible with a ECIA EIA/ECA 310-E 19 inches equipment rack. Each panel shall provide multimode/single-mode adapters as required in duplex SC in accordance with TIA/EIA-604-3 with zirconia ceramic alignment sleeves. Provide dust cover for unused adapters. The rear of each panel shall have a cable management tray a minimum of 8 inches deep with removable cover, incoming cable strain-relief and routing guides. Panels shall have each adapter factory numbered and be equipped with laminated plastic nameplates above each adapter. When populating the panel working left to right start with OSP feed, SM ISO to IDF, MM ISO to IDF, lastly row to row within same comm room.

2.5.7 Optical Fiber Distribution Panel

Cabinet/rack mounted optical fiber distribution panel (OFDP) shall be constructed in accordance with ECIA EIA/ECA 310-E utilizing 16 or 18 gauge steel or 11 gauge aluminum minimum. Panel shall be divided into two sections, distribution and user. Distribution section shall have strain relief, routing guides, splice tray and shall be lockable. User section shall have a cover for patch cord protection. Each panel shall provide multimode and single-mode pigtails and adapters as required. Provide adapters as duplex SC with zirconia ceramic alignment sleeves. Provide dust covers for adapters. Provide patch cords as specified in the paragraph PATCH PANELS. When populating the panel working left to right start with OSP feed, SM ISO to IDF, MM ISO to IDF, lastly row to row within same communications room.

2.6 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

2.6.1 Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68, TIA-568-C.1, and TIA-568-C.2, Category 6 UTP requirements. Outlet/connectors shall be UL 2043UL 2043 listed, non-keyed, compatible with RJ-45 and RJ-11 plugs, rated for 2500 plug mating cycles, glass-reinforced nylon housing, pass through mounting from the front or rear of the faceplate, with enclosed

IDC termination and color-coded for both T568A and T568B wiring. Connectors shall be color matched to network type in Section 2.4.2.1 unless specified otherwise and approved by AHJ. Each outlet/connector shall be terminated 568A. UTP outlet/connectors installed in outdoor or marine environments shall be rated for the environmental conditions.

2.6.2 Optical Fiber Adapters(Couplers)

Provide optical fiber adapters suitable for duplex SC in Accordance with TIA/EIA-604-3 with zirconia ceramic alignment sleeves, as indicated. Provide dust cover for adapters. Optical fiber adapters shall comply with TIA-455-21 for 500 mating cycles.

2.6.3 Optical Fiber Connectors

Provide in accordance with TIA-455-21. Optical fiber connectors shall be duplex SC in accordance with TIA/EIA-604-3 with zirconia ceramic ferrule, epoxyless crimp style compatible with 62.5/125 multimode and 8/125 single-mode fiber. The connectors shall provide a maximum attenuation of 0.3 dB at 850/1300 and 1310/1550 nm with less than a 0.2 dB change after 500 mating cycles.

2.6.4 Cover Plates

Telecommunications cover plates shall comply with UL 514C, and TIA-568-C.1, TIA-568-C.2, ; flush or oversized design constructed of high impact thermoplastic material, color to match the network color designation in Section 2.4.2.1, or as otherwise specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and authorized by the AHJ.. Provide labeling in accordance with the paragraph LABELING in this section. Additionally, outlet cover plate coloring shall be specified in design, and may be required to match the network color designation in Section 2.4.2.1 of this specification.

2.7 MULTI-USER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

Provide MUTOA(s) in accordance with TIA-568-C.1. Ensure proper separation from other networks and power.

For Modular Furniture, provide horizontal cabling from the MUTOA to an adaptor plate in the Modular Furniture. The MUTOA should be limited to serving a maximum of six work areas with 2 cables each for a total of 12 cables.

2.8 TERMINAL CABINETS

Construct of zinc-coated sheet steel, 36 by 24 by 6 inches deep, as indicated. Trim shall be fitted with hinged door and locking latch. Doors shall be maximum size openings to box interiors. Boxes shall be provided with 5/8 inch backboard with two-coat varnish finish. Match trim, hardware, doors, and finishes with panelboards. Provide label and identification systems for telecommunications wiring and components consistent with TIA-606.

2.9 GROUNDING AND BONDING PRODUCTS

Provide in accordance with UL 467, TIA-607, and NFPA 70. Components shall be identified as required by TIA-606. Provide ground rods, bonding conductors, and grounding busbars as specified in Section 26 20 00

INTERIOR DISTRIBUTION SYSTEM. The preferred ground for the Telephone Main Grounding Bus (TMGB) bar will be to the Main electrical Distribution Panel (MDP) bus bar and building steel. In most cases, but not all; a #6 AWG bonding conductor is recommended for telecommunications. All grounding and bonding conductors within the Telecommunications room will be green sheathed copper conductor, stranded, and labeled as suitable for use as such and tagged "DO NOT REMOVE". All grounding and bonding conductors running out of the Telecommunications room should be protected in conduit or attached to the outside of the cable tray and sized according to references. The minimum size of the TMGB shall be no smaller than 4" by 10" by 1/4 inch thick; bus bar should be factory made and factory drilled, not fabricated or drilled onsite. All bonding and grounding terminations shall be irreversible and secured with a double hole crimp termination. Do not exceed minimum bend radius on bonding and grounding conductors. Mount Bus Bar to far left of telecomm backboard at approximately 70" AFF.

## 2.10 FIRESTOPPING MATERIAL

Provide as specified in Section PART 4 of the RFP.

## 2.11 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

## 2.12 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inches thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inches high normal block style.

## 2.13 TESTS, INSPECTIONS, AND VERIFICATIONS

### 2.13.1 Factory Reel Tests

Provide documentation of the testing and verification actions taken by manufacturer to confirm compliance with TIA-568-C.1, TIA-568-C.2, TIA-568-C.3, TIA-526-7 for single mode optical fiber, and TIA-526-14 for multimode optical fiber cables.

# PART 3 EXECUTION

## 3.1 INSTALLATION

Install telecommunications cabling and pathway systems, including the horizontal and backbone cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware in accordance with NECA/BICSI 568, TIA-568-C.1, TIA-568-C.2, TIA-568-C.3, TIA-569, NFPA 70, manufacturer instructions, current industry best practices, and UL standards as applicable. Provide cabling in a star topology network. Provide residential cabling in a star wiring architecture from the distribution device as required by TIA-570. Pathways and outlet boxes

shall be installed as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Standard type 5" x 5" x 2 7/8" square boxes with a single gang plaster ring shall be used except in concrete or concrete masonry units where a standard 4 11/16" square or a floor box will be used. Mount flush in finished walls at height indicated by drawings and with proper clearances from other networks and power systems. Depth of boxes shall be large enough to allow manufacturer's recommended conductor bend radii, normally 2 7/8" depth. Install telecommunications cabling with copper media in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling (normal minimum clearance distances of 4 feet from motors, generators, frequency converters, transformers, x-ray equipment or uninterrupted power system, 300 mm (12 in) from power conduits and cable systems, 125 mm (5 inches) from fluorescent or high frequency lighting system fixtures). Cabling shall be run with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

### 3.1.1 Cabling

Install UTP/STP, and optical fiber telecommunications cabling system as detailed in TIA-568-C.1, TIA-568-C.2, TIA-568-C.3 and TIA-570 for residential cabling. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not untwist Category 6 UTP cables more than ½" (12 mm) from the point of termination to maintain cable geometry. Provide service loop on each end of the cable, minimum 10' (3 meters) in the telecommunications room, 6" (150mm) in or close to the work area outlet for UTP. Do not exceed manufacturers' cable pull tensions for copper and optical fiber cables. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. Only hook and loop fasteners are allowed on Category 6/6A cable and optical fiber cable. DO NOT USE ZIP TIES. For UTP cable, bend radii shall not be less than four times the cable diameter. Cables shall be terminated; no cable shall contain unterminated elements (See NFPA 70 abandoned cabling). Cables shall not be spliced. Label cabling in accordance with paragraph LABELING in this section.

#### 3.1.1.1 Open Cable

Use only where specifically indicated on plans or use in cable trays, or below raised floors in approved pathway (cable free laid on floor is not authorized). Install in accordance with TIA-568-C.1, TIA-568-C.2 and TIA-568-C.3. Do not exceed cable pull tensions recommended by the manufacturer. Copper cable not in a wireway or pathway shall be suspended a minimum of 8 inches above ceilings by cable supports no greater than 60 inches apart. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items. Placement of cable parallel to power conductors shall be avoided, if possible; a minimum separation of 12 inches shall be maintained when such placement cannot be avoided.

Plenum cable shall be used where open cables are routed through plenum areas. Cable routed exposed under raised floors shall be plenum rated.

Plenum cables shall comply with flammability plenum requirements of NFPA 70. Install cabling after the flooring system has been installed in raised floor areas. Cable 6 feet long shall be neatly coiled not less than 12 inches in diameter below each feed point in raised floor areas.

3.1.1.2 Backbone Cable

a. Copper Backbone Cable. Install intrabuilding backbone copper cable, in minimum 2-way 3 inch overhead conduit or larger in indicated pathways, between the campus distributor, located in the telecommunications entrance facility or room, the building distributors and the floor distributors located in telecommunications rooms and telecommunications equipment rooms as indicated on drawings.

b. Optical fiber Backbone Cable. Install intrabuilding backbone optical fiber in indicated pathways (normally in one of multiple inner ducts installed in conduit so as to maximize pathways). Do not exceed manufacturer's recommended bending radii and pull tension. Prepare cable for pulling by cutting outer jacket 10 inches leaving strength members exposed for approximately 10 inches. Twist strength members together and attach to pulling eye. Vertical cable support intervals shall be in accordance with manufacturer's recommendations.

3.1.1.3 Horizontal Cabling

Install horizontal cabling as indicated in the specification and on drawings. Do not untwist Category 6 UTP cables more than one half inch from the point of termination to maintain cable geometry. Provide slack cable in the form of a figure eight or large service loop on each end of the cable (prevent inductance caused by small coils), 10 feet in the telecommunications room, and 12 inches in the work area outlet.

3.1.2 Pathway Installations

Provide in accordance with TIA-569 and NFPA 70, except that 1 1/4 inch diameter conduit from cable tray or telecommunication room backboard to each work area outlet is required. Provide building pathway as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

Conceal conduit within finished walls, ceilings, and floors (not in wet areas). Keep conduit minimum 12 inches away from parallel runs of electrical power equipment, flues, steam, light ballast, and hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit is visible after completion of project. Run conduits in crawl spaces as if exposed. Install no more than two 90 degree bends for a single horizontal cable run. All bends/turns in conduits will be in straight runs of conduit; a pull box shall be installed after every 180 degrees of bends or 100'; in no case will a turn be made within a pull box. The minimum size for a pull box for a single 1¼" conduit will be 5" long by 5" wide by 2 7/8" deep, and for a 3" conduit 30"W x 54"L x9"D. All conduits shll contain an insulated bushing at each end to protect the cable from damage and required bonding. Pull points, LC, LB, and condulets are not authorized.

Under floor cabling, under floor duct, and conduit under floor slabs should be avoided in the Camp Lejeune Greater area due to wet area close to coastal waters.

### 3.1.3 Service Entrance Conduit, Overhead

Provide service entrance overhead as specified in this section and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEMS.

Ensure entrance fitting or weather head is sized to ensure min bend radius for largest cable is maintained.

### 3.1.4 Service Entrance Conduit, Underground

Provide service entrance underground as specified in this section and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

Underground portion shall be encased in minimum of 3 inches of concrete extending from the building entrance to OSP demarcation point and shall be a minimum of 18 inches below slab or grade. Location of entrance conduit in communications room shall be to the left of the longest furthest wall from the door.

### 3.1.5 Cable Tray Installation

Install cable tray as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Only CMP and OFNP type cable shall be installed in a plenum.

A continuous stranded bonding conductor shall be run on the outside along the tray tapped to each section of tray with a listed connector to ensure bonding. Remove all sharps from cable tray and pathways. Ensure bonding is on the pathway so as not to obstruct horizontal cabling. Maintain proper clearance and work space per TIA-569 and TEMPEST.

### 3.1.6 Work Area Outlets

#### 3.1.6.1 Terminations

Terminate UTP cable in accordance with TIA-568-C.1, TIA-568-C.2 and wiring configuration as specified. Terminate fiber optic cables in accordance with TIA-568-C.3.

All work areas will contain a minimum of two work area outlets . Any work area larger than 80 sq feet will require additional work area outlets to service any work location in the room within 6 feet of an electrical outlet. This also applies to any area that could be converted to work space in the future. Recommend one work area outlet box be placed 6" to the left or right of every electrical outlet in a usable space. All work area face plates shall contain four category 6 jacks as specified herein, terminated T568A configuration unless otherwise approved by AHJ. MUTOAs contain 12 cables and may require additional clearance and power. All other outlets shall contain a minimum of 2 Category six jacks, with the exception of single jack wall phone studded faceplates.

#### 3.1.6.2 Cover Plates

As a minimum, each outlet/connector shall be labeled as to its function and a unique number to identify cable link in accordance with the paragraph LABELING in this section. (For secured networks contact AHJ as shielded twisted pair and color coded face plates may be necessary.)

3.1.6.3 Cables

Unshielded/shielded twisted pair and fiber optic cables shall have a minimum of 12 inches of available service slack loosely coiled into the telecommunications outlet boxes or in cable tray as close as possible to outlet box. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

3.1.6.4 Pull Cords

Pull cords shall be installed in conduit serving telecommunications outlets that do not have cable installed (this is not normal as all outlets should be cabled).

3.1.6.5 Multi-User Telecommunications Outlet Assembly (MUTOA)

Run horizontal cable per specifications and terminate cables in a MUTOA in each system furniture zone. MUTOAs shall not be located in ceiling spaces, or any obstructed area. MUTOAs shall not be installed in furniture unless that unit of furniture is permanently secured to the building structure. MUTOAs shall be located in an open work area so that each furniture cluster is served by at least one MUTOA. The MUTOA shall be limited to serving a maximum of six work areas with 2 cables each for a total of 12 cables/12 ports. Maximum work area cable length requirements shall also be taken into account. MUTOAs must be labeled to include the maximum length of work area cables. MUTOA labeling is in addition to the labeling described in TIA-606, or other applicable cabling administration standards. Work area cables extending from the MUTOA to the work area device must also be uniquely identified and labeled.

3.1.7 Telecommunications Space Termination

Install termination hardware required for Category 6 and optical fiber system. A single punch manufacture approved insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors.

3.1.7.1 Connector Blocks

Connector blocks shall be cabinet/rack mounted, as approved by the AHJ, in orderly rows and columns. Adequate vertical and horizontal wire routing areas shall be provided between groups of blocks. Install in accordance with industry standard wire routing guides in accordance with TIA-569.

3.1.7.2 Patch Panels

Patch panels shall be mounted in equipment cabinets/racks with sufficient ports to accommodate the installed cable plant plus 25 percent spares.

a. Copper Patch Panel. Copper cable entering a patch panel shall be secured to a rear cable manager with hook and loop ties as recommended by the manufacturer to prevent movement of the cable.

b. Fiber Optic Patch Panel. Fiber optic cable loop shall be 3 feet in length provided as recommended by the manufacturer. The outer jacket of each cable entering a patch panel shall be secured to the panel to prevent movement of the fibers within the panel, using clamps or brackets specifically manufactured for that purpose.

#### 3.1.7.3 Equipment Support Frames

Install in accordance with TIA-569:

a. Bracket, wall mounted. Mount bracket to right on plywood backboard in accordance with manufacturer's recommendations. Mount rack so height of highest panel does not exceed 78 inches above floor. Mount so there is sufficient space remaining on backboard to mount lightning protection, bonding, and cable managers or install additional backboards.

b. Racks, floor mounted modular type. Permanently anchor rack to the floor in accordance with manufacturer's recommendations. Install sections of ladder rack anchored to telephone rack/cabinet and at least two walls.

c. Cabinets, freestanding modular type. Permanently anchor to the floor in accordance with manufacturer's recommendations. When cabinets are connected together, remove adjoining side panels for cable routing between cabinets. Mount rack mounted fan and 19" power/surge strip in cabinet. Install sections of ladder rack anchored to telephone rack/cabinet and at least two walls.

d. Cabinets, wall-mounted modular type. Mount cabinet to right on plywood backboard in accordance with manufacturer's recommendations. Mount cabinet so height of highest panel does not exceed 78 inches above floor. Mount so there is sufficient space remaining on backboard to mount lightning protection, bonding, and cable managers or install additional backboards.

### 3.1.8 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings as specified in PART 4 of the RFP.

### 3.1.9 Grounding and Bonding

Provide in accordance with TIA-607, NFPA 70 and as specified in this section and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM except only two hole irreversible compression lugs will be accepted.

## 3.2 LABELING

### 3.2.1 Labels

Provide labeling in accordance with TIA-606 except jacks will be numbered in a logical, sequential, clockwise numbering system from 1 to X with a closet designator. Example would be 145 C 146, would be the 145th & 146th jacks from the C telecom room. All labels shall be numbered with manufacturer's labeling system (not fabricated) and be equipped with laminated plastic cover. All terminations that are not to work area outlets should be in the last patch panel locations and labeled accordingly i.e. DDC, FACP, Elevator, Wall phones, or Wireless access points.

### 3.2.2 Cable

Cables shall be labeled using color labels on both ends with identifiers in accordance with TIA-606.

### 3.2.3 Termination Hardware

Workstation outlets and patch panel connections shall be labeled using manufacturing labeling system, color coded labels with identifiers in accordance with this section and TIA-606. Coordinate with Base Telephone.

## 3.3 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in PART 4 of the RFP.

### 3.3.1 Painting Backboards

Camp Lejeune no longer paints backboards as fire rated plywood is available. Manufactured fire retardant backboard shall be used, so as not to increase flame spread and smoke density and must be appropriately labeled.

## 3.4 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

## 3.5 TESTING

### 3.5.1 Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests on both Backbone and Horizontal cabling in accordance with TIA-568-C.1, TIA-568-C.2, TIA-568-C.3 and AHJ local guidance. Test equipment shall conform to TIA-1152. Perform optical fiber field inspection tests via attenuation measurements on factory reels and provide results along with manufacturer certification for factory reel tests. Remove failed cable reels from project site upon attenuation test failure.

#### 3.5.1.1 Inspection

Visually inspect all telecommunications cabling jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for T568A pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1, TIA-568-C.2, TIA-568-C.3, and TIA-570 for residential cabling. Visually confirm Category 6 marking of outlets, cover plates, outlet/connectors, cable physical damage, and patch panels.

#### 3.5.1.2 Verification Tests

Backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after all terminations are complete but prior to being cross-connected.

For multimode optical fiber, perform optical fiber end-to-end attenuation tests in accordance with TIA-568-C.3 and TIA-526-14 using Tier 1 Option with power meter and light source for optical fiber.

Validate/troubleshoot failures with Tier 2 Option. For single-mode optical fiber of sufficient distance (normally OSP), perform optical fiber end-to-end attenuation tests in accordance with TIA-568-C.3 and TIA-526-7 using Tier 2 Option, OTDR for single-mode optical fiber. Perform verification acceptance tests.

3.5.1.3 Performance Tests

Provide summary in .pdf (hard and soft copy) detailed tester results in test format .flw (soft copy only), and fiber power meter/OTDR reports (summary hard copy and detailed soft copy). All Test reports should have a building or project number on it. The final QC and certification of installation will be performed by TSD after the contractor has provided passing and acceptable test results matching work area outlet labels, as-built drawings showing all telecommunications outlets and their labeled designator to include any empty conduit or ports coiled in overhead for future use and all building automated system ports such as DDC, Elevator, FACP, or WAPs. Test results that are marginal may not be accepted. Also fiber tests that pass the link budget but exceed tolerance on any connector or splice are considered a failure. All discrepancies must be repaired and retested.

Perform testing for each outlet and MUTOA as follows:

a. Perform Category 6 link tests in accordance with TIA-568-C.1 and TIA-568-C.2. Tests shall include wire map, length, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, propagation delay, and delay skew.

b. Optical fiber Links. Perform optical fiber end-to-end link tests in accordance with TIA-568-C.3.

3.5.1.4 Final Verification Tests

Perform verification tests for all copper and optical fiber systems after the complete telecommunications cabling and workstation outlet/connectors are installed.

a. Voice Tests. These tests assume that dial tone service has been installed (normally only done for FACP, Elevator, or emergency phones). Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and DSN telephone call.

b. Data Tests. These tests assume the Information Technology Staff has a network installed and are available to assist with testing (normally this is only done for VTC, CCTV). Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

-- End of Section --

SECTION 31 23 00.00 20

EXCAVATION AND FILL
**02/11**

# PART 1 GENERAL

## 1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

| | |
|---|---|
| AWWA C600 | (2017) Installation of Ductile-Iron Mains and Their Appurtenances |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM C136/C136M | (2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates |
| ASTM D1140 | (2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing |
| ASTM D1556/D1556M | (2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method |
| ASTM D1557 | (2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3) |
| ASTM D2216 | (2010) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass |
| ASTM D2321 | (2018) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications |
| ASTM D2487 | (2017) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) |
| ASTM D4318 | (2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils |
| ASTM D6938 | (2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) |

| | |
|---|---|
| ASTM D698 | (2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.)) |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|---|---|
| EPA SW-846.3-3 | (1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods |

## 1.2 DEFINITIONS

### 1.2.1 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D698, for general soil types, abbreviated as percent laboratory maximum density.

### 1.2.2 Hard Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

## 1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring and Sheeting Plan

Dewatering work plan

Submit 15 days prior to starting work.

SD-06 Test Reports

Borrow Site Testing

Fill and backfill test

Select material test

Density tests

Off-Site Soil

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

## 1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

## 1.5 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.

d. Material character is indicated by the boring logs.

e. Hard materials and rock will not be encountered.

f. Borrow material, Suitable backfill and bedding material in the quantities required is not available on Government property.

g. Blasting will not be permitted. Remove material in an approved manner.

## 1.6 REQUIREMENTS FOR OFF SITE SOIL

Soils brought in from off site for use as backfill shall be tested for petroleum hydrocarbons, BTEX, PCBs and HW characteristics (including toxicity, ignitability, corrosivity, and reactivity). Backfill shall not contain concentrations of these analytes above the appropriate State and/or EPA criteria, and shall pass the tests for HW characteristics. Determine petroleum hydrocarbon concentrations by using appropriate State protocols. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5035/8260B. Perform complete TCLP in accordance with EPA SW-846.3-3 Method 1311. Perform HW characteristic tests for ignitability, corrosivity, and reactivity in accordance with accepted standard methods. Perform PCB testing in accordance with accepted standard methods for sampling and analysis of bulk solid samples. Provide borrow site testing for petroleum hydrocarbons and BTEX from a grab sample of material from the area most likely to be contaminated at the borrow site (as indicated by visual or olfactory evidence), with at least one test from each borrow site. For each borrow site, provide borrow site testing for HW characteristics from a composite sample of material, collected in accordance with standard soil sampling techniques. Do not bring material onsite until tests results have been received and approved by the Contracting Officer.

## 1.7 QUALITY ASSURANCE

### 1.7.1 Shoring and Sheeting Plan

Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Drawings shall include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations shall include data and references used.

The Contractor is required to hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer shall be responsible

for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer shall update the excavation, sheeting and dewatering plans as construction progresses to reflect changing conditions and shall submit an updated plan if necessary. A written report shall be submitted, at least monthly, 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 Geotechnical Engineer shall be available to meet with the Contracting Officer at any time throughout the contract duration.

### 1.7.2 Dewatering Work Plan

Submit procedures for accomplishing dewatering work.

### 1.7.3 Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. 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.

## PART 2 PRODUCTS

## 2.1 SOIL MATERIALS

### 2.1.1 Satisfactory Materials

Any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

### 2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 2 inches. The Contracting Officer shall be notified of any contaminated materials.

### 2.1.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM, GP-GM, GW-GM, SW-SM, SP-SM, and SM shall be identified as cohesionless only when the fines are nonplastic (plasticity index equals zero). Materials classified as GM and

SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

2.1.4 Common Fill

Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

2.1.5 Backfill and Fill Material

ASTM D2487, classification GW, GP, GM, SW, SP, SM with a maximum ASTM D4318 liquid limit of 35, maximum ASTM D4318 plasticity index of 12, and a maximum of 25 percent by weight passing ASTM D1140, No. 200 sieve.

2.1.6 Select Material

Provide materials classified as GW, GP, SW, SP, by ASTM D2487 where indicated. The liquid limit of such material shall not exceed 35 percent when tested in accordance with ASTM D4318. The plasticity index shall not be greater than 12 percent when tested in accordance with ASTM D4318, and not more than 35 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D1140.

2.1.7 Topsoil

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.

2.2 UTILITY BEDDING MATERIAL

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. Backfill to top of pipe shall be compacted to 95 percent of ASTM D698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide ASTM D2321 materials as follows:

a. Class I: Angular, 0.25 to 1.5 inches, 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 inches, 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 D2487.

2.2.1 Sand

Clean, coarse-grained sand classified as SW or SP by ASTM D2487 for bedding.

2.2.2 Gravel

Clean, coarsely graded natural gravel, crushed stone or a combination thereof having a classification of GW or GP in accordance with ASTM D2487 for bedding. Maximum particle size shall not exceed 3 inches.

## 2.3 BORROW

Obtain borrow materials required in excess of those furnished from excavations from sources outside of Government property.

## 2.4 MATERIAL FOR RIP-RAP

Bedding material and rock conforming to these requirements for construction indicated.

### 2.4.1 Rock

Rock fragments sufficiently durable to ensure permanence in the structure and the environment in which it is to be used. Rock fragments shall be free from cracks, seams, and other defects that would increase the risk of deterioration from natural causes. The size of the fragments shall be such that no individual fragment exceeds a weight of 150 pounds and that no more than 10 percent of the mixture, by weight, consists of fragments weighing 2 pounds or less each. Specific gravity of the rock shall be a minimum of 2.50. The inclusion of more than trace 1 percent quantities of dirt, sand, clay, and rock fines will not be permitted.

## 2.5 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and 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. Color and printing shall be permanent, unaffected by moisture or soil.

| Warning Tape Color Codes | |
|---|---|
| Red: | Electric |
| Yellow: | Gas, Oil; Dangerous Materials |
| Orange: | Telephone and Other Communications |
| Blue: | Potable Water Systems |
| Green: | Sewer Systems |
| White: | Steam Systems |
| Gray: | Compressed Air |
| Purple: | Non Potable, Reclaimed Water, Irrigation and Slurry lines |

### 2.5.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum

thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.5.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured 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.

2.6 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Drainage and Dewatering

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.1.1 Drainage

So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/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 and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils, prevent erosion and undermining of foundations. 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. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3.1.1.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted 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. Control measures shall be taken 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, the water level shall be maintained continuously, at least 2 feet below the working level.

### 3.1.2 Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

### 3.1.3 Machinery and Equipment

Movement of construction machinery and equipment over pipes during construction shall be at the Contractor's risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged.

## 3.2 SURFACE PREPARATION

### 3.2.1 Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations within the clearing limits. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing surface.

### 3.2.2 Stripping

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be wasted. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

### 3.2.3 Unsuitable Material

Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs.

## 3.3 EXCAVATION

Excavate to contours, elevation, and dimensions indicated. Reuse excavated materials that meet the specified requirements for the material type required at the intended location. Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations, soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed. Refill with select material and compact to 95 percent of ASTM D698 maximum density. Unless specified otherwise, refill excavations cut below indicated depth with select material and compact to 100 percent of ASTM D698 maximum density. Satisfactory material removed below the depths indicated, without specific

direction of the Contracting Officer, shall be replaced with satisfactory materials to the indicated excavation grade; except as specified for spread footings. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

### 3.3.1 Pipe Trenches

Excavate to the dimension indicated. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.

### 3.3.2 Excavated Materials

Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required or shall be separately stockpiled if it cannot be readily placed. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of as specified in Paragraph "DISPOSITION OF SURPLUS MATERIAL."

## 3.4 SUBGRADE PREPARATION

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Minimum subgrade density shall be as specified herein.

### 3.4.1 Proof Rolling

Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade of the building with six passes of a 15 ton, pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes over all areas, and at speeds between 2 1/2 to 3 1/2 miles per hour. When proof rolling under buildings, the building subgrade shall be considered to extend 5 feet beyond the building lines, and one-half of the passes made with the roller shall be in a direction perpendicular to the other passes. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Contracting Officer. Rutting or pumping

of material shall be undercut as directed by the Contracting Officer select material.

## 3.5 FILLING AND BACKFILLING

Fill and backfill to contours, elevations, and dimensions indicated. Compact each lift before placing overlaying lift.

### 3.5.1 Common Fill Placement

Provide for general site. Use satisfactory materials. Place in 6 inch lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

### 3.5.2 Backfill and Fill Material Placement

Provide for paved areas and under concrete slabs, except where select material is provided. Place in 6 inch lifts. Do not place over wet or frozen areas. Place backfill material adjacent to structures as the structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against the structure.

### 3.5.3 Select Material Placement

Provide under structures not pile supported. Place in 6 inch lifts. Do not place over wet or frozen areas. Backfill adjacent to structures shall be placed as structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structure.

### 3.5.4 Trench Backfilling

Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill under structures and paved areas in 6 inch lifts to top of trench and in 6 inch lifts to one foot over pipe outside structures and paved areas.

## 3.6 BORROW

Where satisfactory materials are not available in sufficient quantity from required excavations, approved borrow materials shall be obtained as specified herein.

## 3.7 BURIED WARNING AND IDENTIFICATION TAPE

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

## 3.8 BURIED DETECTION WIRE

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole.

The wire shall remain insulated over it's entire length. The wire shall enter 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, the wire shall terminate in the valve pit at the pump station end of the pipe.

## 3.9 COMPACTION

Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required. Density requirements specified herein are for cohesionless materials. When cohesive materials are encountered or used, density requirements may be reduced by 5 percent.

### 3.9.1 General Site

Compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area or structure to 90 percent of ASTM D698.

### 3.9.2 Paved Areas

Compact top 12 inches of subgrades to 95 percent of ASTM D698. Compact fill and backfill materials to 95 percent of ASTM D698.

## 3.10 RIP-RAP CONSTRUCTION

Construct rip-rap on filter fabric in the areas indicated.

### 3.10.1 Preparation

Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

### 3.10.2 Bedding Placement

Spread filter fabric on prepared subgrade as indicated. Compaction of bedding is not required. Finish bedding to present even surface free from mounds and windrows.

### 3.10.3 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.

## 3.11 FINISH OPERATIONS

### 3.11.1 Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.11.2 Topsoil and Seed

Provide as specified in Section 02 82 30 RE-ESTABLISHING VEGETATION.

3.11.3 Protection of Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.12 DISPOSITION OF SURPLUS MATERIAL

Remove from Government property surplus or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber.

3.13 FIELD QUALITY CONTROL

3.13.1 Sampling

Take the number and size of samples required to perform the following tests.

3.13.2 Testing

Perform one of each of the following tests for each material used. Provide additional tests for each source change.

3.13.2.1 Fill and Backfill Material Testing

Test fill and backfill material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

3.13.2.2 Select Material Testing

Test select material in accordance with ASTM C136/C136M for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D698 or ASTM D1557 for moisture density relations, as applicable.

3.13.2.3 Density Tests

Test density in accordance with ASTM D1556/D1556M, or ASTM D6938. When ASTM D6938 density tests are used, verify density test results by performing an ASTM D1556/D1556M density test at a location already ASTM D6938 tested as specified herein. Perform an ASTM D1556/D1556M density test at the start of the job, and for every 10 ASTM D6938 density tests thereafter. Test each lift at randomly selected locations every 2000 square feet of existing grade in fills for structures and concrete slabs, and every 2500 square feet for other fill areas and every 2000 square feet of subgrade in cut. Include density test results in daily report.

Bedding and backfill in trenches: One test per 50 linear feet in each lift.

3.13.2.4 Moisture Content Tests

In the stockpile, excavation or borrow areas, a minimum of two tests per day per type of material or source of materials being placed is required during stable weather conditions. During unstable weather, tests shall be made as dictated by local conditions and approved moisture content shall be tested in accordance with ASTM D2216. Include moisture content test results in daily report.

-- End of Section --

# SECTION 32 10 00

# BITUMINOUS CONCRETE PAVEMENT
**08/08**

## PART 1 GENERAL

### 1.1 REFERENCES

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

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 | (2015) Standard Method of Test for Mechanical Analysis of Extracted Aggregate |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM D2172/D2172M | (2011) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures |
| ASTM D2950/D2950M | (2014) Density of Bituminous Concrete in Place by Nuclear Methods |
| ASTM D6927 | (2015) Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures |

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

| | |
|---|---|
| NCDOT | (2012) Standard Specifications for Roads and Structures |

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

| | |
|---|---|
| FS TT-P-1952 | (2015; Rev F) Paint, Traffic and Airfield Markings, Waterborne |

### 1.2 SUBMITTALS

Submit the following 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

Paint

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 NCDOT, Standard Specifications for Roads and Structures. "Method of Measurement" and "Basis of Payment" shall not apply.

### 1.3.2 Modification of References

Where term "Engineer" is used in NCDOT 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:

g. Stations Placed:

#### 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 NCDOT RS, Section 610, except where specified otherwise. Recycled asphalt pavement material may be used as permitted by NCDOT.

### 2.2 BINDER COURSE

NCDOT, materials for the construction of the binder course shall be Type I-19.0 B.

### 2.3 SURFACE COURSE

NCDOT, materials for construction of the surface course shall be Type S-9.5 B.

### 2.4 STRIPING

Paint shall conform to FS TT-P-1952, Types I, or II.

### 2.5 TRAFFIC SIGNS

NCDOT, provide traffic signs in accordance with Division 9.

### 2.6 COMPOSITION OF MIXTURE REQUIREMENTS

#### 2.6.1 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 |
|---|---|---|
| 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 23 00.00 20 EXCAVATION AND FILL.

### 3.2 CONSTRUCTION

Provide construction in accordance with the applicable requirements of the NCDOT, except where indicated or specified otherwise.

#### 3.2.1 Subgrade

NCDOT, preparation of subgrade shall be in accordance with 31 23 00.00 EXCAVATION AND FILL.

#### 3.2.2 Base Course

NCDOT, methods of construction of the base course shall be in accordance with Division 2.

3.2.3 Binder and Surface Course

NCDOT, methods of construction of the surface course shall be in accordance with Division 6. Placement will not be permitted unless the Contractor has a working asphalt thermometer on site.

3.2.4 Striping

NCDOT, provide paint striping in accordance with Division 6. Allow bituminous pavement to cure for at least 21 days before paint is applied. Pavement shall be thoroughly clean and entirely free of loose sand, stones, dust, oil, grease, water, and other substances that will be deleterious to the paint or will adversely affect the adhesion of the paint. Do not apply paint during high wind (over 15 miles per hour) or high humidity (over 70 percent). Apply paint only when ambient temperature is 40 degrees F or above and rising but not more than 95 degrees F. Dimensions and arrangement of striping shall be as indicated. Apply paint to a wet film thickness of 0.015 inch by means of conventional traffic line striping equipment. Traffic shall not be permitted to use the painted areas for a minimum of 30 minutes after painting of lines has been completed.

3.2.5 Traffic Signs

NCDOT, install traffic signs in accordance with Division 9.

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 D2172/D2172M and sieve analysis in accordance with AASHTO T 30. Test samples for stability and flow in accordance with ASTM D6927. 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. Variations in final pervious surface shall not be more than 3/8 inch under a 10 foot straightedge. Pavement showing irregularities greater than that specified shall be corrected as directed by Contracting Officer.

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 D2950/D2950M.

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 --

# SECTION 32 11 23

# AGGREGATE BASE COURSES
**08/17**

## PART 1 GENERAL

### 1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

| | |
|---|---|
| AASHTO T 180 | (2017) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop |
| AASHTO T 224 | (2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test |
| AASHTO T 88 | (2013) Standard Method of Test for Particle Size Analysis of Soils |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM C117 | (2017) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing |
| ASTM C131/C131M | (2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine |
| ASTM C136/C136M | (2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates |
| ASTM C29/C29M | (2017a) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate |
| ASTM D1556/D1556M | (2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method |
| ASTM D1557 | (2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3) |
| ASTM D2167 | (2015) Density and Unit Weight of Soil in Place by the Rubber Balloon Method |

| | |
|---|---|
| ASTM D2487 | (2017) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) |
| ASTM D4318 | (2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils |
| ASTM D6938 | (2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) |
| ASTM D75/D75M | (2014) Standard Practice for Sampling Aggregates |
| ASTM E11 | (2016) Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves |

## 1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

### 1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

### 1.2.2 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve will be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

## 1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

ABC Stone

SD-06 Test Reports

Initial Tests
In-Place Tests

## 1.4 EQUIPMENT, TOOLS, AND MACHINES

All plant, equipment, and tools used in the performance of the work will

be subject to approval by the Contracting Officer before the work is started. Maintain all plant, equipment, and tools in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Use equipment capable of minimizing segregation, producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

## 1.5 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor. Perform sampling and testing using a laboratory approved in accordance with Section 01 45 10 QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements and perform testing at the specified frequency. The Contracting Officer may specify the time and location of the tests. Furnish copies of test results to the Contracting Officer within 24 hours of completion of the tests.

### 1.5.1 Sampling

Take samples for laboratory testing in conformance with ASTM D75/D75M. When deemed necessary, the sampling will be observed by the Contracting Officer.

### 1.5.2 Tests

#### 1.5.2.1 Sieve Analysis

Perform sieve analysis in conformance with ASTM C117 and ASTM C136/C136M using sieves conforming to ASTM E11. Perform particle-size analysis of the soils in conformance with AASHTO T 88.

#### 1.5.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D4318.

#### 1.5.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture content in accordance with paragraph DEGREE OF COMPACTION.

#### 1.5.2.4 Field Density Tests

Measure field density in accordance with ASTM D1556/D1556M, ASTM D2167 or ASTM D6938. For the method presented in ASTM D1556/D1556M use the base plate as shown in the drawing. For the method presented in ASTM D6938 check the calibration curves and adjust them, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D6938 result in a wet unit weight of soil and ASTM D6938 will be used to determine the moisture content of the soil. Also check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D6938. Make the calibration checks of both the density and moisture gauges using the prepared containers of material method, as described in paragraph Calibration of ASTM D6938, on each different type of material being tested at the beginning of a job and at intervals as directed.

a. Submit certified copies of test results for approval not less than 30 days before material is required for the work.

b. Submit calibration curveds and related test results prior to using the device or equipment being calibrated.

c. Submit coppies of field test results within 24 hours after the tests are performed.

1.5.2.5 Wear Test

Perform wear tests on ABC course material in conformance with ASTM C131/C131M.

1.5.2.6 Weight of Slag

Determine weight per cubic foot of slag in accordance with ASTM C29/C29M on the ABC course material.

PART 2 PRODUCTS

2.1 AGGREGATES

Provide ABC conforming to NCDOT, Section 1005.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.2.1 Initial Tests

Perform one of each of the following tests, on the proposed material prior to commencing construction, to demonstrate that the proposed material meets all specified requirements when furnished. Complete this testing for each source if materials from more than one source are proposed.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Weight per cubic foot of Slag.

2.2.2 Approval of Material

Select the source of the material 30 day sprior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted coure(s).

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, clean the previously constructed layer of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas

where power cleaning is not practicable. Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area.

## 3.2 OPERATION OF AGGREGATE SOURCES

Condition aggregate sources on private lands in accordance with local laws or authorities. Clearing, stripping, and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified time limit.

## 3.3 STOCKPILING MATERIAL

Clear and level storage sites prior to stockpiling of material. Stockpile all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Stockpile aggregates on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Stockpile materials obtained from different sources separately.

## 3.4 PREPARATION OF UNDERLYING COURSE OR SUBGRADE

Clean the underlying course or subgrade of all foreign substances prior to constructing the base course(s). Do not construct base course(s) on underlying course or subgrade that is frozen. Construct the surface of the underlying course or subgrade to meet specified compaction and surface tolerances. Correct ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the specified requirements set forth herein by loosening and removing soft or unsatisfactory material and adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D2487, stabilize the surface prior to placement of the base course(s). Stabilize by mixing ABC into the underlying course and compacting by approved methods. Consider the stabilized material as part of the underlying course and meet all requirements of the underlying course. Do not allow traffic or other operations to disturb the finished underlying course and maintain in a satisfactory condition until the base course is placed.

## 3.5 GRADE CONTROL

Provide a finished and completed base course conforming to the lines, grades, and cross sections shown. Place line and grade stakes as necessary for control.

## 3.6 MIXING AND PLACING MATERIALS

Mix the coarse and fine aggregates in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. Make adjustments in mixing procedures or in equipment, as directed, to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification. Place the mixed material on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. Place the layers so that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer,

clean the previously constructed layers of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Make adjustments in placing procedures or equipment as may be directed by the Contracting Officer to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

## 3.7 LAYER THICKNESS

Compact the completed base course to the thickness indicated. No individual layer may be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. Compact the base course(s) to a total thickness that is within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course will be considered as conforming to the specified thickness requirements. The average job thickness will be the average of all thickness measurements taken for the job and must be within 1/4 inch of the thickness indicated. Measure the total thickness of the base course at intervals of one measurement for each 500 square yards of base course. Measure total thickness using 3 inch diameter test holes penetrating the base course.

## 3.8 COMPACTION

Compact each layer of the base course, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Slightly vary the length of alternate trips of the roller. Adjust speed of the roller as needed so that displacement of the aggregate does not occur. Compact mixture with hand-operated power tampers in all places not accessible to the rollers. Continue compaction until each layer is compacted through the full depth to at least 100 percent of laboratory maximum density. Make such adjustments in compacting or finishing procedures as may be directed by the Contracting Officer to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Remove any materials found to be unsatisfactory and replace with satisfactory material or rework, as directed, to meet the requirements of this specification.

## 3.9 PROOF ROLLING

In addition to the compaction specified, proof roll areas designated on the drawings by application of two coverages of a heavy pneumatic-tired roller having four or more tires abreast, each tire loaded to a minimum of 30,000 pounds and inflated to a minimum of 125 psi. A coverage is defined as the application of one tire print over the designated area. In the areas designated, apply proof rolling to the top of the underlying material on which the base course is laid and to the each layer of base course. Maintain water content of the underlying material and each layer of the base course as specified in Paragraph COMPACTION from start of compaction to completion of proof rolling of that layer. Remove any base course materials or any underlying materials that produce unsatisfactory results by proof rolling and replace with satisfactory materials. Then

recompact and proof roll to meet these specifications.

## 3.10 EDGES OF BASE COURSE

Place the base course(s) so that the completed section will be a minimum of one-half foot wider, on all sides, than the next layer that will be placed above it. Place approved material along the outer edges of the base course in sufficient quantity to compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, simultaneously roll and compact at least a 2 foot width of this shoulder material with the rolling and compacting of each layer of the base course, as directed.

## 3.11 FINISHING

Finish the surface of the top layer of base course after final compaction and proof rolling by cutting any overbuild to grade and rolling with a steel-wheeled roller. Do not add thin layers of material to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, scarify the top layer to a depth of at least 3 inches and blend new material in and compact and proof roll to bring to grade. Make adjustments to rolling and finishing procedures as directed by the Contracting Officer to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, scarify the unsatisfactory portion and rework and recompact it or replace as directed.

## 3.12 SMOOTHNESS TEST

Construct the top layer so that the surface shows no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Also take measurements perpendicular to the centerline at 50 foot intervals. Correct deviations exceeding this amount by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

## 3.13 FIELD QUALITY CONTROL

### 3.13.1 In-Place Tests

Perform each of the following tests on samples taken from the placed and compacted ABC. Take samples and test at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

d. Measure the thickness of the base course at intervals providing at least one measurement for each 500 square yards of base course or part thereof. Measure the thickness using test holes, at least 3 inch in

diameter through the base course.

3.13.2 Approval of Material

Select the source of the material 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and fully compacted course(s).

3.14 TRAFFIC

Do not allow traffic on the completed base course.

3.15 MAINTENANCE

Maintain the base course in a satisfactory condition until the full pavement section is completed and accepted. Immediately repair any defects and repeat repairs as often as necessary to keep the area intact. Retest any base course that was not paved over prior to the onset of winter to verify that it still complies with the requirements of this specification. Rework or replace any area of base course that is damaged as necessary to comply with this specification.

3.16 DISPOSAL OF UNSATISFACTORY MATERIALS

Dispose of any unsuitable materials that have been removed outside the limits of Government-controlled land. No additional payments will be made for materials that have to be replaced.

-- End of Section --

# SECTION 33 71 01

# OVERHEAD TRANSMISSION AND DISTRIBUTION

**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.

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)

| | |
|---|---|
| ATIS O5.1 | (2002) Wood Products - Specifications and Dimensions |

ASME INTERNATIONAL (ASME)

| | |
|---|---|
| ASME B16.11 | (2016) Forged Fittings, Socket-Welding and Threaded |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM A 53/A 53M | (2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless |
| ASTM A 153/A 153M | (2001; Rev. A) Zinc Coating (Hot-Dip) on Iron and Steel Hardware - AASHTO No.: M232 |
| ASTM A 475 | (1998) Zinc-Coated Steel Wire Strand |
| ASTM B 1 | (2001) Hard-Drawn Copper Wire |
| ASTM B 2 | (2000) Medium-Hard-Drawn Copper Wire |
| ASTM B 3 | (2001) Soft or Annealed Copper Wire |
| ASTM B 8 | (1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft |
| ASTM B 231/B 231M | (1999) Concentric-Lay-Stranded Aluminum 1350 Conductors |
| ASTM B 397 | (1985; R 1999) Concentric-Lay-Stranded Aluminum-Alloy 5005-H19 Conductors |
| ASTM B 399/B 399M | (1999) Concentric-Lay-Stranded Aluminum-Alloy 6201-T81 Conductors |
| ASTM D 117 | (2002) Electrical Insulating Oils of Petroleum Origin |
| ASTM D 3487 | (2000) Mineral Insulating Oil Used in |

Electrical Apparatus

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

| | |
|---|---|
| AWPA C1 | (2000) All Timber Products - Preservative Treatment by Pressure Processes |
| AWPA C4 | (1995) Poles - Preservative Treatment by Pressure Processes |
| AWPA C25 | (1995) Sawn Crossarms, - Preservative Treatment by Pressure Processes |

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE C2 | (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code |
| IEEE C57.12.28 | (2014) Standard for Pad-Mounted Equipment - Enclosure Integrity |
| IEEE C62.11 | (1999) Metal-Oxide Surge Arresters for AC Power Circuits (= 1 kV) (ANSI/IEEE) |
| IEEE C135.22 | (1988) Zinc-Coated Ferrous Pole-Top Insulator Pins with Lead Threads for Overhead Line Construction |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| NEMA C29.5 | (1984; R 2002) Wet-Process Porcelain Insulators - Low- and Medium-Voltage Types |
| NEMA C37.42 | (1996) High Voltage Expulsion Type Distribution Class Fuses, Cutouts, Fuse Disconnecting Switches and Fuse Links |
| NEMA C57.12.20 | (1997) Transformers - Overhead Type Distribution Transformers, 500 kVA and Smaller: High-Voltage, 34500 Volts and Below; Low-Voltage, 7970/13800Y Volts and Below (ANSI Approved) |

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

| | |
|---|---|
| NETA ATS | (2017; Errata 2017) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

U.S. DEPARTMENT OF AGRICULTURE (USDA)

| | |
|---|---|
| RUS 202-1 | (2001; Supp. 2002) List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers |
| RUS 1728F-700 | (1993) Wood Poles, Stubs, and Anchor Logs |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 6 | (2007; Reprint Sep 2019) UL Standard for Safety Electrical Rigid Metal Conduit-Steel |
| UL 510 | (2017) UL Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape |

## 1.2 RELATED REQUIREMENTS

Section 26 00 00, "Basic Electrical Materials and Methods" and Section 26 08 00, "Apparatus Inspection and Testing" apply to this section with additions and modifications specified herein.

## 1.3 OVERHEAD SERVICE

Terminate overhead service conductors into buildings at service entrance fittings or weatherhead outside building. Installation and connection of service entrance equipment to overhead service conductor is included in Section 26 20 00, "Interior Distribution System."

## 1.4 SUBMITTALS

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

Public Works (Code 404), Building 1005 Michael Road, Camp Lejeune, North Carolina will review and approve transformer submittals. As an exception to this paragraph, transformers manufactured by ABB in Athens, GA; by Cooper Power Systems in Waukesha, WI or Nacogdoches, TX; or by Howard Industries in Laurel, MS need not meet the submittal requirements of this contract. Instead, the following shall be submitted.

a. A certification, from the manufacturer, that the technical requirements of this specification shall be met.

b. Routine and other tests (paragraph entitled "Routine and Other Tests, shall be conducted by the manufacturer and may be witnessed by the Government (paragraph entitled "Source Quality Control"). Provide certified copies of the tests.

c. Provide field test reports (paragraph entitled "Field Quality Control").

SD-03 Product Data

Conductors

Insulators

Wood Poles

Cutouts

Transformer

Surge arresters

Guy strand

Anchors

SD-06 Test Reports

Field Test Plan

Field Quality Control

Ground resistance test reports

Submit report of the acceptance test results as specified by paragraph entitled "Field Quality Control"

SD-07 Certificates

Wood poles

Composite crossarms

## 1.5 QUALITY ASSURANCE

### 1.5.1 Ground Resistance Test Reports

Submit the measured ground resistance of grounding system. When testing grounding electrodes and grounding systems, identify each grounding electrode and each grounding system for testing. Include the test method and test setup (i.e. pin location) used to determine ground resistance and soil conditions at the time the measurements were made.

### 1.5.2 Field Test Plan

Provide a proposed field test plan 20 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

## 1.6 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements.

# PART 2 PRODUCTS

## 2.1 MATERIALS AND EQUIPMENT

Consider materials specified herein or shown on contract drawings which are identical to materials listed in RUS 202-1 as conforming to requirements.

## 2.2 POLES

Poles shall be of lengths and classes indicated.

### 2.2.1 Wood Poles

Wood poles machine trimmed by turning, Southern Yellow Pine conforming to ATIS O5.1 and RUS 1728F-700. Gain, bore and roof poles before treatment. Should additional gains be required subsequent to treatment, metal gain plates shall be provided. Pressure treat poles with chromated copper arsenate (CCA), except that Douglas Fir and Western Larch poles shall not be treated with CCA in accordance with AWPA C1 and AWPA C4 as referenced in RUS 1728F-700. The quality of each pole shall be ensured with "WQC" (wood quality control) brand on each piece, or by an approved inspection agency report.

## 2.3 CROSSARMS

### 2.3.1 Composite Crossarms

### 2.3.2 Crossarm Braces

Provide steel angle as indicated. Provide braces with 38 inch span for 8 foot crossarms and 60 inch span for 10 foot crossarms.

### 2.3.3 Armless Construction

Pole mounting brackets for line-post or pin insulators and eye bolts for suspension insulators shall be as shown. Brackets shall be attached to poles with a minimum of two bolts. Brackets may be either provided integrally as part of an insulator or attached to an insulator with a suitable stud. Bracket mounting surface shall be suitable for the shape of the pole. Brackets for wood poles shall have wood gripping members. Horizontal offset brackets shall have a 5-degree uplift angle. Pole top brackets shall conform to IEEE C135.22, except for modifications necessary to provide support for a line-post insulator. Brackets shall provide a strength exceeding that of the required insulator strength, but in no case less than a 2800 pound cantilever strength.

## 2.4 HARDWARE

Hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M.

## 2.5 INSULATORS

Provide wet-process porcelain insulators which are radio interference free.

a. Pin insulators: NEMA C29.5, Class 55-5.

## 2.6 OVERHEAD CONDUCTORS

Conductors of bare copper and aluminum alloy (AAAC) of sizes and types indicated.

### 2.6.1 Solid Copper

ASTM B 1, ASTM B 2, and ASTM B 3, hard-drawn, medium-hard-drawn, and soft-drawn, respectively. ASTM B 8, stranded.

### 2.6.2 Aluminum

ASTM B 231/B 231M.

#### 2.6.2.1 Aluminum Alloy

ASTM B 397 or ASTM B 399/B 399M.

## 2.7 GUY STRAND

ASTM A 475, high-strength, Class A or B, galvanized strand steel cable. Guy strand shall be 3/8 inch in diameter with a minimum breaking strength of 12,000 pounds. Provide guy terminations designed for use with the particular strand and developing at least the ultimate breaking strength of the strand.

## 2.8 ROUND GUY GUARDS

Vinyl or PVC material, yellow colored, 8 feet long and shatter resistant at sub-zero temperatures.

### 2.8.1 Guy Attachment

Thimble eye guy attachment.

## 2.9 ANCHORS AND ANCHOR RODS

Anchors shall be screw anchors presenting holding area indicated on drawings as a minimum. Anchor rods shall be triple thimble-eye, 3/4 inch diameter by 8 feet long. Anchors and anchor rods shall be hot dip galvanized.

### 2.9.1 Screw Anchors

Screw type anchors having a manufacturer's rating of not less than 6,000 pounds in loose to medium sand/clay soil, Class 6 and extra heavy pipe rods conforming to ASTM A 53/A 53M, Schedule 80, and couplings conforming

to ASME B16.11.

## 2.10 GROUND RODS

Copper clad steel ground rods at least 3/4 inch in diameter and 10 feet long. Die-stamp each near top with name or trademark of manufacturer and length of rod in feet. Rods shall have a hard, clean, smooth, continuous, surface throughout length of rod.

### 2.10.1 Ground Wire

Provide soft drawn copper wire ground conductors a minimum No. 4 AWG. Ground wire protectors may be either PVC or half round wood molding. Wood molding shall be fir, pressure treated in accordance with AWPA C25, or shall be cypress or cedar.

## 2.11 SURGE ARRESTERS

IEEE C62.11, metal oxide, porcelain housed, surge arresters arranged for crossarm mounting. RMS voltage rating shall be 10 kV. Arresters shall be Distribution class.

## 2.12 FUSED CUTOUTS

Open type fused cutouts rated 100 amperes and 12,000 amperes symmetrical interrupting current at 7.8 kV ungrounded, conforming to NEMA C37.42. Type K fuses conforming to NEMA C37.42 with ampere ratings equal to 150 percent of the transformer full load rating. Open link type fuse cutouts are not acceptable.

## 2.13 CONDUIT RISERS AND CONDUCTORS

The riser shield shall be PVC containing a PVC back plate and PVC extension shield or a rigid galvanized steel conduit, as indicated, and conforming to UL 6. Provide conductors and terminations as specified in Section 33 71 01 "Overground Transmission and Distribution."

## 2.14 TRANSFORMER (OVERHEAD-TYPE DISTRIBUTION)

a. NEMA C57.12.20.

b. Single phase, self-cooled, 65 degrees C. continuous temperature rise, two winding, 60 Hertz.

c. Insulating liquid:

(1) Mineral oil per ASTM D 3487, Type II, tested in accordance with ASTM D 117.

(2) Provide identification of transformer as "non-PCB" on the nameplate.

(3) Do not provide insulating liquids containing polychlorinated biphenyls (PCB) or tetrachloroethylene (TCE) or perchloroethylene.

d. Ratings:

(1) kVA: 25.

(2) BIL: 95 kV.

(3) Primary voltage: 12.47 kV.

(4) Secondary voltage: 208/120 volts.

(5) Minimum Tested Impedance at 85 degrees C: 2.1 percent.

f. Three-phase connections:

(1) Connect primary: Delta.

(2) Connect secondary: Grounded wye, for 208/120 volt, three phase, 4 wire service.

g. Taps:

(1) Provide four 2 1/2 percent full capacity taps, 2 above and 2 below rated primary voltage. Tap changer shall have external handle.

h. Corrosion Protection:

Paint coating system shall comply with IEEE C57.12.28 regardless of tank and cover material. Finish coat shall be light gray, ANSI color No. 70.

j. Show transformer kVA capacity using 2 1/2 inch Arabic numerals placed near the low-voltage bushings.

## 2.15 ELECTRICAL TAPES

Tapes shall be UL listed for electrical insulation and other purposes in wire and cable splices. Terminations, repairs and miscellaneous purposes, electrical tapes shall comply with UL 510.

## 2.16 CALKING COMPOUND

Compound for sealing of conduit risers shall be of a puttylike consistency workable with hands at temperatures as low as 35 degrees F, shall not slump at a temperature of 300 degrees F, and shall not harden materially when exposed to air. Compound shall readily calk or adhere to clean surfaces of the materials with which it is designed to be used. Compound shall have no injurious effects upon the workmen or upon the materials.

# PART 3 EXECUTION

## 3.1 INSTALLATION

Provide overhead pole line installation conforming to requirements of IEEE C2 for Grade B construction of overhead lines in medium loading districts and NFPA 70 for overhead services. Provide material required to make connections into existing system and perform excavating, backfilling,

and other incidental labor. Consider street, alleys, roads and drives "public." Pole configuration shall be as indicated.

3.1.1 Wood Pole Installation

Provide pole holes at least as large at the top as at the bottom and large enough to provide 4 inch clearance between the pole and side of the hole. Provide a 6 inch band of soil around and down to the base of the pole treated with 2 to 3 gallons of a one percent dursban TC termiticide solution.

3.1.1.1 Setting Depth of Pole

Pole setting depths shall be as follows:

| Length of Pole (feet) | Setting in Soil (feet) | Setting in Solid Rock (feet) |
|---|---|---|
| 20 | 5.0 | 3.0 |
| 25 | 5.5 | 3.5 |
| 30 | 5.5 | 3.5 |
| 35 | 6.0 | 4.0 |
| 40 | 6.0 | 4.0 |
| 45 | 6.5 | 4.5 |
| 50 | 7.0 | 4.5 |
| 55 | 7.5 | 5.0 |
| 60 | 8.0 | 5.0 |

3.1.1.2 Setting in Soil, Sand, and Gravel

"Setting in Soil" depths, as specified in paragraph entitled "Setting Depth of Pole," apply where the following occurs:

a. Where pole holes are in soil, sand, or gravel or any combination of these;

b. Where soil layer over solid rock is more than 2 feet deep;

c. Where hole in solid rock is not substantially vertical; or

d. Where diameter of hole at surface of rock exceeds twice the diameter of pole at same level. At corners, dead ends and other points of extra strain, poles 40 feet or more long shall be set 6 inches deeper.

3.1.1.3 Setting in Solid Rock

"Setting in Solid Rock," as specified in paragraph entitled "Setting Depth of Pole," applies where poles are to be set in solid rock and where hole is substantially vertical, approximately uniform in diameter and large enough to permit use of tamping bars the full depth of hole.

3.1.1.4 Setting With Soil Over Solid Rock

Where a layer of soil 2 feet or less in depth over solid rock exists, depth of hole shall be depth of soil in addition to depth specified under "Setting in Solid Rock" in paragraph entitled "Setting Depth of Pole,"

provided, however, that such depth shall not exceed depth specified under "Setting in Soil."

3.1.1.5 Setting on Sloping Ground

On sloping ground, always measure hole depth from low side of hole.

3.1.1.6 Backfill

Thoroughly tamp pole backfill for full depth of the hole and mound excess fill around the pole.

3.1.1.7 Setting Poles

Set poles so that alternate crossarm gains face in opposite directions, except at terminals and dead ends where gains of last two poles shall be on side facing terminal or dead end. On unusually long spans, set poles so that crossarm comes on side of pole away from long span. Where pole top pins are used, they shall be on opposite side of pole from gain, with flat side against pole.

3.1.1.8 Alignment of Poles

Set poles in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain. Set not less than 2 inches for each 10 feet of pole length above grade, nor more than 4 inches for each 10 feet of pole length after conductors are installed at required tension. When average ground run is level, consecutive poles shall not vary more than 5 feet in height. When ground is uneven, poles differing in length shall be kept to a minimum by locating poles to avoid the highest and lowest ground points. If it becomes necessary to shorten a pole, a piece shall be sawed off the top. Holes shall be dug large enough to permit the proper use of tampers to full depth of hole.

3.1.2 Anchors and Guys

Place anchors in line with strain. The length of the guy lead (distance from base of pole to the top of the anchor rod) shall be as indicated.

3.1.2.1 Setting Anchors

Set anchors in place with anchor rod aligned with, and pointing directly at, guy attachment on the pole with the anchor rod projecting 6 to 9 inches out of ground to prevent burial of rod eye.

3.1.2.2 Screw Anchors

Install screw anchors by torquing with boring machine.

3.1.2.3 Swamp Anchors

Install swamp anchors by torquing with boring machine or wrenches, adding sections of pipe as required until anchor helix is fully engaged in firm soil.

#### 3.1.2.4 Setting Guy Strands

Complete anchor and guy installation, dead end to dead end, and tighten guy before wire stringing and sagging is begun on that line section. Provide strain insulators at a point on guy strand 8 feet minimum from the ground and 6 feet minimum from the surface of pole.

### 3.1.3 Hardware

Provide hardware with washer against wood and with nuts and lock nuts applied wrench tight. Provide locknuts on threaded hardware connections. Locknuts shall be M-F style and not palnut style.

### 3.1.4 Grounding

Unless otherwise indicated, grounding shall conform to IEEE C2. Pole grounding electrodes shall have a resistance to ground not exceeding 25 ohms. When work in addition to that indicated or specified is directed in order to obtain specified ground resistance, provisions of the contract covering changes shall apply.

#### 3.1.4.1 Ground Rod Connections

Make ground rod connections on pole lines by exothermic weld or by using a compression connector for ground wire or wire to rod connections. Make exothermic welds strictly in accordance with manufacturer's written recommendations. Welds which have puffed up or which show convex surfaces indicating improper cleaning, are not acceptable. No mechanical connectors are required at exothermic weldments. Compression connectors shall be type that uses a hydraulic compression tool to provide correct pressure. Provide tools and dies recommended by compression connector manufacturer. An embossing die code or similar method shall provide visible indication that a connector has been fully compressed on ground wire.

#### 3.1.4.2 Grounding and Grounded Connections

a. Where no primary or common neutral exists, surge arresters and frames of equipment operating at over 750 volts shall be bonded together and connected to a dedicated primary grounding electrode.

b. Where no primary or common neutral exists, transformer secondary neutral bushing, secondary neutral conductor, and frames of equipment operating at under 750 volts shall be bonded together and connected to a dedicated secondary grounding electrode.

c. When a primary or common neutral exists, connect all grounding and grounded conductors to a common grounding electrode.

#### 3.1.4.3 Protective Molding

Protect grounding conductors which are run on surface of wood poles by wood molding extending from ground line throughout communication and transformer spaces.

### 3.1.5 CONDUCTOR INSTALLATION

#### 3.1.5.1 Line Conductors

Conductors shall be handled with care necessary to prevent nicking, kinking, gouging, abrasions, sharp bends, cuts, flattening, or otherwise deforming or weakening conductor or any damage to insulation or impairing its conductivity. Remove damaged sections of conductor and splice conductor. Conductors shall be paid out with the free end of conductors fixed and cable reels portable, except where terrain or obstructions make this method unfeasible. Bend radius for any insulated conductor shall not be less than the applicable NEMA specification recommendation. Conductors shall not be drawn over rough or rocky ground, nor around sharp bends.

#### 3.1.5.2 Connectors and Splices

Conductor splices, as installed, shall exceed ultimate rated strength of conductor and shall be of type recommended by conductor manufacturer. No splice shall be permitted within 10 feet of a support. Connectors and splices shall be mechanically and electrically secure under tension and shall be of the nonbolted compression type. The tensile strength of any splice shall be not less than the rated breaking strength of the conductor. Splice materials, sleeves, fittings, and connectors shall be noncorrosive and shall not adversely affect conductors. Aluminum-composition conductors shall be wire brushed and an oxide inhibitor applied before making a compression connection. Connectors which are factory-filled with an inhibitor are acceptable. Inhibitors and compression tools shall be of types recommended by the connector manufacturer. Primary line apparatus taps shall be by means of hot line clamps attached to compression type bail clamps (stirrups). Low-voltage connectors for copper conductors shall be of the solderless pressure type. Noninsulated connectors shall be smoothly taped to provide a waterproof insulation equivalent to the original insulation, when installed on insulated conductors. On overhead connections of aluminum and copper, the aluminum shall be installed above the copper.

#### 3.1.5.3 Conductor-To-Insulator Attachments

Conductors shall be attached to insulators by means of clamps, shoes or tie wires, in accordance with the type of insulator. For insulators requiring conductor tie-wire attachments, tie-wire sizes shall be as indicated in TABLE II.

TABLE II

TIE-WIRE REQUIREMENTS

| CONDUCTOR<br>Copper (AWG) | TIE WIRE<br>Soft-Drawn Copper (AWG) |
|---|---|
| 6 | 8 |
| 4 and 2 | 6 |
| 1 through 3/0 | 4 |
| 4/0 and larger | 2 |
| AAC, AAAC, or ACSR (AWG) | AAAC OR AAC (AWG) |
| Any size | 6 or 4 |

AAC, AAAC, or ACSR (AWG) AAAC OR AAC (AWG)

3.1.5.4 Armor Rods

Armor rods shall be provided for AAC and AAAC. Armor rods shall be installed at supports, except armor rods will not be required at primary dead-end assemblies if aluminum or aluminum-lined zinc-coated steel clamps are used. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. For span lengths of less than 200 feet, flat aluminum armor rods may be used. Flat armor rods, not less than 0.03 by 0.25 inch shall be used on No. 1 AWG AAC and AAAC and smaller conductors and on No. 5 AWG ACSR and smaller conductors. On larger sizes, flat armor rods shall be not less than 0.05 by 0.30 inches. For span lengths of 200 feet or more, preformed round armor rods shall be used.

3.1.5.5 Ties

Provide ties on pin insulators tight against conductor and insulator and ends turned down flat against conductor so that no wire ends project.

3.1.5.6 Reinstalling Conductors

Existing conductors to be reinstalled or resagged shall be strung to "final" sag table values indicated for the particular conductor type and size involved.

3.1.5.7 New Conductor Installation

String new conductors to "initial" sag table values recommended by the manufacturer for conductor type and size of conductor and ruling span indicated.

3.1.5.8 Fittings

Dead end fittings, clamp or compression type, shall conform to written recommendations of conductor manufacturer and shall develop full ultimate strength of conductor.

3.1.5.9 Aluminum Connections

Make aluminum connections to copper or other material using only splices, connectors, lugs, or fittings designed for that specific purpose. Keep a copy of manufacturer's instructions for applying these fittings at job site for use of the inspector.

3.1.6 Risers

Secure galvanized steel conduits on poles by two hole galvanized steel pipe straps spaced as indicated and within 3 feet of any outlet or termination. Ground metallic conduits.

## 3.2 TRANSFORMER INSTALLATION

Transformers shall be carefully installed so as not to scratch finishes or damage bushings. Transformers shall be installed in accordance with the manufacturer's instructions. After installation, surfaces shall be inspected and scratches shall be touched up with a finish provided by the transformer manufacturer for this purpose.

## 3.3 FIELD QUALITY CONTROL

### 3.3.1 General

The Contractor shall notify the Contracting Officer 14 days prior to conducting tests. The Contractor shall furnish materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field reports will be signed and dated by the Contractor.

### 3.3.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

### 3.3.3 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

#### 3.3.3.1 Overhead-Type Distribution Transformers

a. Visual and mechanical inspection

(1) Compare equipment nameplate information with specifications and approved shop drawings.

(2) Inspect physical and mechanical condition.

(3) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method. Thermographic survey is not required.

(4) Perform specific inspections and mechanical tests as recommended by manufacturer.

(5) Verify correct equipment grounding.

b. Electrical tests

(1) Insure that the series-multiple voltage-changing switch is in

the correct position. Transformers are normally shipped in the series position.

(2) Perform insulation-resistance tests.

(3) Perform continuity test.

(4) Set tap changer to provide a secondary voltage of 120/208.

3.3.3.2 Grounding System

a. Visual and mechanical inspection

(1) Inspect ground system for compliance with contract plans and specifications.

b. Electrical tests

(1) Perform ground-impedance measurements utilizing the fall-of-potential method. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.

3.3.4 Devices Subject to Manual Operation

Each device subject to manual operation shall be operated at least three times, demonstrating satisfactory operation each time.

3.3.5 Follow-Up Verification

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and testing.

-- End of Section --

# SECTION 33 82 00

# TELECOMMUNICATIONS OUTSIDE PLANT (OSP)
06/17

## 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 B1 | (2013) Standard Specification for Hard-Drawn Copper Wire |
| ASTM B8 | (2011; R 2017) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft |
| ASTM D1557 | (2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3) |
| ASTM D709 | (2017) Standard Specification for Laminated Thermosetting Materials |

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE 100 | (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms |
| IEEE C2 | (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code |

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

| | |
|---|---|
| ICEA S-87-640 | (2016) Optical Fiber Outside Plant Communications Cable; 4th Edition |
| ICEA S-98-688 | (2012) Broadband Twisted Pair Telecommunication Cable, Aircore, Polyolefin Insulated, Copper Conductors Technical Requirements |
| ICEA S-99-689 | (2012) Broadband Twisted Pair Telecommunication Cable Filled, Polyolefin Insulated, Copper Conductors Technical Requirements |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| ANSI C62.61 | (1993) American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code |

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

| | |
|---|---|
| TIA-455-107 | (1999a) FOTP-107 Determination of Component Reflectance or Link/System Return Loss using a Loss Test Set |
| TIA-455-46A | (1990) FOTP-46 Spectral Attenuation Measurement for Long-Length, Graded-Index Optical Fibers |
| TIA-455-78-B | (2002) FOTP-78 Optical Fibres - Part 1-40: Measurement Methods and Test Procedures - Attenuation |
| TIA-472D000 | (2007b) Fiber Optic Communications Cable for Outside Plant Use |
| TIA-492AAAA | (2009b) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers |
| TIA-492CAAA | (1998; R 2002) Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers |
| TIA-492E000 | (1996; R 2002) Sectional Specification for Class IVd Nonzero-Dispersion Single-Mode Optical Fibers for the 1550 nm Window |
| TIA-526-14 | (2015c) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant |
| TIA-526-7 | (2015a) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant |
| TIA-568-C.1 | (2009; Add 2 2011; Add 1 2012) Commercial Building Telecommunications Cabling Standard |
| TIA-568-C.2 | (2009; Errata 2010; Add 2 2014; Add 1 2016) Balanced Twisted-Pair Telecommunications Cabling and Components Standards |
| TIA-568-C.3 | (2008; Add 1 2011) Optical Fiber Cabling Components Standard |

| | |
|---|---|
| TIA-569 | (2015d) Commercial Building Standard for Telecommunications Pathways and Spaces |
| TIA-590 | (1997a) Standard for Physical Location and Protection of Below Ground Fiber Optic Cable Plant |
| TIA-606 | (2012b; Add 1 2015) Administration Standard for the Telecommunications Infrastructure |
| TIA-607 | (2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises |
| TIA-758 | (2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard |
| TIA/EIA-455 | (1998b) Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components |
| TIA/EIA-455-204 | (2000) Standard for Measurement of Bandwidth on Multimode Fiber |
| TIA/EIA-598 | (2014d) Optical Fiber Cable Color Coding |

U.S. DEPARTMENT OF AGRICULTURE (USDA)

| | |
|---|---|
| RUS 1755 | Telecommunications Standards and Specifications for Materials, Equipment and Construction |
| RUS Bull 1751F-630 | (1996) Design of Aerial Plant |
| RUS Bull 1751F-640 | (1995) Design of Buried Plant, Physical Considerations |
| RUS Bull 1751F-643 | (2002) Underground Plant Design |
| RUS Bull 1751F-815 | (1979) Electrical Protection of Outside Plant |
| RUS Bull 1753F-201 | (1997) Acceptance Tests of Telecommunications Plant (PC-4) |
| RUS Bull 1753F-401 | (1995) Splicing Copper and Fiber Optic Cables (PC-2) |
| RUS Bull 345-50 | (1979) Trunk Carrier Systems (PE-60) |
| RUS Bull 345-65 | (1985) Shield Bonding Connectors (PE-65) |
| RUS Bull 345-72 | (1985) Filled Splice Closures (PE-74) |
| RUS Bull 345-83 | (1979; Rev Oct 1982) Gas Tube Surge Arrestors (PE-80) |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 497 | (2001; Reprint Jul 2013) Protectors for Paired Conductor Communication Circuits |
| UL 510 | (2017) UL Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape |
| UL 83 | (2017) UL Standard for Safety Thermoplastic-Insulated Wires and Cables |

## 1.2 RELATED REQUIREMENTS

Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM, Section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION, apply to this section with additions and modifications specified herein.

## 1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in TIA-568-C.1, TIA-568-C.2, TIA-568-C.3, TIA-569, TIA-606, and IEEE 100 and herein.

### 1.3.1 Campus Distributor (CD)

A distributor from which the campus backbone cabling emanates. (International expression for main cross-connect - (MC).) On Camp Lejeune the main cross-connect is established in Area Distribution Nodes (ADN), network operation centers (NOC), or telephone central office serving predesignated areas of the base. Designers should not design any new main cross-connects without approval from TSD (Telecommunications Support Division aka Base Telephone). The campus backbone is outside plant (OSP) back to TSD and a network operations center.

### 1.3.2 Entrance Facility (EF) (Telecommunications)

An entrance to the building for both private and public network service cables (including antennae, CATV, CCTV, IDS) including the entrance point at the building wall and continuing to the entrance room or space.

### 1.3.3 Entrance Room (ER) (Telecommunications)

A centralized space for telecommunications equipment that serves the occupants of a building. Equipment housed therein is considered distinct from a telecommunications room because of the nature of its complexity but could be combined within the communications room if additional space needed is allotted.

### 1.3.4 Building Distributor (BD)

A distributor in which the building backbone cables terminate and at which connections to the campus backbone cables may be made. (International expression for intermediate cross-connect - (IC).)

### 1.3.5 Pathway

A physical infrastructure utilized for the placement and routing of telecommunications cable.

## 1.4 SYSTEM DESCRIPTION

The telecommunications outside plant consists of cable, conduit, manholes, splices, protection, riser points, load coils, etc. required to provide signal paths from the closest point of presence (demarcation) to the new facility, including free standing frames or backboards, interconnecting hardware, terminating cables, lightning and surge protection modules at one or both ends of the cable, installed from the entrance facility in building to designated demarcation point. The work consists of providing, testing and making operational cabling, interconnecting hardware and lightning and surge protection necessary to form a complete outside plant telecommunications system for continuous use. The telecommunications contractor must coordinate with TSD concerning layout and configuration of the EF telecommunications and OSP. The telecommunications contractor may be required to coordinate work effort for access to the EF telecommunications and OSP with TSD.

## 1.5 SUBMITTALS

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

a. Submittals shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable federal, military, industry, and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified in paragraph "Regulatory Requirements" and as required for certificates in Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES:

b. Commercial off-the-shelf manuals shall be provided for operation, installation, configuration, and maintenance of products provided as a part of the communications outside plant (OSP). Submit operations and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA and as specified herein not later than 2 months prior to the date of beneficial occupancy. In addition to requirements of Data package 5, include the requirements of paragraphs "Telecommunications Outside Plant Shop Drawings" and "Telecommunications Entrance Facility Drawings".

SD-02 Shop Drawings

Telecommunications Outside Plant

Telecommunications Entrance Facility Drawings

In addition to Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES, provide shop drawings in accordance with paragraph SHOP DRAWINGS.

SD-03 Product Data

Wire and cable

Cable splices, and connectors

Closures

Building protector assemblies

Protector modules

Cross-connect terminal cabinets

Spare Parts

Submittals shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Submittals shall also include applicable federal, military, industry, and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified in paragraph REGULATORY REQUIREMENTS and as required for certificates in Section 01 33 00 CONSTRUCTION SUBMITTAL PROCEDURES:

SD-06 Test Reports

Pre-installation tests

Acceptance tests

Outside Plant Test Plan

SD-07 Certificates

Telecommunications Contractor Qualifications

Key Personnel Qualifications

Minimum Manufacturer's Qualifications

SD-08 Manufacturer's Instructions

Building protector assembly installation

Cable tensions

Fiber Optic Splices

Submit instructions prior to installation.

SD-09 Manufacturer's Field Reports

Factory Reel Test Data

SD-10 Operation and Maintenance Data

Telecommunications outside plant (OSP), Data Package 5

Commercial off-the-shelf manuals shall be provided for operation, installation, configuration, and maintenance of products provided as a part of the telecommunications outside plant (OSP). Submit operations and maintenance data in accordance with Section 01 78 23, OPERATION AND MAINTENANCE DATA and as specified herein not later than 2 months prior to the date of beneficial occupancy. In

addition to requirements of Data package 5, include the requirements of paragraphs TELECOMMUNICATIONS OUTSIDE PLANT SHOP DRAWINGS and TELECOMMUNICATIONS ENTRANCE FACILITY DRAWINGS.

SD-11 Closeout Submittals

Record Documentation

In addition to other requirements, provide in accordance with paragraph RECORD DOCUMENTATION.

### 1.5.1 ADDITIONAL SUBMITTAL REQUIREMENTS

All submittals of material, equipment and design must be approved by the TSD Office prior to installing any telecommunications cabling and equipment.

## 1.6 QUALITY ASSURANCE

Ensure compliance with Section 01 45 10 DESIGN AND CONSTRUCTION QUALITY CONTROL.

### 1.6.1 Shop Drawings

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. Submittals shall include the nameplate data, size, and capacity. Submittals shall also include applicable federal, military, industry, and technical society publication references.

#### 1.6.1.1 Telecommunications Outside Plant Shop Drawings

Provide Outside Plant Design in accordance with TIA-758, RUS Bull 1751F-630 for aerial system design, and RUS Bull 1751F-643 for underground duct system design and for direct buried system design. Provide T0 shop drawings that show the physical and logical connections from the perspective of an entire campus, such as actual building locations, exterior pathways and campus backbone cabling on plan view drawings, major system nodes, and related connections on the logical system drawings in accordance with TIA-606. Drawings shall include wiring and schematic diagrams for fiber optic and copper cabling and splices, copper conductor gauge and pair count, load coils, fiber pair count and type, pathway duct and innerduct arrangement, associated construction materials, and any details required to demonstrate that cable system has been coordinated and will properly support the switching and transmission system identified in specification and drawings. Provide Registered Communications Distribution Designer (RCDD) approved drawings of the telecommunications outside plant. Update existing telecommunication Outside Plant T0 drawings to include information modified, deleted or added as a result of this installation in accordance with TIA-606. The telecommunications outside plant (OSP) shop drawings shall be included in the operation and maintenance manuals.

#### 1.6.1.2 Telecommunications Entrance Facility Drawings

Provide T3 drawings for EF Telecommunications in accordance with TIA-606 that include telecommunications entrance facility plan views, pathway layout (cable tray, racks, ladder-racks, etc.), mechanical/electrical layout, and cabinet, rack, backboard and wall elevations. Drawings shall show layout of applicable equipment including incoming cable connector blocks, building protector assembly, outgoing cable connector blocks, patch panels and equipment spaces and cabinet/racks. Drawings shall include a complete list of equipment and material, equipment rack details, proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operation. Drawings may also be an enlargement of a congested area of T1 or T2 drawings. Provide T3 drawings for EF Telecommunications as specified in the paragraph TELECOMMUNICATIONS SPACE DRAWINGS of Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEMS. The telecommunications entrance facility shop drawings shall be included in the operation and maintenance manuals.

### 1.6.2 Telecommunications Qualifications

Work under this section shall be performed by and the equipment shall be provided by the approved telecommunications contractor and key personnel. Qualifications shall be provided for: the telecommunications system contractor, the telecommunications system installer, the supervisor (if different from the installer), and the cable splicing and terminating personnel. A minimum of 30 days prior to installation, submit documentation of the experience of the telecommunications contractor and of the key personnel.

#### 1.6.2.1 Telecommunications Contractor Qualifications

The telecommunications contractor shall be a firm which is regularly and professionally engaged in the business of the applications, installation, and testing of the specified telecommunications systems and equipment. The telecommunications contractor shall demonstrate experience in providing successful telecommunications systems that include outside plant and broadband cabling within the past 3 years. Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for the telecommunications contractor. Each of the key personnel shall demonstrate experience in providing successful telecommunications systems in accordance with TIA-758 within the past 3 years.

#### 1.6.2.2 Key Personnel Qualifications

Provide key personnel who are regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. There may be one key person or more key persons proposed for this solicitation depending upon how many of the key roles each has successfully provided. Each of the key personnel shall demonstrate experience in providing successful telecommunications systems within the past 3 years.

Cable splicing and terminating personnel assigned to the installation of this system or any of its components shall have training in the proper techniques, shall be Building Industry Consulting Services International (BICSI) Certified Cabling Installation Technicians, Installer Level 2, or have a minimum of 3 years current consecutive experience in the

installation of the specified copper and fiber optic cable and components for products used.

Supervisors and installers assigned to the installation of this system or any of its components shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for each of the key personnel. Documentation for each key person shall include at least two successful system installations provided that are equivalent in system size and in construction complexity to the telecommunications system proposed for this solicitation. Include specific experience in installing and testing telecommunications outside plant systems, including broadband cabling, and provide the names and locations of at least two project installations successfully completed using optical fiber and copper telecommunications cabling systems. All of the existing telecommunications system installations offered by the key persons as successful experience shall have been in successful full-time service for at least 18 months prior to the issuance date for this solicitation. Provide the name and role of the key person, the title, location, and completed installation date of the referenced project, the referenced project owner point of contact information including name, organization, title, and telephone number, and generally, the referenced project description including system size and construction complexity.

Indicate that all key persons are currently employed by the telecommunications contractor, or have a commitment to the telecommunications contractor to work on this project. All key persons shall be employed by the telecommunications contractor at the date of issuance of this solicitation, or if not, have a commitment to the telecommunications contractor to work on this project by the date that the bid was due to the Contracting Officer.

Note that only the key personnel approved by the Contracting Officer in the successful proposal shall do work on this solicitation's telecommunications system. Key personnel shall function in the same roles in this contract, as they functioned in the offered successful experience. Any substitutions for the telecommunications contractor's key personnel requires approval from the Contracting Officer.

#### 1.6.2.3 Minimum Manufacturer's Qualifications

Cabling, equipment and hardware manufacturers shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of components which comply with, TIA-568-C.1, TIA-568-C.2 and TIA-568-C.3. In addition, cabling manufacturers shall have a minimum of 3 years experience in the manufacturing and factory testing of cabling which comply with ICEA S-87-640, ICEA S-98-688, and ICEA S-99-689.

### 1.6.3 Outside Plant Test Plan

Prepare and provide a complete and detailed test plan for field tests of the outside plant including a complete list of test equipment for the copper conductor and optical fiber cables, components, and accessories for approval by Telecommunications Support Division (aka Base Telephone) via the Contracting Officer. Include a cut-over plan with procedures and schedules for relocation of facility station numbers without interrupting

service to any active location. Submit the plan at least 30 days prior to tests for Contracting Officer approval. Provide outside plant testing and performance measurement criteria in accordance with TIA-568-C.1 and RUS Bull 1753F-201. Include procedures for certification, validation, and testing that includes fiber optic link performance criteria.

1.6.4 Standard Products

Provide materials and equipment that are standard products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and shall be the manufacturer's latest standard design that has been in satisfactory commercial or industrial use for at least 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. Products supplied shall be specifically designed and manufactured for use with outside plant telecommunications systems. 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 this section. Product submission must be approved for use by TSD via Contracting Officer prior to install.

1.6.4.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is provided.

1.6.4.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.6.5 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the TSD via the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated by references or AHJ. Because references are living documents use of most current version shall be enforced.

1.6.5.1 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.

## 1.7 DELIVERY, STORAGE, AND HANDLING

Ship cable on reels in 5000 feet length with a minimum overage of 10 percent for 25, 50 or 100 pair configuration and 1250 feet length for larger cables. Radius of the reel drum shall not be smaller than the minimum bend radius of the cable. Wind cable on the reel so that unwinding can be done without kinking the cable. Two meters of cable at both ends of the cable shall be accessible for testing. Attach permanent label on each reel showing length, cable identification number, cable size, cable type, and date of manufacture. Provide water resistant label and the indelible writing on the labels. Apply end seals to each end of the cables to prevent moisture from entering the cable. Reels with cable shall be suitable for outside storage conditions when temperature ranges from minus 40 degrees C to plus 65 degrees C, with relative humidity from 0 to 100 percent. Equipment, other than cable, delivered and placed in storage shall be stored with protection from weather, humidity and temperature variation, dirt and dust, or other contaminants in accordance with manufacturer's requirements.

## 1.8 MAINTENANCE

### 1.8.1 Record Documentation

Provide the activity responsible for telecommunications system maintenance and administration (TSD via the Contracting Officer) a single complete and accurate set of record documentation for the entire telecommunications system for each structure with respect to this project.

Provide record documentation as specified in Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM.

Provide T5 drawings including documentation on cables and termination hardware in accordance with TIA-606. T5 drawings shall include schedules to show information for cut-overs and cable plant management, patch panel layouts, cross-connect information and connecting terminal layout as a minimum. T5 drawings shall be provided in both hard copy format and on electronic media using Windows based computer cable management software. A licensed copy of the cable management software including documentation, shall be provided. Update existing record documentation to reflect campus distribution T0 drawings and T3 drawing schedule information modified, deleted or added as a result of this installation. Provide the following T5 drawing documentation as a minimum:

a. Cables - A record of installed cable shall be provided in accordance with TIA-606. The cable records shall include the required data fields for each cable and complete end-to-end circuit report for each complete circuit from the assigned outlet to the entry facility for the soft copy in accordance with TIA-606. Include manufacture date of cable with submittal.

b. Termination Hardware - Provide a record of installed patch panels, cross-connect points, campus distributor and terminating block arrangements and type in accordance with TIA-606. Documentation shall include the required data fields as a minimum in accordance with TIA-606.

Provide record documentation as specified in Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM.

### 1.8.2 Spare Parts

In addition to the requirements of Section 01 78 23 OPERATION AND MAINTENANCE DATA, provide a complete list of parts and supplies, with current unit prices and source of supply, and a list of spare parts recommended for stocking. Spare parts shall be provided no later than the start of field testing.

## 1.9 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

# PART 2 PRODUCTS

## 2.1 MATERIALS AND EQUIPMENT

Products supplied shall be specifically designed and manufactured for use with outside plant telecommunications systems. All product data must be supplied in the submittal process and no product can be used without approval from TSD via the Contracting Officer.

## 2.2 TELECOMMUNICATIONS ENTRANCE FACILITY

### 2.2.1 Building Protector Assemblies

Building protector assembly (BEP) shall be self-contained and have interconnecting hardware (710 input and 66 output) for connection to all Outside Plant rated cabling at full capacity. Provide and follow manufacturers instructions for building protector assembly installation. If Multiple BEPs are used, arrange and connect with lowest count high and to left and highest to bottom right. Provide copper cable interconnecting hardware as specified in Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM. There will be no service loops or splicing of copper cable outside of the building protector assembly within the telecommunications room (pigtail BEPs are not authorized).

### 2.2.2 Protector Modules

Provide in accordance with UL 497 three-electrode gas tube type, 5 pin, rated for the application. Provide gas tube protection modules in accordance with RUS Bull 345-83 and shall be heavy duty, A>10kA, B>400, C>65A where A is the maximum single impulse discharge current, B is the impulse life and C is the AC discharge current in accordance with ANSI C62.61. The gas modules shall shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils in accordance with UL 497. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly. Recommend 4B1E type.

### 2.2.3 Fiber Optic Terminations

Provide fiber optic cable terminations as specified in 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM. Ensure terminations within the Fiber Distribution Center (FDC) are logical left to right and top to bottom (OSP SM/Backbone SM then MM/Row to Row SM then MM).

### 2.2.4 Pathways

Underground applications for single buildings: provide a minimum of (3) four inch ducts (copper, fiber, maintenance duct... in that order), one of which (fiber)contains (2)- three cell fabric inner duct. The (3) four inch ducts shall enter the Main Communications Room (entrance facility) to the far left of the communications backboard (longest farthest wall from the door) and shall be 3-6 inches above floor and 3-6 inches away from wall, aligned parallel to the communications backboard wall. The underground ducts must have 3" concrete encasing, with 24 inches minimum backfill below grade from the Communications Entrance Facility to the maintenance hole that will be providing service to the building (Demarcation point).

For campus distribution between maintenance holes, ducts may need to be 5" to support larger cables, also there will be no less than 4, and up to xx ducts as needed for distribution to the area serviced. All new ducts will include bell ends and terminators flush with MH walls sealed water tight. Both ends of new duct shall be plugged with compression plugs or duct seal around cables (no expanding foam). All new pathway shall be visibly marked and provided on area map with GPS coordinates. All ducts shall be installed as straight through runs between holes and shall not cross each other allowing a straight pull through. All duct banks where fiber cables are installed shall include fabric innerduct to maximize the pathway.

For direct buried applications (only in remote areas where there is no manhole duct systems and none is in project contract), provide a minimum of three (3) four inch ducts from the Communications Entrance Facility to outside the bldg foot print past any obstructions, footers, or sidewalks by at least 5 feet into clear soil/entryway, 24 inches below grade. The ducts will be plugged at both ends and clearly marked on outside end. For distribution to demarcation, between handholes, and riser points cables need to be 36" below grade with metal locating tape at 24" below grade. Cables need to be in HDDPE direct bored, HDDPE direct buried, concrete encased in conduit, or concrete encased split duct under all roadways and pavement. All new cables need to be provided on area map with GPS coordinates for riser points or hand holes. Handholes and maintenance holes shall be traffic rated (MIN tier 22). Handhole size min 4'x4'x4'. Maintenance hole size 6'x7'x8'and all penetrations should be splayed.

If utility pathway conflicts necessitate placement of a manhole below the typical/normal depth (6-12 inches), the roof of the manhole shall be placed at normal depth and riser extensions shall be used to increase the depth of the manhole. If a deep collar is unavoidable and the depth of the collar will exceed 24 inches, the Designer shall obtain written permission from TSD (Base Telephone) and ensure that the collar is equipped with permanent galvanized steps (rungs). Also do not drill hole in bottom of maintenance/handhole for grounding rod, use grounding ribbon built into the concrete structure itself that is in full contact with the ground.

## 2.3 CLOSURES

### 2.3.1 Copper Conductor Closures

#### 2.3.1.1 Aerial Cable Closures

Provide cable closure assembly consisting of a frame with clamps, a lift-off polyethylene cover, cable nozzles, and drop wire rings. Closure

shall be suitable for use on Figure 8 cables. Closures shall be free breathing and suitable for housing either straight-through type or branch type splices of non-pressurized communications cables and shall be sized as indicated. The closure shall be constructed with ultraviolet resistant PVC.

**NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.**

2.3.1.2 Underground Cable Closures

a. Aboveground: Provide aboveground closures constructed of not less than 14 gauge steel and acceptable for pole or stake mounting in accordance with RUS 1755.910. Closures shall be sized and contain a marker as indicated. Covers shall be secured to prevent unauthorized entry. PVC type closures are to be used in beach areas. All pedestals shall contain a minimum 4 foot x 3/8 inch pigtailed ground rod.

b. Direct burial: Provide buried closure suitable for enclosing a straight, butt, and branch splice in a container into which can be poured an encapsulating compound. Closure shall have adequate strength to protect the splice and maintain cable shield electrical continuity in the buried environment. Encapsulating compound shall be reenterable and shall not alter the chemical stability of the closure. Provide filled splice cases in accordance with RUS Bull 345-72.

**NOTE: The installation of a direct buried closure aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized; all closures shall be in a riser point, handhole, or manhole.**

c. In vault or manhole: Provide underground closure suitable to house a straight, butt, and branch splice in a protective housing into which air can be pumped for flash testing. Closure shall be of suitable thermoplastic or stainless steel material supplying structural strength necessary to pass the mechanical and electrical requirements in a vault or manhole environment. Heat shrinkable type closures shall not be used. Provide filled splice cases in accordance with RUS Bull 345-72.

2.3.2 Fiber Optic Closures

2.3.2.1 Aerial

Provide aerial closure that is free breathing and suitable for housing splice organizer of non-pressurized cables. Closure shall be constructed from heavy PVC with ultraviolet resistance.

**NOTE: The installation of new aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.**

2.3.2.2 Direct Burial

Provide buried closure suitable to house splice organizer in protective housing into which can be poured an encapsulating compound. Closure shall have adequate strength to protect the splice and maintain cable shield electrical continuity, when metallic, in buried environment. Encapsulating compound shall be reenterable and shall not alter chemical

stability of the closure.

**NOTE: The installation of a direct buried closure aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized; all closures shall be in a riser point, handhold, or manhole.**

2.3.2.3 In Vault or Manhole

Provide underground closure suitable to house splice organizer in a protective housing into which air can be pumped for flash testing. Closure shall be of thermoplastic material supplying structural strength necessary to pass the mechanical and electrical requirements in a vault or manhole environment. Provide 60' slack coils on fiber in every 3rd manhole/handhole or in any which a turn is made.

2.4 PAD MOUNTED CROSS-CONNECT TERMINAL CABINETS

Provide in accordance with RUS 1755.910 and the following:

a. Constructed of 14 gauge steel.

b. Equipped with a double set of hinged doors with closed-cell foam weatherstripping. Doors shall be locked and contain a marker as indicated.

c. Equipped with spool spindle bracket, mounting frames, binding post log, jumpering instruction label, and load coil mounting provisions.

d. Complete with cross connect modules to terminate number of pairs as indicated.

e. Sized as indicated.

2.5 CABLE SPLICES, AND CONNECTORS

2.5.1 Copper Cable Splices

In vaults or manholes or entrance protectors provide multi-pair, in-line fold back to maximize length of accessible conductors for maintenance or single pair, in-line splices of a moisture resistant, three-wire insulation displacement connector held rigidly in place to assure maximum continuity in accordance with RUS Bull 1753F-401. Cables greater than 25 pairs shall be spliced using multipair splicing connectors, which accommodate 25 pairs of conductors at a time (typical 710). Provide correct connector size to accommodate the cable gauge of the supplied cable. Provide enough cable slack suitable for splicing operations to maximize length of accessible conductors for maintenance operations. In above ground splices use three wire insulation displacement single pair connectors no matter what size the cable. In longer runs of copper provide proper load coils to balance the load as needed to ensure line quality in accordance with RUS Bull 1753F-201.

2.5.2 Copper Cable Splice Connector

Provide splice connectors with a polycarbonate body and cap and a tin-plated brass contact element. Connector shall accommodate 19 to 26 AWG solid wire with a maximum insulation diameter of 0.065 inch and shall only be installed with manufacturer recommended crimp/cut tool. Fill connector with sealant grease to make a moisture resistant connection, in

accordance with RUS Bull 1753F-401.

2.5.3 Fiber Optic Cable Splices

Provide fiber optic cable splices and splicing materials for fusion methods at locations shown on the construction drawings. The splice insertion loss shall be 0.3 dB maximum when measured in accordance with TIA-455-78-B using an Optical Time Domain Reflectometer (OTDR). Splices shall be designed for a return loss of 40.0 db max for single mode fiber when tested in accordance with TIA-455-107. Physically protect each fiber optic splice by a splice kit specially designed for the splice. Provide enough cable slack suitable for splicing operations, but in no case less than 30 feet at each end.

2.5.4 Fiber Optic Splice Organizer

Provide splice organizer suitable for housing fiber optic splices in a neat and orderly logical fashion. Splice organizer shall allow for a minimum of 3 feet of fiber for each fiber within the cable to be neatly stored without kinks or twists. Splice organizer shall accommodate individual strain relief for each splice and allow for future maintenance or modification, without damage to the cable or splices. Provide splice organizer hardware, such as splice trays, protective glass shelves, and shield bond connectors in a splice organizer kit.

2.5.5 Shield Connectors

Provide connectors with a stable, low-impedance electrical connection between the cable shield and the bonding conductor in accordance with RUS Bull 345-65.

2.6 CONDUIT

Provide conduit as specified in Section 33 71 01 OVERHEAD ELECTRICAL DISTRIBUTION.

2.7 PLASTIC INSULATING TAPE

Tape shall be premium quality, heavy-duty, weather-resistant designed for use on electrical and telecommunications applications and UL 510 compliant.

2.8 WIRE AND CABLE

2.8.1 Copper Conductor Cable

Solid copper conductors, covered with an extruded solid insulating compound. Insulated conductors shall be twisted into pairs which are then stranded or oscillated to form a cylindrical core. For special high frequency applications, the cable core shall be separated into compartments. Cable shall be completed by the application of a suitable core wrapping material, a corrugated copper or plastic coated aluminum shield, and an overall extruded jacket. Telecommunications contractor shall verify distances between splice points, slack required, and pair count required prior to ordering cable. Gauge of conductor shall be determined by the distance from the central office. In all cases the installed cable shall be of the same gauge as the cable it is being spliced into at the Demarcation point. The cable range available is; numbers of pairs specified; 19 gauge (6 to 400 pairs), 22 gauge (6 to 1200 pairs), 24 gauge (6 to 2100 pairs), and 26 gauge (6 to 3000 pairs). **26**

**AWG is not used on Camp Lejeune** Copper conductors shall conform to the following: All outside plant copper conductor cable available in PE-39 type shall be used; PE-89 is only approved for large pair counts when PE-39 is not manufactured due to large count.

2.8.1.1 Underground

Provide filled cable (type PE-39/89) meeting the requirements of ICEA S-99-689, RUS 1755.390, and RUS 1755.890. Provide enough cable slack suitable for splicing operations, but in no case less than 10 feet.

2.8.1.2 Aerial

Provide filled cable meeting the requirements of ICEA S-99-689, ICEA S-98-688, and RUS 1755.390 except that it shall be suitable for aerial installation and shall be Figure 8 distribution wire with 6,000 pound Class A galvanized steel or 6,000 pound aluminum-clad steel strand.

2.8.1.3 Screen

Provide screen-compartmental core cable filled cable meeting the requirements of ICEA S-99-689 and RUS 1755.390.

2.8.2 Fiber Optic Cable

Provide single-mode, 8/125-um, 0.10 aperture 1310 nm fiber optic cable in accordance with TIA-492CAAA, and single-mode, 8/125-um, 0.10 aperture 1550 nm fiber optic cable in accordance with TIA-492E000 and multimode 62.5/125-um, 0.275 aperture fiber optic cable in accordance with TIA-492AAAA, TIA-472D000, and ICEA S-87-640 including any special requirements made necessary by a specialized design. Provide a minimum of 24 optical fibers or more as indicated by drawings but never less without a waiver from local authority having jurisdiction. Fiber optic cable shall be specifically designed for outside use with preferred double jacket (if buried), single armor, loose buffer construction, and must be shielded. Provide fiber optic color code in accordance with TIA/EIA-598. Provide minimum 60' slack coil in every 3rd MH or any one where a turn is made.

**NOTE: The installation of Multi-mode OSP Fiber Optic cables aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized; except as Backbone Underground Cabling between Communications Rooms within the same building, which is allowed, but not recommended.**

2.8.2.1 Strength Members

Provide central/non-central, non-metallic/metallic strength members with sufficient tensile strength for installation and residual rated loads to meet the applicable performance requirements in accordance with ICEA S-87-640. The strength member is included to serve as a cable core foundation to reduce strain on the fibers, and shall not serve as a pulling strength member.

2.8.2.2 Shielding or Other Metallic Covering

Provide continuous, conductive or locatable, single tape covering and shield in accordance with ICEA S-87-640 on all cables.

#### 2.8.2.3 Performance Requirements

Provide fiber optic cable with optical and mechanical performance requirements in accordance with ICEA S-87-640.

### 2.8.3 Grounding and Bonding Conductors

Provide grounding and bonding conductors in accordance with RUS 1755.200, TIA-607, IEEE C2, and NFPA 70. Solid bare copper wire meeting the requirements of ASTM B1 for sizes No. 8 AWG and smaller and stranded bare copper wire meeting the requirements of ASTM B8, for sizes No. 6 AWG and larger. Conductors should be installed so as not to exceed minimum bend radius and shall be attached to most suitable bond available at location. Do not install field modified ground rods in maintenance holes that already have factory grounding. Insulated conductors shall have 600-volt, Type TW insulation meeting the requirements of UL 83.

## 2.9 T-SPAN LINE TREATMENT REPEATERS

Provide as indicated. Repeaters shall be pedestal mounted with pressurized housings, sized as indicated and shall meet the requirements of RUS Bull 345-50.

## 2.10 POLES AND HARDWARE

Provide poles and hardware as specified in Section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION.

## 2.11 CABLE TAGS IN MANHOLES, HANDHOLES, AND VAULTS

Provide tags for each telecommunications cable or wire located in manholes, handholes, and vaults. Cable tags shall be stainless steel or polyethylene and labeled in accordance with TIA-606. Coordinate actual cable tag information with TSD. Handwritten labeling is unacceptable.

### 2.11.1 Stainless Steel

Provide stainless steel, cable tags 1 5/8 inches in diameter 1/16 inch thick minimum, and circular in shape. Tags shall be die stamped with numbers, letters, and symbols not less than 0.25 inch high and approximately 0.015 inch deep in normal block style.

### 2.11.2 Polyethylene Cable Tags

Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are 0.08 inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees F. Provide 0.05 inch (minimum) thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags orientation.

## 2.12 BURIED WARNING AND IDENTIFICATION TAPE

Provide fiber optic media marking and protection in accordance with TIA-590. Provide color, type and depth of tape as specified in PART 4 of the RFP.

## 2.13 GROUNDING BRAID

Provide grounding braid that provides low electrical impedance connections for dependable shield bonding in accordance with RUS 1755.200. Braid shall be made from flat tin-plated copper properly attached to factory ground in maintenance/handhole, TMGB, building steel, electrical bus, or approved grounding rods in riser points.

## 2.14 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

## 2.15 FIELD FABRICATED NAMEPLATES

Provide laminated plastic nameplates in accordance with ASTM D709 for each patch panel, protector assembly, rack, cabinet and other equipment or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

## 2.16 TESTS, INSPECTIONS, AND VERIFICATIONS

### 2.16.1 Factory Reel Test Data

Test 100 percent OTDR test of FO media at the factory in accordance with TIA-568-C.1 and TIA-568-C.3. Use TIA-526-7 for single mode fiber and TIA-526-14 Method B for multi mode fiber measurements. Calibrate OTDR to show anomalies of 0.2 dB minimum. Enhanced performance filled OSP copper cables, referred to as Broadband Outside Plant (BBOSP), shall meet the requirements of ICEA S-99-689. Enhanced performance air core OSP copper cables shall meet the requirements of ICEA S-98-688. Submit test reports, including manufacture date for each cable reel and receive approval before delivery of cable to the project site.

# PART 3 EXECUTION

## 3.1 INSTALLATION

Install all system components and appurtenances in accordance with manufacturer's instructions, IEEE C2, NFPA 70, and as indicated. Provide all necessary interconnections, services, and adjustments required for a complete and operable telecommunications system from designated demarcation point to building entrance facility, to include lightning protection terminations at one or both ends of the cable as required per paragraph: SYSTEM DESCRIPTION.

### 3.1.1 Contractor Damage

Promptly repair indicated utility lines or systems damaged during site preparation and construction. Damages to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the Contract Clauses. When Contractor is advised in

writing of the location of a nonindicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In every event, immediately notify Base Telephone via the Contracting Officer of damage.

### 3.1.2 Cable Inspection and Repair

Handle cable and wire provided in the construction of this project with care. Inspect cable reels for cuts, nicks or other damage. Damaged cable shall be replaced or repaired to the satisfaction of the Contracting Officer. Reel wraps shall remain intact on the reel until the cable is ready for placement.

### 3.1.3 Direct Burial System

Installation shall be in accordance with RUS Bull 1751F-640. Under railroad tracks, paved areas, and roadways install cable in conduit encased in concrete. Slope ducts to drain. Excavate trenches by hand or mechanical trenching equipment after proper locates and pothole methods are used. Provide a minimum cable cover of 36 inches below finished grade for both fiber and copper cable. Trenches shall be not less than 6 inches wide and in straight lines between cable markers. Do not use cable plows. Bends in trenches shall have a radius of not less than 36 inches. Where two or more cables are laid parallel in the same trench, space laterally at least 3 inches apart. When rock is encountered, remove it to a depth of at least 3 inches below the cable and fill the space with sand or clean earth free from particles larger than 1/4 inch. Do not unreel and pull cables into the trench from one end. Cable may be unreeled on grade and lifted into position. Provide color, type and depth of warning tape as specified in paragraph BURIED WARNING AND IDENTIFICATION TAPE in PART 4 of the RFP. Fiber optic cable will not be direct buried, it will be installed in a smooth wall HDPE type duct.

#### 3.1.3.1 Cable Placement

a. Prior to design and installation of any copper or optical fiber cable systems, cable routes and pathways must be approved by the Base Telephone via Contracting Officer. Manhole layouts (butterflies) shall be provided for review and approval. Cable route shall include which conduits are to be used for which cables using a logical bottom up and straight run approach.

b. Separate cables crossing other cables or metal piping from the other cables or pipe by not less than 3 inches of well tamped earth. Do not install circuits for communications under or above traffic signal loops.

c. Cables shall be in one piece without splices between connections except where the distance exceeds the lengths in which the cable is furnished.

d. Avoid bends in cables of small radii and twists that might cause damage. Do not bend cable and wire in a radius less than 10 times the outside diameter of the cable or wire.

e. Leave a horizontal slack of approximately 10 feet in the ground on each end of cable runs, on each side of connection boxes, and at points where connections are brought aboveground. Where cable is brought aboveground, leave additional slack to make necessary

connections. (For fiber, provide a minimum of 30 feet at each end.)

3.1.3.2 Identification Slabs (Markers)

Provide a marker at each change of direction of the cable, over the ends of ducts or conduits which are installed under paved areas and roadways and over each splice. Identification markers shall be of concrete, approximately 20 inches square by 6 inches thick.

3.1.3.3 Backfill for Rocky Soil

When placing cable in a trench in rocky soil, the cable shall be cushioned by a fill of sand or selected soil at least 2 inches thick on the floor of the trench before placing the cable or wire. The backfill for at least 4 inches above the wire or cable shall be free from stones, rocks, or other hard or sharp materials which might damage the cable or wire. If the buried cable is placed less than 24 inches in depth, a protective cover of concrete shall be used.

3.1.4 Cable Protection

Provide direct burial cable protection in accordance with NFPA 70 and as specified in Section 33 71 01 OVERHEAD ELECTRICAL DISTRIBUTION. Galvanized conduits which penetrate concrete (slabs, pavement, and walls) shall be PVC coated and shall extend from the first coupling or fitting outside either side of the concrete minimum of 6 inches per 12 inches burial depth beyond the edge of the surface where cable protection is required; all conduits shall be sealed on each end. Where additional protection is required, cable may be placed in galvanized iron pipe (GIP) sized on a maximum fill of 40 percent of cross-sectional area, or in concrete encased 4 inches PVC pipe. Conduit may be installed by jacking or trenching. Trenches shall be backfilled with earth and mechanically tamped at 6 inches lift so that the earth is restored to the same density, grade and vegetation as adjacent undisturbed material.

3.1.4.1 Cable End Caps

Cable ends shall be sealed at all times with coated heat shrinkable end caps. Cables ends shall be sealed when the cable is delivered to the job site, while the cable is stored and during installation of the cable. The caps shall remain in place until the cable is spliced or terminated. Sealing compounds and tape are not acceptable substitutes for heat shrinkable end caps. Cable which is not sealed in the specified manner at all times will be rejected.

3.1.5 Underground Duct

Provide underground duct and connections (terminators and bell ends) to existing manholes or handholes with any additional requirements as specified herein. Minimum size of ducts shall be 4 inch and minimum number will be three (3) into any building.

3.1.6 Penetrations

Caulk and seal cable access penetrations in walls, ceilings and other parts of the building. Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings in accordance with PART 4 of the RFP.

### 3.1.7 Cable Pulling

Test duct lines with a mandrel (SHALL BE WITNESSED BY GOVERNMENT) and swab out to remove foreign material before the pulling of cables. Avoid damage to cables in setting up pulling apparatus or in placing tools or hardware. Do not step on cables when entering or leaving the manhole. Do not place cables in ducts other than those shown without prior written approval of Base Telephone via the Contracting Officer. Roll cable reels in the direction indicated by the arrows painted on the reel flanges. Set up cable reels on the same side of the manhole as the conduit section in which the cable is to be placed. Level the reel and bring into proper alignment with the conduit section so that the cable pays off from the top of the reel in a long smooth bend into the duct without twisting. Under no circumstances shall the cable be paid off from the bottom of a reel. Check the equipment set up prior to beginning the cable pulling to avoid an interruption once pulling has started. Use a cable feeder guide of suitable dimensions between cable reel and face of duct to protect cable and guide cable into the duct as it is paid off the reel. As cable is paid off the reel, lubricate and inspect cable for sheath defects. When defects are noticed, stop pulling operations and notify the Contracting Officer to determine required corrective action. Cable pulling shall also be stopped when reel binds or does not pay off freely. Rectify cause of binding before resuming pulling operations. Provide cable lubricants recommended by the cable manufacturer. Avoid bends in cables of small radii and twists that might cause damage. Do not bend cable and wire in a radius less than 10 times the outside diameter of the cable or wire.

#### 3.1.7.1 Cable Tensions

Obtain from the cable manufacturer and provide to the Contracting Officer, the maximum allowable pulling tension. This tension shall not be exceeded.

#### 3.1.7.2 Pulling Eyes

Equip cables 1.25 inches in diameter and larger with cable manufacturer's factory installed pulling-in eyes. Provide cables with diameter smaller than 1.25 inches with heat shrinkable type end caps or seals on cable ends when using cable pulling grips. Rings to prevent grip from slipping shall not be beaten into the cable sheath. Use a swivel of 3/4 inch links between pulling-in eyes or grips and pulling strand.

#### 3.1.7.3 Installation of Cables in Manholes, Handholes, and Vaults

Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Do not install slack coils in copper unless approved or requested by AHJ. Fiber slack coils should be min 60' in every 3rd MH or any MH where a turn is made. Form cables to closely parallel walls, not to interfere with duct entrances, and support cables on brackets and cable insulators at a maximum of 4 feet. Install cable or cables in corresponding ducts entering and exiting the manholes in straight lines, do not cross ducts or manhole. In existing manholes, handholes, and vaults where new ducts are to be terminated, or where new cables are to be installed, modify the existing installation of cables, cable supports, and grounding as required with cables arranged and supported as specified for new cables. Identify each cable with corrosion-resistant embossed metal tags. All fiber optic cables will be installed in fabric innerduct measuring min 1 inch (or larger) with min of three cells (but should maximize pathways).

### 3.1.8 Aerial Cable Installation

Pole installation shall be as specified in Section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION. Where physical obstructions make it necessary to pull distribution wire along the line from a stationary reel, use cable stringing blocks to support wire during placing and tensioning operations. Do not place ladders, cable coils, and other equipment on or against the distribution wire. Wire shall be sagged in accordance with the data shown. Protect cable installed outside of building less than 8 feet above finished grade against physical damage.

**NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.**

#### 3.1.8.1 Figure 8 Distribution Wire

Perform spiraling of the wire within 24 hours of the tensioning operation. Perform spiraling operations at alternate poles with the approximate length of the spiral being 15 feet. Do not remove insulation from support members except at bonding and grounding points and at points where ends of support members are terminated in splicing and dead-end devices. Ground support wire at poles to the pole ground.

#### 3.1.8.2 Suspension Strand

Place suspension strand as indicated. Tension in accordance with the data indicated. When tensioning strand, loosen cable suspension clamps enough to allow free movement of the strand. Place suspension strand on the road side of the pole line. In tangent construction, point the lip of the suspension strand clamp toward the pole. At angles in the line, point the suspension strand clamp lip away from the load. In level construction place the suspension strand clamp in such a manner that it will hold the strand below the through-bolt. At points where there is an up-pull on the strand, place clamp so that it will support strand above the through-bolt. Make suspension strand electrically continuous throughout its entire length, bond to other bare cables suspension strands and connect to pole ground at each pole.

#### 3.1.8.3 Aerial Cable

Keep cable ends sealed at all times using cable end caps. Take cable from reel only as it is placed. During placing operations, do not bend cables in a radius less than 10 times the outside diameter of cable. Place temporary supports sufficiently close together and properly tension the cable where necessary to prevent excessive bending. In those instances where spiraling of cabling is involved, accomplish mounting of enclosures for purposes of loading, splicing, and distribution after the spiraling operation has been completed.

**NOTE: The installation of aerial cabling aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.**

### 3.1.9 Cable Splicing

#### 3.1.9.1 Copper Conductor Splices

Perform splicing in accordance with manufacturer, best known practices, and requirements of RUS Bull 1753F-401 except that direct buried splices and twisted and soldered splices are not allowed. Exception does not apply

for pairs assigned for carrier application.

3.1.9.2 Fiber Optic Splices

Fiber optic splicing shall be in accordance with manufacturer's recommendation and shall exhibit an insertion loss not greater than 0.2 dB for fusion splices.

**NOTE: The installation of Mechanical Fiber Optic Splices aboard Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River is not authorized.**

3.1.10 Surge Protection

All cables and conductors, except fiber optic cable, which serve as communication lines through off-premise lines, shall have surge protection (710 input/66 output) installed at each end which meet the requirements of RUS Bull 1751F-815.

3.1.11 Grounding

Provide grounding and bonding in accordance with RUS 1755.200, TIA-607, IEEE C2, and NFPA 70. Ground exposed noncurrent carrying metallic parts of telephone equipment, cable sheaths, cable splices, and terminals.

3.1.11.1 Telecommunications Master Ground Bar (TMGB)

The TMGB is the hub of the basic telecommunications grounding system providing a common point of connection for ground from outside cable, CD, and equipment. Establish a TMGB for connection point for cable stub shields to connector blocks and CD protector assemblies as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. The TMGB will at a minimum be 4 inches by 10 inches by 1/4 inch as shown in TIA-607.

3.1.11.2 Incoming Cable Shields

Shields shall not be bonded across the splice to the cable stubs at the main distribution frame. Ground shields of incoming cables in the EF Telecommunications to the TMGB.

3.1.11.3 Campus Distributor Grounding

a. Protection assemblies: Mount CD protector assemblies directly on the telecommunications backboard. Connect assemblies mounted on each vertical frame with No. 6 AWG copper conductor to provide a low resistance path to TMGB.

b. TMGB connection: Connect TMGB to TGB with copper conductor with a total resistance of less than 0.01 ohms.

3.1.12 Cut-Over

All necessary transfers and cut-overs, shall be accomplished by the telecommunications contractor except government owned cables with active service which must be done by TSD.

## 3.2 LABELING

### 3.2.1 Labels

Provide labeling for new cabling and termination hardware located within the facility in accordance with TIA-606. Handwritten labeling is unacceptable. Stenciled lettering for cable and termination hardware shall be provided using either thermal ink transfer process or laser printer. Actual information on labels shall be obtained from TSD via contracting office.

### 3.2.2 Cable Tag Installation

Install cable tags for each telecommunications cable or wire located in manholes, handholes, and vaults including each splice. Tag new wire and cable provided under this contract and existing wire and cable which are indicated to have splices and terminations provided by this contract. The labeling of telecommunications cable tag identifiers shall be in accordance with TIA-606. Tag legend shall be as indicated. Do not provide handwritten letters. Install cable tags so that they are clearly visible without disturbing any cabling or wiring in the manholes, handholes, and vaults.

### 3.2.3 Termination Hardware

Label patch panels, distribution panels, connector blocks and protection modules using color coded labels with identifiers in accordance with TIA-606.

## 3.3 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

## 3.4 FIELD QUALITY CONTROL

Provide the Contracting Officer 10 working days notice prior to each test. Provide labor, equipment, and incidentals required for testing. Correct defective material and workmanship disclosed as the results of the tests. Furnish a signed copy of the test results to the Contracting Officer within 3 working days after the tests for each segment of construction are completed. Perform testing as construction progresses and do not wait until all construction is complete before starting field tests.

### 3.4.1 Pre-Installation Tests

Perform the following tests on cable at the job site before it is removed from the cable reel. For cables with factory installed pulling eyes, these tests shall be performed at the factory and certified test results shall accompany the cable.

#### 3.4.1.1 Cable Capacitance

Perform capacitance tests on all pairs within a cable to determine if cable capacitance is within the limits specified.

#### 3.4.1.2 Loop Resistance

Perform DC-loop resistance on all of the pairs within a cable to determine if DC-loop resistance is within the manufacturer's calculated resistance.

#### 3.4.1.3 Pre-Installation Test Results

Provide results of pre-installation tests to the Contracting Officer at least 5 working days before installation is to start. Results shall indicate reel number of the cable, manufacturer, size of cable, pairs tested, and recorded readings. When pre-installation tests indicate that cable does not meet specifications, remove cable from the job site.

### 3.4.2 Acceptance Tests

Perform acceptance testing in accordance with RUS Bull 1753F-201 and as further specified in this section. Provide personnel, equipment, instrumentation, and supplies necessary to perform required testing. Notification of any planned testing shall be given to the Contracting Officer at least 14 days prior to any test unless specified otherwise. Testing shall not proceed until after the Contractor has received written Contracting Officer's approval of the test plans as specified. Test plans shall define the tests required to ensure that the system meets technical, operational, and performance specifications. The test plans shall define milestones for the tests, equipment, personnel, facilities, and supplies required. The test plans shall identify the capabilities and functions to be tested. Provide test reports to TSD via Contracting officer in soft and hard copy in .pdf or .xls form showing all field tests performed, upon completion and testing of the installed system. Measurements shall be tabulated on a pair by pair or strand by strand basis. Blank forms can be provided from Base Telephone upon request.

#### 3.4.2.1 Copper Conductor Cable

Perform the following acceptance tests in accordance with TIA-758:

a. Wire map (pin to pin continuity)

b. Continuity to remote end

c. Crossed pairs

d. Reversed pairs

e. Split pairs

f. Shorts between two or more conductors

g. Grounded pairs.

#### 3.4.2.2 Fiber Optic Cable

Test fiber optic cable in accordance with TIA/EIA-455 and as further specified in this section. Two optical tests shall be performed on all optical fibers: Optical Time Domain Reflectometry (OTDR) Test, and Attenuation Test. These tests shall be performed on the completed end-to-end spans which include the near-end pre-connectorized single fiber cable assembly, outside plant as specified, outside plant field un-terminated at demarcation point, and the far-end pre-connectorized

single fiber cable assembly.

a. OTDR Test: The OTDR test shall be used to determine the adequacy of the cable installations by showing any irregularities, such as discontinuities, micro-bendings or improper splices for the cable span under test. Hard copy fiber signature records shall be obtained from the OTDR for each fiber in each span and shall be included in the test results. The OTDR test shall be measured in both directions. A reference length of fiber, 1000 feet minimum, used as the delay line shall be placed before the new end connector and after the far end patch panel connectors for inspection of connector signature. Conduct OTDR test and provide calculation or interpretation of results in accordance with TIA-526-7 for single-mode fiber and TIA-526-14 for multimode fiber. Splice losses shall not exceed 0.2 db.

b. Attenuation Test: End-to-end attenuation measurements shall be made on all fibers, in both directions, using a 850 & 1300 for 62.5 multi-mode fiber and 1310 & 1550 for single mode nanometer light source at one end and the optical power meter on the other end to verify that the cable system attenuation requirements are met in accordance with TIA-455-46A for multimode and TIA-526-7 for single-mode fiber optic cables. The measurement method shall be in accordance with TIA-455-78-B. Attenuation losses shall not exceed 0.5 db/km at 1310 nm and 1550 nm for single-mode fiber. Attenuation losses shall not exceed 5.0 db/km at 850 nm and 1.5 db/km at 1300 nm for multimode fiber.

c. Bandwidth Test: The end-to-end bandwidth of all multimode fiber span links shall be measured by the frequency domain method. The bandwidth shall be measured in both directions on all fibers. The bandwidth measurements shall be in accordance with TIA/EIA-455-204.

3.4.3 Soil Density Tests

a. Determine soil-density relationships for compaction of backfill material in accordance with ASTM D1557, Method D.

b. Determine soil-density relationships as specified for soil tests in PART 4 of the RFP.

-- End of Section --

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 01 20 00 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Schedule of prices | 1.3 | | | | | | | | | | | | | | |
| | | 01 30 00 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | List of contact personnel | 1.4.1 | | | | | | | | | | | | | | |
| | | 01 31 50 | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Interim DD-1354, Transfer & | 1.2 | | | | | | | | | | | | | | |
| | | | Acceptance of Military Real | | | | | | | | | | | | | | | |
| | | | Property | | | | | | | | | | | | | | | |
| | | 01 32 16 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Construction schedule | 1.2 | | | | | | | | | | | | | | |
| | | | Equipment delivery schedule | 1.3 | | | | | | | | | | | | | | |
| | | 01 33 00 | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Submittal register | 1.4.1 | | | | | | | | | | | | | | |
| | | | Complete Submittal Package | 1.6.1 | | | | | | | | | | | | | | |
| | | 01 35 29 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Accident Prevention Plan (APP) | 1.9 | | | | | | | | | | | | | | |
| | | | Activity Hazard Analysis (AHA) | 1.10 | | | | | | | | | | | | | | |
| | | | Crane Critical Lift Plan | 1.9.1 | | | | | | | | | | | | | | |
| | | | Crane Work Plan | 1.9.1 | | | | | | | | | | | | | | |
| | | | Crane Operators | 1.7.1.4 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Reports | 1.14 | | | | | | | | | | | | | | |
| | | | Accident Reports | 1.14.1 | | | | | | | | | | | | | | |
| | | | Monthly Exposure Reports | 1.14.3 | | | | | | | | | | | | | | |
| | | | Regulatory Citations and | 1.14.4 | | | | | | | | | | | | | | |
| | | | Violations | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 01 35 29 | Crane Reports | 1.14.5 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Confined Space Entry Permit | 1.11 | | | | | | | | | | | | | | |
| | | | Certificate of Compliance | 1.14.6 | | | | | | | | | | | | | | |
| | | | Third Party Certification of | 1.14.7 | | | | | | | | | | | | | | |
| | | | Barge-Mounted Mobile Cranes | | | | | | | | | | | | | | | |
| | | 01 45 10 | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | QC PLAN | 1.6 | | | | | | | | | | | | | | |
| | | 01 50 00 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Backflow preventers | 2.1 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Backflow Preventer Tests | 3.1 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Backflow Tester Certifications | 1.3 | | | | | | | | | | | | | | |
| | | | Backflow Preventers Certificate | 1.3.1 | | | | | | | | | | | | | | |
| | | 01 57 19 | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Solid waste disposal permit | 1.4.1 | | | | | | | | | | | | | | |
| | | | Disposal permit for hazardous | 1.4.2 | | | | | | | | | | | | | | |
| | | | waste | | | | | | | | | | | | | | | |
| | | | Environmental training | 1.2 | | | | | | | | | | | | | | |
| | | | documentation | | | | | | | | | | | | | | | |
| | | | Permit to transport hazardous | 1.4.3 | | | | | | | | | | | | | | |
| | | | waste | | | | | | | | | | | | | | | |
| | | | Hazardous waste certification | 1.4.4 | | | | | | | | | | | | | | |
| | | | Annual Report of Products | 2.1 | | | | | | | | | | | | | | |
| | | | Containing Recovered Materials | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 01 78 00 | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Equipment/product warranty list | 1.4.1 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | As-built drawings | 1.2 | | | | | | | | | | | | | | |
| | | | Record of materials | 1.3 | | | | | | | | | | | | | | |
| | | | Complete Submittal Package | 1.6 | | | | | | | | | | | | | | |
| | | | Equipment/product warranty tag | 1.4.2 | | | | | | | | | | | | | | |
| | | 01 78 23 | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | O&M Database | 1.4 | | | | | | | | | | | | | | |
| | | | Training Plan | 3.1.1 | | | | | | | | | | | | | | |
| | | | Training Outline | 3.1.3 | | | | | | | | | | | | | | |
| | | | Training Content | 3.1.2 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Training Video Recording | 3.1.4 | | | | | | | | | | | | | | |
| | | | Validation of Training Completion | 3.1.6 | | | | | | | | | | | | | | |
| | | 01 78 30 | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | GIS Data Deliverables | 1.3.7 | | | | | | | | | | | | | | |
| | | 02 41 00 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Demolition Plan | 1.2.1 | | | | | | | | | | | | | | |
| | | 02 82 16 | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Air sampling results | 1.5.2 | | | | | | | | | | | | | | |
| | | | Pressure differential recordings | 1.5.3 | | | | | | | | | | | | | | |
| | | | for local exhaust system | | | | | | | | | | | | | | | |
| | | | Clearance sampling | 3.3.3.2 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 02 82 16 | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Asbestos hazard abatement plan | 1.5.1 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Asbestos Waste Shipment | 1.5.4 | | | | | | | | | | | | | | |
| | | | Record N.C. (DHHS-HHCU) Form | | | | | | | | | | | | | | | |
| | | | 3787 | | | | | | | | | | | | | | | |
| | | | Daily log | 1.5.5 | | | | | | | | | | | | | | |
| | | | North Carolina permit | 1.5.6 | | | | | | | | | | | | | | |
| | | | Modifications to the North | 1.5.7 | | | | | | | | | | | | | | |
| | | | Carolina permit | | | | | | | | | | | | | | | |
| | | | Asbestos Inspection Reporting | 1.5.8 | | | | | | | | | | | | | | |
| | | | Form | | | | | | | | | | | | | | | |
| | | 02 82 33.13 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Vacuum filters | 1.6.4 | | | | | | | | | | | | | | |
| | | | Respirators | 1.6.1 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Monitoring Results | 1.4.4 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Qualifications of CIH | 1.4.1 | | | | | | | | | | | | | | |
| | | | Testing laboratory | 1.4.2 | | | | | | | | | | | | | | |
| | | | Materials coated with | 1.4.3 | | | | | | | | | | | | | | |
| | | | lead-containing paint removal work | | | | | | | | | | | | | | | |
| | | | plan | | | | | | | | | | | | | | | |
| | | | Rental equipment notification | 1.6.3 | | | | | | | | | | | | | | |
| | | | work plan | 1.3.8 | | | | | | | | | | | | | | |
| | | | Respiratory protection program | 1.3.4 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | MAILED TO CONTR/ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 02 82 33.13 | Hazard communication program | 1.3.5 | | | | | | | | | | | | | | |
| | | | disposal | 3.4.4 | | | | | | | | | | | | | | |
| | | | Hazardous waste management | 1.3.6 | | | | | | | | | | | | | | |
| | | | plan | | | | | | | | | | | | | | | |
| | | | Vacuum filters | 1.6.4 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | disposal | 3.4.4 | | | | | | | | | | | | | | |
| | | | medical examinations | 1.3.1 | | | | | | | | | | | | | | |
| | | | training certification | 1.3.3.1 | | | | | | | | | | | | | | |
| | | 02 83 13.00 20 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Lead Compliance Plan | 1.5.2.2 | | | | | | | | | | | | | | |
| | | | Competent Person | 1.5.1.1 | | | | | | | | | | | | | | |
| | | | Training Certification | 1.5.1.2 | | | | | | | | | | | | | | |
| | | | lead waste management plan | 1.5.2.8 | | | | | | | | | | | | | | |
| | | | Medical Examinations | 1.5.2.4 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | sampling results | 1.5.2.3 | | | | | | | | | | | | | | |
| | | | Occupational and Environmental | 1.5.2.3 | | | | | | | | | | | | | | |
| | | | Assessment Data Report | | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Testing laboratory | 1.5.1.3 | | | | | | | | | | | | | | |
| | | | Clearance Certification | 3.5.1.1 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | hazardous waste manifest | 3.5.2.1 | G | | | | | | | | | | | | | |
| | | | turn-in documents or weight | 3.5.2.1 | G | | | | | | | | | | | | | |
| | | | tickets | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAG # RAPH | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 02 84 16 | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Qualifications of CIH | 1.8.1 | | | | | | | | | | | | | | |
| | | | Training Certification | 1.8.1 | | | | | | | | | | | | | | |
| | | | PCB and Lamp Removal Work | 1.8.2 | | | | | | | | | | | | | | |
| | | | Plan | | | | | | | | | | | | | | | |
| | | | PCB and Lamp Disposal Plan | 1.8.3 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Transporter certification | 3.5.2 | | | | | | | | | | | | | | |
| | | | Certification of Decontamination | 3.2.4 | | | | | | | | | | | | | | |
| | | | Certificate of Disposal and/or | 3.5.2.1 | | | | | | | | | | | | | | |
| | | | recycling | | | | | | | | | | | | | | | |
| | | | DD Form 1348-1 | 3.5.3.1 | | | | | | | | | | | | | | |
| | | 03 30 04 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Air-Entraining Admixture | 2.1.3.1 | | | | | | | | | | | | | | |
| | | | Water-Reducing or Retarding | 2.1.3.3 | | | | | | | | | | | | | | |
| | | | Admixture | | | | | | | | | | | | | | | |
| | | | Curing Materials | 2.1.9 | | | | | | | | | | | | | | |
| | | | Reinforcing Steel | 2.1.5 | | | | | | | | | | | | | | |
| | | | Expansion Joint Filler Strips, | 2.1.6 | | | | | | | | | | | | | | |
| | | | Premolded | | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Aggregates | 2.1.2 | | | | | | | | | | | | | | |
| | | | Concrete Mixture Proportions | 1.3.2 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Cementitious Materials | 2.1.1 | | | | | | | | | | | | | | |
| | | | Aggregates | 2.1.2 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 04 20 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Cut CMU | 3.3.9.1 | | | | | | | | | | | | | | |
| | | | Detail Drawings | 3.4.1.1 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Hot Weather Procedures | 1.5.1 | | | | | | | | | | | | | | |
| | | | Cold Weather Procedures | 1.5.2 | | | | | | | | | | | | | | |
| | | | Cementitious Materials | 2.4.1.1 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Concrete Masonry Units (CMU) | 2.2.2.2 | | | | | | | | | | | | | | |
| | | | Admixtures for Masonry Mortar | 2.4.1.4 | | | | | | | | | | | | | | |
| | | | Anchors, Ties, and Bar | 2.6.2 | | | | | | | | | | | | | | |
| | | | Positioners | | | | | | | | | | | | | | | |
| | | | Joint Reinforcement | 2.6.3 | | | | | | | | | | | | | | |
| | | | Clay Masonry Expansion-Joint | 2.6.6 | | | | | | | | | | | | | | |
| | | | Materials | | | | | | | | | | | | | | | |
| | | | INSULATION | 2.6.8 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Masonry Compressive Strength | 2.1.2 | | | | | | | | | | | | | | |
| | | | Fire-Rated Concrete Masonry | 2.2.2.3 | | | | | | | | | | | | | | |
| | | | Units | | | | | | | | | | | | | | | |
| | | | Bracing Calculations | 3.2.5 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Fire-Rated Concrete Masonry | 2.2.2.3 | | | | | | | | | | | | | | |
| | | | Units | | | | | | | | | | | | | | | |
| | | | Field Testing of Mortar | 3.6.1 | | | | | | | | | | | | | | |
| | | | Field Testing of Grout | 3.6.2 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 04 20 00 | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Concrete Masonry Units (CMU) | 2.2.2.2 | | | | | | | | | | | | | | |
| | | | Cementitious Materials | 2.4.1.1 | | | | | | | | | | | | | | |
| | | | Admixtures for Masonry Mortar | 2.4.1.4 | | | | | | | | | | | | | | |
| | | | Admixtures for Grout | 2.4.2.2 | | | | | | | | | | | | | | |
| | | | Anchors, Ties, and Bar | 2.6.2 | | | | | | | | | | | | | | |
| | | | Positioners | | | | | | | | | | | | | | | |
| | | | Joint Reinforcement | 2.6.3 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | Admixtures for Masonry Mortar | 2.4.1.4 | | | | | | | | | | | | | | |
| | | | Admixtures for Grout | 2.4.2.2 | | | | | | | | | | | | | | |
| | | 06 10 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Structural glued laminated | 2.2.3 | | | | | | | | | | | | | | |
| | | | Fabricated structural members | 1.8.1 | | | | | | | | | | | | | | |
| | | | Modifications of structural | 1.8.2 | | | | | | | | | | | | | | |
| | | | members | | | | | | | | | | | | | | | |
| | | | Nailing Strips | 2.5.3.1 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Underlayment | 2.4 | | | | | | | | | | | | | | |
| | | | Engineered wood products | 2.1.1 | | | | | | | | | | | | | | |
| | | | Structural-use | 1.4.4 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Modifications of structural | 1.8.2 | | | | | | | | | | | | | | |
| | | | members | | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Preservative-treated | 1.4.5 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 06 10 00 | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Certificates of grade | 1.8.3 | | | | | | | | | | | | | | |
| | | | Preservative treatment | 1.7 | | | | | | | | | | | | | | |
| | | 06 20 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Detail Drawings | 1.3 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Certificates of grade | 1.4 | | | | | | | | | | | | | | |
| | | | Certificates of compliance | 1.4 | | | | | | | | | | | | | | |
| | | 07 22 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Wood nailers | 2.5 | | | | | | | | | | | | | | |
| | | | Tapered roof insulation | 2.1.4 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Fasteners | 2.4 | | | | | | | | | | | | | | |
| | | | Insulation | 2.1 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Flame spread and smoke | 1.4.1 | | | | | | | | | | | | | | |
| | | | developed ratings | | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | qualifications | 1.3 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | fasteners | 2.4 | | | | | | | | | | | | | | |
| | | | insulation | 2.1 | | | | | | | | | | | | | | |
| | | 07 42 13 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Qualification of Manufacturer | 1.5.3 | | | | | | | | | | | | | | |
| | | | Qualification of Installation | 1.5.4 | | | | | | | | | | | | | | |
| | | | Contractor | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 07 42 13 | Warranty | 1.8 | | | | | | | | | | | | | | |
| | | | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Installation Drawings | 1.5.1.1 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Wall Panels | 2.2.1 | | | | | | | | | | | | | | |
| | | | Factory Color Finish | 2.2.2 | | | | | | | | | | | | | | |
| | | | Closure Materials | 1.5.5 | | | | | | | | | | | | | | |
| | | | Pressure Sensitive Tape | 2.5.4.4 | | | | | | | | | | | | | | |
| | | | Sealants and Caulking | 2.5.4.1 | | | | | | | | | | | | | | |
| | | | Galvanizing Repair Paint | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | Enamel Repair Paint | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | Accessories | 1.5.5 | | | | | | | | | | | | | | |
| | | | Accessories | 2.5 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Wall Panels | 2.2.1 | | | | | | | | | | | | | | |
| | | | Fasteners | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | Metal Closure Strips | 2.5.3 | | | | | | | | | | | | | | |
| | | | Color chart | 2.2.2.5 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Wind load design analysis | 1.5.1.2 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Leakage Tests | 3.7.2 | | | | | | | | | | | | | | |
| | | | Wind Load Tests | 1.3.2 | | | | | | | | | | | | | | |
| | | | Coating | 2.2.2.6 | | | | | | | | | | | | | | |
| | | | Chalking | 2.2.2.6 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 07 42 13 | Coil Stock | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | Fasteners | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | Galvanizing Repair Paint | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | Enamel Repair Paint | 1.5.3.1 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | Installation | 3.3 | | | | | | | | | | | | | | |
| | | | SD-09 Manufacturer’s Field | | | | | | | | | | | | | | | |
| | | | Reports | | | | | | | | | | | | | | | |
| | | | Manufacturer's Field Reports | 3.8.1 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Warranty | 1.8 | | | | | | | | | | | | | | |
| | | | Maintenance Instructions | 1.5.6 | | | | | | | | | | | | | | |
| | | | 20 year 'No Dollar Limit' warranty | 1.8.1 | | | | | | | | | | | | | | |
| | | | for labor and material | | | | | | | | | | | | | | | |
| | | 07 52 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Roof plan | 1.4.7 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Modified Bitumen Sheets | 2.1 | | | | | | | | | | | | | | |
| | | | Asphalt | 2.3 | | | | | | | | | | | | | | |
| | | | Primer | 2.5 | | | | | | | | | | | | | | |
| | | | Modified Bitumen Roof Cement | 2.6 | | | | | | | | | | | | | | |
| | | | Pre-Manufactured Accessories | 2.9 | | | | | | | | | | | | | | |
| | | | Fasteners And Plates | 2.8 | | | | | | | | | | | | | | |
| | | | Warranty | 1.9 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Wind Uplift Calculations | 1.4.6 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAG # RAPH | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 07 52 00 | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Qualification of Manufacturer | 1.4.1 | | | | | | | | | | | | | | |
| | | | Qualification of Applicator | 1.4.2 | | | | | | | | | | | | | | |
| | | | Qualification of Engineer of | 1.4.4 | | | | | | | | | | | | | | |
| | | | Record | | | | | | | | | | | | | | | |
| | | | Bill of Lading | 1.5.1 | | | | | | | | | | | | | | |
| | | | Wind Uplift Resistance FM 90/ | 1.4.6 | | | | | | | | | | | | | | |
| | | | 130 MPH | | | | | | | | | | | | | | | |
| | | | Fire Resistance | 1.4.5 | | | | | | | | | | | | | | |
| | | | Wind Uplift Resistance | 1.4.6 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer's Instructions | | | | | | | | | | | | | | | |
| | | | Modified Bitumen Membrane | 3.3.5 | | | | | | | | | | | | | | |
| | | | Application | | | | | | | | | | | | | | | |
| | | | Flashing | 3.3.6 | | | | | | | | | | | | | | |
| | | | Temperature Limitations for | 3.2.3.1 | | | | | | | | | | | | | | |
| | | | Asphalt | | | | | | | | | | | | | | | |
| | | | Torches | 3.2.2.3 | | | | | | | | | | | | | | |
| | | | Primer | 2.5 | | | | | | | | | | | | | | |
| | | | Fasteners | 2.8.1 | | | | | | | | | | | | | | |
| | | | Coating Application | 3.3.7.1 | | | | | | | | | | | | | | |
| | | | Cold Weather Installation | 1.6 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Warranty | 1.9 | | | | | | | | | | | | | | |
| | | | Information Card | 3.9 | | | | | | | | | | | | | | |
| | | | Instructions To Government | 3.8 | | | | | | | | | | | | | | |
| | | | Personnel | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAG # RAPH | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 07 60 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Flashing for roof drains | 3.1.7 | | | | | | | | | | | | | | |
| | | | Base flashing | 3.1.4 | | | | | | | | | | | | | | |
| | | | Counterflashing | 3.1.5 | | | | | | | | | | | | | | |
| | | | Flashing at roof penetrations | 3.1.9 | | | | | | | | | | | | | | |
| | | | Reglets | 3.1.6 | | | | | | | | | | | | | | |
| | | | Scuppers | 3.1.8 | | | | | | | | | | | | | | |
| | | | Copings | 3.1.10 | | | | | | | | | | | | | | |
| | | | Roof hatch | 2.2 | | | | | | | | | | | | | | |
| | | | Roof hatch | 3.2 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Quality Control Plan | 3.6 | | | | | | | | | | | | | | |
| | | 07 61 15.00 20 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Roofing panels; Gutter / | 2.3 | | | | | | | | | | | | | | |
| | | | Downspout System | | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Roofing panels; | 2.1 | | | | | | | | | | | | | | |
| | | | Attachment clips; | 2.2 | | | | | | | | | | | | | | |
| | | | Closures | 2.3.1 | | | | | | | | | | | | | | |
| | | | Accessories | 2.3 | | | | | | | | | | | | | | |
| | | | warranty | 1.8 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Roofing panels | 2.1 | | | | | | | | | | | | | | |
| | | | Accessories | 2.3 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Load calculations | 1.5 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 07 61 15.00 20 | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Manufacturer's field inspection | 3.5 | G | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Technical representative | 1.6.2 | | | | | | | | | | | | | | |
| | | | Qualification of Installer | 1.6.3 | | | | | | | | | | | | | | |
| | | | Coil stock | 2.1.1.5 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | Sealant | 2.3.3 | | | | | | | | | | | | | | |
| | | | Installation | 3.3 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Information card | 3.7 | | | | | | | | | | | | | | |
| | | 07 84 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Firestopping System | 2.1 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Firestopping Materials | 2.2 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Inspection | 3.3 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Inspector Qualifications | 1.5.2 | | | | | | | | | | | | | | |
| | | | Firestopping Materials | 2.2 | | | | | | | | | | | | | | |
| | | | Installer Qualifications | 1.5.1 | | | | | | | | | | | | | | |
| | | 07 92 00 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Sealants | 2.1 | | | | | | | | | | | | | | |
| | | | Primers | 2.2 | | | | | | | | | | | | | | |
| | | | Bond breakers | 2.3 | | | | | | | | | | | | | | |
| | | | Backstops | 2.4 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | | |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 07 92 00 | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Sealant | 3.3.6 | | | | | | | | | | | | | | |
| | | 08 11 13 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Doors | 2.2 | | | | | | | | | | | | | | |
| | | | Doors | 2.2 | | | | | | | | | | | | | | |
| | | | Frames | 2.7 | | | | | | | | | | | | | | |
| | | | Frames | 2.7 | | | | | | | | | | | | | | |
| | | | Accessories | 2.5 | | | | | | | | | | | | | | |
| | | | Weatherstripping | 2.9 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Doors | 2.2 | | | | | | | | | | | | | | |
| | | | Frames | 2.7 | | | | | | | | | | | | | | |
| | | | Accessories | 2.5 | | | | | | | | | | | | | | |
| | | | Weatherstripping | 2.9 | | | | | | | | | | | | | | |
| | | 08 33 23 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Overhead Coiling Doors | 2.2.1 | | | | | | | | | | | | | | |
| | | | Counterbalancing Mechanism | 2.2.3 | | | | | | | | | | | | | | |
| | | | Manual Door Operators | 2.2.4 | | | | | | | | | | | | | | |
| | | | Bottom Bars | 2.2.1.3 | | | | | | | | | | | | | | |
| | | | Guides | 2.1.1.1 | | | | | | | | | | | | | | |
| | | | Mounting Brackets | 2.2.3.1 | | | | | | | | | | | | | | |
| | | | Overhead Drum | 2.2.1.7 | | | | | | | | | | | | | | |
| | | | Hood | 3.3.2 | | | | | | | | | | | | | | |
| | | | Installation Drawings | 2.1.1.1 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Overhead Coiling Doors | 2.2.1 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAG # RAPH | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 08 33 23 | Hardware | 2.2.2 | | | | | | | | | | | | | | |
| | | | Counterbalancing Mechanism | 2.2.3 | | | | | | | | | | | | | | |
| | | | Manual Door Operators | 2.2.4 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Overhead Coiling Doors | 2.2.1 | | | | | | | | | | | | | | |
| | | | Hardware | 2.2.2 | | | | | | | | | | | | | | |
| | | | Counterbalancing Mechanism | 2.2.3 | | | | | | | | | | | | | | |
| | | | Manual Door Operators | 2.2.4 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Operation and Maintenance | 3.3.2 | | | | | | | | | | | | | | |
| | | | Manuals | | | | | | | | | | | | | | | |
| | | | Materials | 3.3.2 | | | | | | | | | | | | | | |
| | | | Devices | 3.3.2 | | | | | | | | | | | | | | |
| | | | Procedures | 3.3.2 | | | | | | | | | | | | | | |
| | | | Manufacture's Brochures | 3.3.2 | | | | | | | | | | | | | | |
| | | | Parts Lists | 3.3.2 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Warranty | 3.3.1 | | | | | | | | | | | | | | |
| | | 08 51 13 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Windows | 2.1 | | | | | | | | | | | | | | |
| | | | Fabrication Drawings | 1.10 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Windows | 2.1 | | | | | | | | | | | | | | |
| | | | Hardware | 2.2.8.1 | | | | | | | | | | | | | | |
| | | | Fasteners | 2.2.3 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAG # RAPH | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 08 51 13 | Window Performance | 1.11 | | | | | | | | | | | | | | |
| | | | Thermal-Barrier Windows | 2.3 | | | | | | | | | | | | | | |
| | | | Mullions | 2.4 | | | | | | | | | | | | | | |
| | | | Screens | 2.2.10 | | | | | | | | | | | | | | |
| | | | Weatherstripping | 2.2.2 | | | | | | | | | | | | | | |
| | | | Accessories | 2.2.8 | | | | | | | | | | | | | | |
| | | | Thermal Performance | 1.11.4 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Finish Sample | 1.4.2.1 | | | | | | | | | | | | | | |
| | | | Window Sample | 1.4.2.2 | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Structural Calculations for | 2.1 | | | | | | | | | | | | | | |
| | | | Deflection | | | | | | | | | | | | | | | |
| | | | Design Analysis | 1.4.3 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Minimum Condensation | 1.4.4 | | | | | | | | | | | | | | |
| | | | Resistance Factor | | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Windows | 2.1 | | | | | | | | | | | | | | |
| | | | Plastic Identification | 1.7 | | | | | | | | | | | | | | |
| | | 08 71 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Hardware schedule | 1.3 | | | | | | | | | | | | | | |
| | | | Keying system | 2.4.7 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Hardware items | 2.4 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 08 71 00 | SD-08 Manufacturer's Instructions | | | | | | | | | | | | | | | |
| | | | Installation | 3.1 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Hardware Schedule | 1.3 | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Key Bitting | 1.4 | | | | | | | | | | | | | | |
| | | 08 81 00 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Insulating Glass | 1.6.1 | | | | | | | | | | | | | | |
| | | | Glazing Accessories | 1.3 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Insulating Glass | 1.6.1 | | | | | | | | | | | | | | |
| | | | Glazing Compound | 2.4.2 | | | | | | | | | | | | | | |
| | | | Tape | 2.4.5 | | | | | | | | | | | | | | |
| | | | Sealant | 2.4.3.1 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Insulating Glass | 1.6.1 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer's Instructions | | | | | | | | | | | | | | | |
| | | | Setting and Sealing Materials | 2.4 | | | | | | | | | | | | | | |
| | | | Glass Setting | 3.2 | | | | | | | | | | | | | | |
| | | 09 29 00 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Cementitious backer units | 2.1.3 | | | | | | | | | | | | | | |
| | | | Water-Resistant Gypsum Backing | 2.1.2 | | | | | | | | | | | | | | |
| | | | Board | | | | | | | | | | | | | | | |
| | | | Accessories | 2.1.7 | | | | | | | | | | | | | | |
| | | | Gypsum Board | 2.1.1 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 09 29 00 | Joint Treatment Materials | 2.1.4 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Asbestos Free Materials | 2.1 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | Material Safety Data Sheets | 2.1 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Waste Management | 3.7 | | | | | | | | | | | | | | |
| | | 09 67 23.13 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Installation Drawings | 1.3 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Manufacturer's Catalog Data | 1.3.1 | | | | | | | | | | | | | | |
| | | | Epoxy Undercoat | 1.3.2 | | | | | | | | | | | | | | |
| | | | Urethane Mortar | 1.3.1 | | | | | | | | | | | | | | |
| | | | Urethane Mortar | 1.3.2 | | | | | | | | | | | | | | |
| | | | Flakes | 1.3.1 | | | | | | | | | | | | | | |
| | | | Urethane Sealer | 1.3.2 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Hardboard Mounted Epoxy | 1.4.2 | | | | | | | | | | | | | | |
| | | | Flooring | | | | | | | | | | | | | | | |
| | | | SD-05 Design Data | | | | | | | | | | | | | | | |
| | | | Physical Properties | 2.1.1 | | | | | | | | | | | | | | |
| | | | Design Mix Data | 1.3.2 | | | | | | | | | | | | | | |
| | | | Urethane Mortar | 1.3.1 | | | | | | | | | | | | | | |
| | | | Urethane Mortar | 1.3.2 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 09 67 23.13 | Records of Inspection | 1.4 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Listing of Product Installations | 1.4.1 | | | | | | | | | | | | | | |
| | | | Referenced Standards | 1.4 | | | | | | | | | | | | | | |
| | | | Certificates | | | | | | | | | | | | | | | |
| | | | Warranty | 3.6 | | | | | | | | | | | | | | |
| | | 09 90 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Piping identification | 3.10 | | | | | | | | | | | | | | |
| | | | stencil | 3.10 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Coating | 2.1 | | | | | | | | | | | | | | |
| | | | Manufacturer's Technical Data | 2.1 | | | | | | | | | | | | | | |
| | | | Sheets | | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Color | 1.10 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Applicator's qualifications | 1.3 | | | | | | | | | | | | | | |
| | | | Qualification Testing | 1.4.1.2 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | Application instructions | 3.2.1 | | | | | | | | | | | | | | |
| | | | Mixing | 3.6.2 | | | | | | | | | | | | | | |
| | | | Manufacturer's Material Safety | 1.7.2 | | | | | | | | | | | | | | |
| | | | Data Sheets | | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Coatings: | 2.1 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 10 28 13 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Finishes | 2.1.2 | | | | | | | | | | | | | | |
| | | | Accessory Items | 2.2 | | | | | | | | | | | | | | |
| | | | SD-04 Samples | | | | | | | | | | | | | | | |
| | | | Finishes | 2.1.2 | | | | | | | | | | | | | | |
| | | | Accessory Items | 2.2 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Accessory Items | 2.2 | | | | | | | | | | | | | | |
| | | 10 44 30 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Plaque signs | 2.4.1 | | | | | | | | | | | | | | |
| | | | Letters | 2.5 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Adhesive | 2.7 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Fiber-reinforced polyester | 2.1 | | | | | | | | | | | | | | |
| | | | Acrylic sheet | 2.2 | | | | | | | | | | | | | | |
| | | 10 52 20 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Fire extinguishers | 2.1 | | | | | | | | | | | | | | |
| | | | Fire extinguisher cabinets | 2.2 | | | | | | | | | | | | | | |
| | | 22 00 00 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Fixtures | 2.4 | | | | | | | | | | | | | | |
| | | | Flush valve water closets | 2.4.1 | | | | | | | | | | | | | | |
| | | | Countertop lavatories | 2.4.2 | | | | | | | | | | | | | | |
| | | | Water heaters | 2.7 | | | | | | | | | | | | | | |
| | | | Backflow prevention assemblies | 3.6.1.1 | | | | | | | | | | | | | | |
| | | | Interior Hose Bibb | 2.3.2 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 22 00 00 | Exterior Wall Faucets | 2.3.1 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Tests, Flushing and Disinfection | 3.6 | | | | | | | | | | | | | | |
| | | | Test of Backflow Prevention | 3.6.1.1 | | | | | | | | | | | | | | |
| | | | Assemblies | | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Materials and Equipment | 1.3 | | | | | | | | | | | | | | |
| | | 23 05 92 | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | TAB Report | 1.4.1 | | | | | | | | | | | | | | |
| | | 23 07 00 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Piping insulation | 2.1 | | | | | | | | | | | | | | |
| | | | Piping insulation finishes | 2.1.4 | | | | | | | | | | | | | | |
| | | | Accessory materials | 2.3 | | | | | | | | | | | | | | |
| | | | Adhesives, sealants, and coating | 2.2 | | | | | | | | | | | | | | |
| | | | compounds | | | | | | | | | | | | | | | |
| | | 23 73 33 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Pipe hangers and supports | 2.5.1 | | | | | | | | | | | | | | |
| | | | Flexible pipe connectors | 2.5.3 | | | | | | | | | | | | | | |
| | | | Diffusers, registers, and grilles | 2.3.2 | | | | | | | | | | | | | | |
| | | | Valves | 2.4.5 | | | | | | | | | | | | | | |
| | | | Pipe and fittings | 2.4 | | | | | | | | | | | | | | |
| | | | Sidewall Propeller Fans | 2.1.3 | | | | | | | | | | | | | | |
| | | | Square In-Line Centrifugal Fans | 2.1.4 | | | | | | | | | | | | | | |
| | | | Mini-Split Heat Pump Systems | 2.1.1 | | | | | | | | | | | | | | |
| | | | Gas-Fired Unit Heater | 2.1.2 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 23 73 33 | Installation manual | 1.3.1 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Sidewall Propeller Fans | 2.1.3 | | | | | | | | | | | | | | |
| | | | Square In-Line Centrifugal Fans | 2.1.4 | | | | | | | | | | | | | | |
| | | | Mini-Split Heat Pump Systems | 2.1.1 | | | | | | | | | | | | | | |
| | | | Gas-Fired Unit Heater | 2.1.2 | | | | | | | | | | | | | | |
| | | 26 08 00 | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Acceptance tests and inspections | 3.1 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Qualifications | 1.4.1 | | | | | | | | | | | | | | |
| | | | Acceptance test and inspections | 1.4.3 | | | | | | | | | | | | | | |
| | | | procedure | | | | | | | | | | | | | | | |
| | | 26 20 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Panelboards | 2.12 | | | | | | | | | | | | | | |
| | | | Cable trays | 2.4 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Receptacles | 2.11 | | | | | | | | | | | | | | |
| | | | Circuit breakers | 2.12.1 | | | | | | | | | | | | | | |
| | | | Switches | 2.10 | | | | | | | | | | | | | | |
| | | | Motor controllers | 2.14 | | | | | | | | | | | | | | |
| | | | Manual motor starters | 2.15 | | | | | | | | | | | | | | |
| | | | Surge protective devices | 2.20 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | 600-volt wiring test | 3.2.2 | | | | | | | | | | | | | | |
| | | | Grounding system test | 3.2.4 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO. N40085-15-D-0859

TITLE AND LOCATION: INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 26 20 00 | Ground-fault receptacle test | 3.2.3 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Fuses | 2.13 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Electrical Systems | 1.5.1 | | | | | | | | | | | | | | |
| | | 26 51 00.00 22 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Photometric Plan | 1.6.2 | | | | | | | | | | | | | | |
| | | | LED Luminaire Warranty | 1.7.1 | | | | | | | | | | | | | | |
| | | | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | LED Luminaire drawings | 1.6.1.1 | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | LED Luminaires | 2.1 | | | | | | | | | | | | | | |
| | | | Exit signs | 2.5 | | | | | | | | | | | | | | |
| | | | Emergency lighting equipment | 2.6 | | | | | | | | | | | | | | |
| | | | Occupancy sensors | 2.8 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | LED Luminaire - IESNA LM-79 | 1.6.3 | | | | | | | | | | | | | | |
| | | | Test Report | | | | | | | | | | | | | | | |
| | | | LED Light Source - IESNA LM-80 | 1.6.4 | | | | | | | | | | | | | | |
| | | | Test Report | | | | | | | | | | | | | | | |
| | | | Operating test | 3.3 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Luminaire Useful Life Certificate | 1.7.1 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | | |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 26 51 00.00 22 | Lighting Control System | 1.4.1 | | | | | | | | | | | | | | |
| | | 27 10 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Telecommunications drawings | 1.6.1.1 | | | | | | | | | | | | | | |
| | | | Telecommunications Space | 1.6.1.2 | | | | | | | | | | | | | | |
| | | | Drawings | | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Telecommunications cabling | 2.4 | | | | | | | | | | | | | | |
| | | | Patch panels | 2.5.6 | | | | | | | | | | | | | | |
| | | | Telecommunications | 2.6 | | | | | | | | | | | | | | |
| | | | outlet/connector assemblies | | | | | | | | | | | | | | | |
| | | | Equipment support frame | 2.5.2 | | | | | | | | | | | | | | |
| | | | Connector blocks | 2.5.3 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Telecommunications cabling | 3.5.1 | | | | | | | | | | | | | | |
| | | | testing | | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Telecommunications Contractor | 1.6.2.1 | | | | | | | | | | | | | | |
| | | | Key Personnel | 1.6.2.2 | | | | | | | | | | | | | | |
| | | | Manufacturer Qualifications | 1.6.2.3 | | | | | | | | | | | | | | |
| | | | Test plan | 1.6.3 | | | | | | | | | | | | | | |
| | | | SD-09 Manufacturer's Field | | | | | | | | | | | | | | | |
| | | | Reports | | | | | | | | | | | | | | | |
| | | | Factory reel tests | 2.13.1 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAG # RAPH | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 27 10 00 | Telecommunications cabling and | 1.10.1 | | | | | | | | | | | | | | |
| | | | pathway system | | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |
| | | | Record Documentation | 1.10.2 | | | | | | | | | | | | | | |
| | | 31 23 00.00 20 | SD-01 Preconstruction Submittals | | | | | | | | | | | | | | | |
| | | | Shoring and Sheeting Plan | 1.7.1 | | | | | | | | | | | | | | |
| | | | Dewatering work plan | 1.7.2 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Borrow Site Testing | 1.6 | | | | | | | | | | | | | | |
| | | | Fill and backfill | 3.13.2.1 | | | | | | | | | | | | | | |
| | | | Select material | 3.13.2.2 | | | | | | | | | | | | | | |
| | | | Density tests | 3.13.2.3 | | | | | | | | | | | | | | |
| | | 32 10 00 | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Trial batch | 1.3.4 | | | | | | | | | | | | | | |
| | | | Mix design | 1.3.5 | | | | | | | | | | | | | | |
| | | | Asphalt concrete | 2.1 | | | | | | | | | | | | | | |
| | | | Density | 3.3.2.2 | | | | | | | | | | | | | | |
| | | | Density | 3.3.2.3 | | | | | | | | | | | | | | |
| | | | Thickness | 3.3.2.2 | | | | | | | | | | | | | | |
| | | | Thickness | 3.3.2.3 | | | | | | | | | | | | | | |
| | | | Straightedge test | 3.3.2.2 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | mix delivery record | 1.3.3 | | | | | | | | | | | | | | |
| | | | Asphalt concrete | 2.1 | | | | | | | | | | | | | | |
| | | | Asphalt concrete | 2.1 | | | | | | | | | | | | | | |
| | | 32 11 23 | SD-06 Test Reports | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 32 11 23 | Initial Tests | 2.2.1 | | | | | | | | | | | | | | |
| | | | In-Place Tests | 3.13.1 | | | | | | | | | | | | | | |
| | | 33 71 01 | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Conductors | 2.6 | | | | | | | | | | | | | | |
| | | | Insulators | 2.5 | | | | | | | | | | | | | | |
| | | | Wood Poles | 2.2.1 | | | | | | | | | | | | | | |
| | | | Cutouts | 2.12 | | | | | | | | | | | | | | |
| | | | Transformer | 2.14 | | | | | | | | | | | | | | |
| | | | Surge arresters | 2.11 | | | | | | | | | | | | | | |
| | | | Guy strand | 2.7 | | | | | | | | | | | | | | |
| | | | Anchors | 2.9 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Field Test Plan | 1.5.2 | | | | | | | | | | | | | | |
| | | | Field Quality Control | 3.3 | | | | | | | | | | | | | | |
| | | | Ground resistance test reports | 1.5.1 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Wood poles | 2.2.1 | | | | | | | | | | | | | | |
| | | | Composite crossarms | 2.3.1 | | | | | | | | | | | | | | |
| | | 33 82 00 | SD-02 Shop Drawings | | | | | | | | | | | | | | | |
| | | | Telecommunications Outside | 1.6.1.1 | | | | | | | | | | | | | | |
| | | | Plant | | | | | | | | | | | | | | | |
| | | | Telecommunications Entrance | 1.6.1.2 | | | | | | | | | | | | | | |
| | | | Facility Drawings | | | | | | | | | | | | | | | |
| | | | SD-03 Product Data | | | | | | | | | | | | | | | |
| | | | Wire and cable | 2.8 | | | | | | | | | | | | | | |
| | | | Cable splices, and connectors | 2.5 | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | MAILED TO CONTR/ | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | DATE RCD FRM APPR AUTH | |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 33 82 00 | Closures | 2.3 | | | | | | | | | | | | | | |
| | | | Building protector assemblies | 2.2.1 | | | | | | | | | | | | | | |
| | | | Protector modules | 2.2.2 | | | | | | | | | | | | | | |
| | | | Cross-connect terminal cabinets | 2.4 | | | | | | | | | | | | | | |
| | | | Spare Parts | 1.8.2 | | | | | | | | | | | | | | |
| | | | SD-06 Test Reports | | | | | | | | | | | | | | | |
| | | | Pre-installation tests | 3.4.1 | | | | | | | | | | | | | | |
| | | | Acceptance tests | 3.4.2 | | | | | | | | | | | | | | |
| | | | Outside Plant Test Plan | 1.6.3 | | | | | | | | | | | | | | |
| | | | SD-07 Certificates | | | | | | | | | | | | | | | |
| | | | Telecommunications Contractor | 1.6.2.1 | | | | | | | | | | | | | | |
| | | | Key Personnel | 1.6.2.2 | | | | | | | | | | | | | | |
| | | | Manufacturer's Qualifications | 1.6.2.3 | | | | | | | | | | | | | | |
| | | | SD-08 Manufacturer’s Instructions | | | | | | | | | | | | | | | |
| | | | Building protector assembly | 2.2.1 | | | | | | | | | | | | | | |
| | | | installation | | | | | | | | | | | | | | | |
| | | | Cable tensions | 3.1.7.1 | | | | | | | | | | | | | | |
| | | | Fiber Optic Splices | 3.1.9.2 | | | | | | | | | | | | | | |
| | | | SD-09 Manufacturer’s Field | | | | | | | | | | | | | | | |
| | | | Reports | | | | | | | | | | | | | | | |
| | | | Factory Reel Test Data | 2.16.1 | | | | | | | | | | | | | | |
| | | | SD-10 Operation and Maintenance | | | | | | | | | | | | | | | |
| | | | Data | | | | | | | | | | | | | | | |
| | | | Telecommunications outside | 1.6.1.1 | | | | | | | | | | | | | | |
| | | | plant (OSP) | | | | | | | | | | | | | | | |
| | | | SD-11 Closeout Submittals | | | | | | | | | | | | | | | |

# SUBMITTAL REGISTER

CONTRACT NO.
N40085-15-D-0859

TITLE AND LOCATION
INTERIOR/EXTERIOR REPAIRS BUILDING AS124

CONTRACTOR

| ACTIVITY NO | TRANSMITTAL NO | SPEC SECT | DESCRIPTION ITEM SUBMITTED | PARAGRAPH # | CLASSIFICATION | GOVT OR A/E REVWR | CONTRACTOR: SCHEDULE DATES | | | CONTRACTOR ACTION | | | APPROVING AUTHORITY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SUBMIT | APPROVAL NEEDED BY | MATERIAL NEEDED BY | ACTION CODE | DATE OF ACTION | DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR | DATE FWD TO OTHER REVIEWER | DATE RCD FROM OTH REVIEWER | ACTION CODE | DATE OF ACTION | MAILED TO CONTR/ DATE RCD FRM APPR AUTH | REMARKS |
| (a) | (b) | (c) | (d) | (e) | (f) | | (g) | (h) | (i) | (j) | (k) | (l) | (m) | (n) | (o) | (p) | (q) | (r) |
| | | 33 82 00 | Record Documentation | 1.8.1 | | | | | | | | | | | | | | |

# SURVEY REPORT FOR ASBESTOS AND LEAD-BASED PAINT

Prepared For:

**TALLEY & SMITH ARCHITECTURE, INC.**
**409 EAST MARION STREET**
**SHELBY, NORTH CAROLINA 28150**

**Regarding:**

**DELIVERY ORDER NO. 0018**
**INTERIOR/EXTERIOR REPAIRS, BLDG. AS 124**
**TASK ORDER N40085-17F5562, PROJECT 17-B-0075**
**MARINE CORPS AIR STATION – NEW RIVER**
**JACKSONVILLE, NORTH CAROLINA**

Prepared By:

**ALLIED CONSULTING & ENVIRONMENTAL SERVICES, LLC**
**POST OFFICE BOX 2426**
**SHELBY, NORTH CAROLINA 28151**
**PHONE (704) 600-6255**
**FAX (704) 482-5596**

**ISSUE DATE: FEBRUARY 12, 2019**

**ACES PROJECT: 2017-10-104**

# SURVEY REPORT
# FOR ASBESTOS AND LEAD-BASED PAINT

Prepared for:

**TALLEY & SMITH ARCHITECTURE, INC.**
**409 EAST MARION STREET**
**SHELBY, NORTH CAROLINA 28150**

**Regarding:**

**DELIVERY ORDER NO. 0018**
**INTERIOR/EXTERIOR REPAIRS, BLDG. AS 124**
**TASK ORDER N40085-17F5562, PROJECT 17-B-0075**
**MARINE CORPS AIR STATION – NEW RIVER**
**JACKSONVILLE, NORTH CAROLINA**

**ACES Project No.: 2017-10-104**

**February 12, 2019**


Prepared by:

DeWitt Whitten, CHMM, REM, CES, REPA
General Manager
NC Licensed Asbestos Inspector #10706
NC Licensed LBP Risk Assessor #120118

Reviewed by:

Robert L. Smith, AIA, LEED AP
Managing Partner

**TABLE OF CONTENTS**


**1.0 EXECUTIVE SUMMARY ..... 1**

**2.0 INTRODUCTION ..... 1**

2.1 ASBESTOS ..... 1
2.2 LEAD-BASED PAINT ..... 3
2.3 PROJECT SCOPE ..... 4

**3.0 METHODOLOGY ..... 4**

3.1 ASBESTOS ..... 4
3.2 LEAD-BASED PAINT ..... 4

**4.0 FINDINGS AND RECOMMENDATIONS ..... 4**

4.1 NON-ASBESTOS CONTAINING MATERIALS ..... 4
4.2 ASBESTOS CONTAINING MATERIALS & PRESUMED ASBESTOS CONTAINING MATERIALS ..... 5
4.3 LEAD-BASED PAINT ..... 5
4.4 RECOMMENDATIONS - ACM & PACM ..... 6
4.5 RECOMMENDATIONS - LEAD-BASED PAINT ..... 6

**5.0 LIMITATIONS ..... 7**

Appendix 1
Figures
Appendix 2
Asbestos Analytical Results
Chain of Custody
Appendix 3
Asbestos Report by Others
Appendix 4
XRF Field Data Sheets

# SURVEY REPORT
# FOR ASBESTOS AND LEAD-BASED PAINT

**INTERIOR/EXTERIOR REPAIRS, BLDG. AS 124**

**MARINE CORPS AIR STATION – NEW RIVER**

**JACKSONVILLE, NORTH CAROLINA**

## 1.0 INTRODUCTION

As authorized by Talley & Smith Architecture, Inc. on April 10, 2018, personnel of Allied Consulting and Environmental Services, LLC (ACES) performed a non-invasive survey for suspect asbestos containing materials (ACM) and a limited lead-based paint (LBP) survey for building AS 124 at the Marine Corps Air Station – New River in Jacksonville, North Carolina on October 11, 2017. The surveys were conducted for the purpose of identifying asbestos containing materials and lead-based painted materials that may be impacted by the proposed renovation of the Building AS 124.

## 2.0 GENERAL BACKGROUND INFORMATION

### 2.1 Asbestos

The term "asbestos" refers to a group of naturally-occurring, fibrous minerals that are commercially mined throughout the world, primarily in Canada, Russia, and South Africa. Asbestos has been used in hundreds of products. Collectively, these products are referred to as asbestos-containing materials (ACMs). Asbestos gained wide use because it is plentiful, readily available, low in cost, and because of its unique properties – fire resistance, high tensile strength, resistance, and insulating characteristics.

As an insulator, asbestos received wide spread use for thermal insulation and condensation control. Asbestos is added to a variety of building materials to enhance strength. It is found in concrete and concrete-like products. Asbestos cement products are used as siding and roofing shingles, wallboard, as corrugated or flat sheets for roofing and partition walls, and as piping. Asbestos has also been added to asphalt, vinyl, and other materials to make products like roofing cements, felts and shingles, exterior siding materials, floor tiles, joint compounds, and mastics/adhesives. Asbestos also proved valuable as a component of acoustical plaster. This material was troweled-on or sprayed-on to ceilings or walls. As a decorative product, asbestos was frequently used to texture ceilings, walls, and other painted surfaces. Asbestos is still mined commercially and used in many common products, including brake shoes, roofing materials, and flooring products. It is important to realize that commercially available products containing asbestos can still be purchased. It is a common misconception that asbestos is no longer used.

The three most commonly encountered types of asbestos are sometimes referred to by their predominant color. Chrysotile (white) is by far the most frequently used asbestos mineral, constituting approximately 95% of all commercial and industrial applications. Chrysotile fibers

are long and flexible and can be spun or woven into cloth. Amosite (brown) and crocidolite (blue) are used in approximately 4-5% of asbestos-containing products.

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP, the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Nonfriable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Nonfriable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Nonfriable ACM – Any material excluding Category I Nonfriable ACM containing more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – RACM include one of the following:

1) Friable ACM
2) Category I Nonfriable ACM that has become friable.
3) Category I Nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4) Category II Nonfriable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1) Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2) Remove all RACM from the facility before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3) RACM need not be removed if:
    a) It is Category I nonfriable ACM that is not in poor condition.
    b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.
    c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.

d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

The Occupational Safety and Health Administration (OSHA) has established three sets of regulatory standards pertaining to asbestos exposure:

| | |
|---|---|
| 29 CFR 1910.1001 | General Industry |
| 29 CFR 1926.1101 | Construction Industry |
| 29 CFR 1910.134 | Respiratory Protection |

The construction industry standard covers activities involving asbestos demolition, removal, alteration, repair, maintenance, installation, cleanup, transportation, disposal, and storage. The general industry standard covers other activities where asbestos exposure is possible. Addressed under the OSHA standards are building owner / employer responsibilities regarding the identification of identified or presumed asbestos containing materials (PACM), notification to tenants / employees of the presence of asbestos, employee training, and work procedures.

## 2.2 Lead-based Paint

Lead-based paint is paint containing lead, a heavy metal, which is used as pigment. Lead chromate ($PbCrO_4$ - "chrome yellow") and lead carbonate($PbCO_3$ - "white lead") are the most common lead compounds used as pigments. Lead is also added to paint to speed drying, increase durability, retain a fresh appearance, and resist moisture that causes corrosion. Paint with significant lead content is still used in industry and by the military. For example, leaded paint is sometimes used to paint roadway markings and parking lot lines.

Although lead improves paint performance, it is a dangerous substance. It is especially damaging to children under age six whose bodies are still developing. Lead causes nervous system damage, hearing loss, stunted growth, and delayed development. It can cause kidney damage and affects every organ system of the body. It also is dangerous to adults, and can cause reproductive problems for both men and women. One myth related to lead-based paint is that the most common cause of poisoning was eating leaded paint chips. In fact, the most common pathway of childhood lead exposure is through ingestion of lead dust through normal hand-to-mouth contact during which children swallow lead dust dislodged from deteriorated paint or lead dust generated during remodeling or painting. Lead dust from remodeling or deteriorated paint lands on the floor near where children play and can ingest it.

Paint containing more than 0.06% (600 ppm) lead was banned for residential use in the United States in 1978 by the U.S. Consumer Product Safety Commission (16 Code of Federal Regulations CFR 1303). The U.S. Government defines "lead-based paint" as any "paint, surface coating that contains lead equal to or exceeding one milligram per square centimeter (1.0 $mg/cm^2$) or 0.5% by weight." These definitions are used to enforce regulations that apply to certain activities conducted in housing constructed prior to 1978, such as abatement, or the permanent elimination of a "lead-based paint hazard." Construction activities that involve LBP are addressed OSHA in 29 CFR 1926.62 (Lead in Construction).

## 2.3 Project Scope

The scope of this survey included the interior and exterior of Building AS 124 as designated on drawings furnished by Talley & Smith Architecture, Inc., the proposed scope of work provided to ACES, and as discussed in our conversation on October 4, 2018. It is our understanding that the building will be renovated in the near future.

# 3.0 METHODOLOGY

## 3.1 Asbestos

For this project, a visual, non-invasive survey and sampling for suspect asbestos containing materials (ACM) was conducted at the above referenced building. ACES personnel submitted a total of thirteen (13) bulk samples of suspect ACM that may be impacted by the planned renovation project. Samples were collected by a NC Licensed Asbestos Inspector (DeWitt Whitten - #10706) and submitted to a NVLAP Accredited Asbestos Laboratory (EMSL in Charlotte, NC). Samples were analyzed using Polarized Light Microscopy (PLM) by EPA Method 600/R-93/116. Due to some materials consisting of more than one layer, a total of twenty-six (26) samples were analyzed by the laboratory. Samples included the following materials: ceiling panels, floor tile and associated mastic, drywall, spackling, and a wall section. Please refer to the Sample Location Plan (Figure No. 1) and the Chain of Custody sheets in Appendices 1 and 2, respectively, for the approximate sample locations and the specific materials sampled.

During the survey, ACES personnel also reviewed a previously prepared report for Building AS 124 provided by personnel of the Camp Lejeune Marine Corps' Environmental Protection office. The report was dated October 16, 2017 (print date). For the purpose of this report, the materials listed in the report are considered presumed asbestos containing materials. These materials are discussed further in Section 4.3 of this report. A copy of the provided report prepared by others is presented in Appendix 3.

## 3.2 Lead-based Paint

A North Carolina Lead-based Paint Risk Assessor (Mr. DeWitt Whitten, Risk Assessor #120118) performed a limited lead-based paint (LBP) survey of the interior and exterior painted surfaces at ninety-seven (97) locations at the building. Please refer to the Sample Location Plan (Figure No. 2) and the XRF Field Data Sheets in Appendices 1 and 4, respectively, for the approximate test locations and the specific materials sampled. The testing was conducted using a INNOV-X Portable X-ray Fluorescence (XRF) Analyzer to screen surface coatings that may contain lead. The sampling for lead-based paint was not a comprehensive surface by surface testing of the paint (*e.g.* a HUD level survey), but consisted of testing representative painted surfaces for the presence of LBP. Surfaces tested included roofs, exterior and interior walls, exterior and interior doors and door frames, structural framing components, and columns.

# 4.0 FINDINGS AND RECOMMENDATIONS

## 4.1 Non-asbestos Containing Materials

Sixteen (16) of the twenty-six (26) samples analyzed by EMSL did not contain asbestos (i.e. greater than one percent asbestos).

## 4.2 Asbestos Containing Materials & Presumed Asbestos Containing Materials (PACM)

Asbestos was detected in eight (8) of the twenty-six (26) samples analyzed by EMSL. Asbestos reports prepared by others indicated that friable and non-friable ACM is present in the building. Materials identified as containing asbestos or that are presumed to contain asbestos are summarized in Table 1.

**TABLE 1 – SUMMARY OF ACM or PRESUMED ACM**

| ACM/PACM DESRIPTION | REPORTED LOCATION | APPROX. QUANTITY |
|---|---|---|
| 9” x 9” brown/black floor tile | Southeast Office Closet/Storage Area | 50 sq. ft. |
| Wall @ Water Fountain in Warehouse | Northwest Rooms, Center Dividing Wall | 130 sq. ft. |
| Black mastic associated with 12” x 12” white floor tile | Office Area, Storage Area | 500 sq. ft. |
| Black mastic associated with 12” x 12” gray floor tile | Storage Area | 50 sq. ft. |
| Ceiling panel | Storage Area | 220 sq. ft. |
| Roofing Sealant (Silver) | Southside Pitched Metal Roof Coating Throughout | 4,400 sq. ft. |
| Transite Panel Material | Southeast Loft, South Center | 1 sq. ft. |
| 9” Brown Floor Tile & Adhesive | Southside Office Closets/Storage | 50 sq. ft. |
| Transite-type Wall Panels | Northwest Rooms, Center Dividing Walls | 130 sq. ft. |
| Transite-type Ceiling Panels | Northwest Room Ceiling | 220 sq. ft. |
| 12” Beige with Brown Floor Tile & Adhesive | Southeast Office Area and Northeast Restroom Areas | 130 sq. ft. |
| Window Glazing Material | Metal Windows, Interior Side; Exterior Side East and West Warehouse Upper Windows | 288 lin. ft. |
| Roofing Material | Southeast Loft, South Center; Interior Debris form Dripping Roof | 2 sq. ft. |
| 12” Green Floor Tile & Adhesive | Northeast Storage Cubby, North of Head | 12 sq. ft. |
| Pipe Insulation Debris | Southeast Loft Area, Joints of TnG Wood Flooring, Under Flooring at Holes | 120 sq. ft. |

## 4.3 Lead-based Paint

The results of the testing (Appendix 3) revealed that lead-based paint was present at ten (10) locations associated with Building AS 124 as shown in Table 2.

**TABLE 2 – SUMMARY OF LEAD-BASED PAINT FINDINGS**

| FACILITY ID. | XRF TEST NO. | INT./EXT. | FEATURE | SUBSTRATE | COLOR | XRF RDG.[1] |
|---|---|---|---|---|---|---|
| AS 124 | 60 | Exterior | Window | Metal | White | 1.32 |
| AS 124 | 66 | Exterior | Door frame | Metal | Off-white | 1.53 |
| AS 124 | 99 | Exterior | Bollard | Metal | Yellow | 1.44 |
| AS 124 | 96 | Interior | Wall | Wood | Off-white | 1.31 |

| TABLE 2 continued – SUMMARY OF LEAD-BASED PAINT FINDINGS | | | | | | |
|---|---|---|---|---|---|---|
| **FACILITY ID.** | **XRF TEST NO.** | **INT./EXT.** | **FEATURE** | **SUBSTRATE** | **COLOR** | **XRF RDG.[1]** |
| AS 124 | 104 | Interior | Wall | Drywall | White | > 1.0 |
| AS 124 | 106 | Interior | Wall | Drywall | White | > 1.0 |
| AS 124 | 108 | Interior | Wall | Drywall | White | > 1.0 |
| AS 124 | 117 | Interior | Wall | Drywall | White | 1.62 |
| AS 124 | 135 | Interior | Door frame | Wood | Off-white | 2.34 |
| AS 124 | 139 | Interior | Door casing | Wood | Peach | 3.26 |

NOTE: 1) units in millgrams per square centimeter (mg/cm$^2$)

## 4.4 Recommendations - ACM & Presumed ACM

Asbestos containing materials (ACM) or Presumed ACM (PACM) were identified in the building. In their current condition, these materials are considered Category I Non-friable ACM or PACM with one exception. The report provided by personnel of the Camp Lejeune Marine Corps' Environmental Protection office dated October 16, 2017 (print date) identified pipe insulation debris in the southeast loft area of the building which is considered friable ACM. For the purposes of renovation, the identified ACM and the PACM should be considered Regulated Asbestos Containing Materials (RACM). These materials and any other suspect ACM where present should be removed prior to the renovation of the facilities by accredited personnel in accordance with applicable local, state, and federal regulations and guidelines. Disposal of the removed RACM should be disposed of in accordance with applicable local, state, and federal regulations/guidelines.

All ACM waste materials resulting from the renovation activities should be collected and disposed of in accordance with applicable state and federal regulations, the project specifications, and the "Marine Corps Base (MCB) Camp Lejeune Contractor Environmental Guidelines".

## 4.5 Recommendations - Lead-based Paint

Lead-based paint (LBP), i.e. paint that contains lead equal to or exceeding one milligram per square centimeter (1.0 mg/cm$^2$), was identified at ten (10) locations on the painted surfaces tested at the building as shown in Table 2. ACES recommends that the lead paint on the various surfaces not be disturbed as a part of the renovation activities unless necessary as a result of the renovation activities. If the painted surfaces must be disturbed, removal of the LBP should be performed in accordance with local, state, and federal regulations.

In addition, lead was identified on other painted surfaces but the concentration did not meet the definition of LBP. For painted surfaces where LBP was not present but lead was present and would be impacted by the renovation activities, the necessary protection for the potential exposure to lead that may be present should be addressed as outlined in applicable Occupational Safety and Health Administration (OSHA) regulatory standards.

All waste materials from the renovations should be collected and disposed of in accordance with applicable state and federal regulations, the project specifications, and the "Marine Corps Base (MCB) Camp Lejeune Contractor Environmental Guidelines".

## 5.0 LIMITATIONS

This report has been prepared for the exclusive use of Talley & Smith Architecture, Inc. and their agents with regard to Building AS 124 located at the Marine Corps Air Station – New River in Jacksonville, North Carolina. This report has been prepared in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made. Our observations are based upon conditions readily visible at the time of our site visit. We have not verified the completeness or accuracy of the information provided by others.

Materials identified as presumed ACM should be considered to contain asbestos or additional sampling and analysis should be performed to confirm or deny the presence of asbestos.

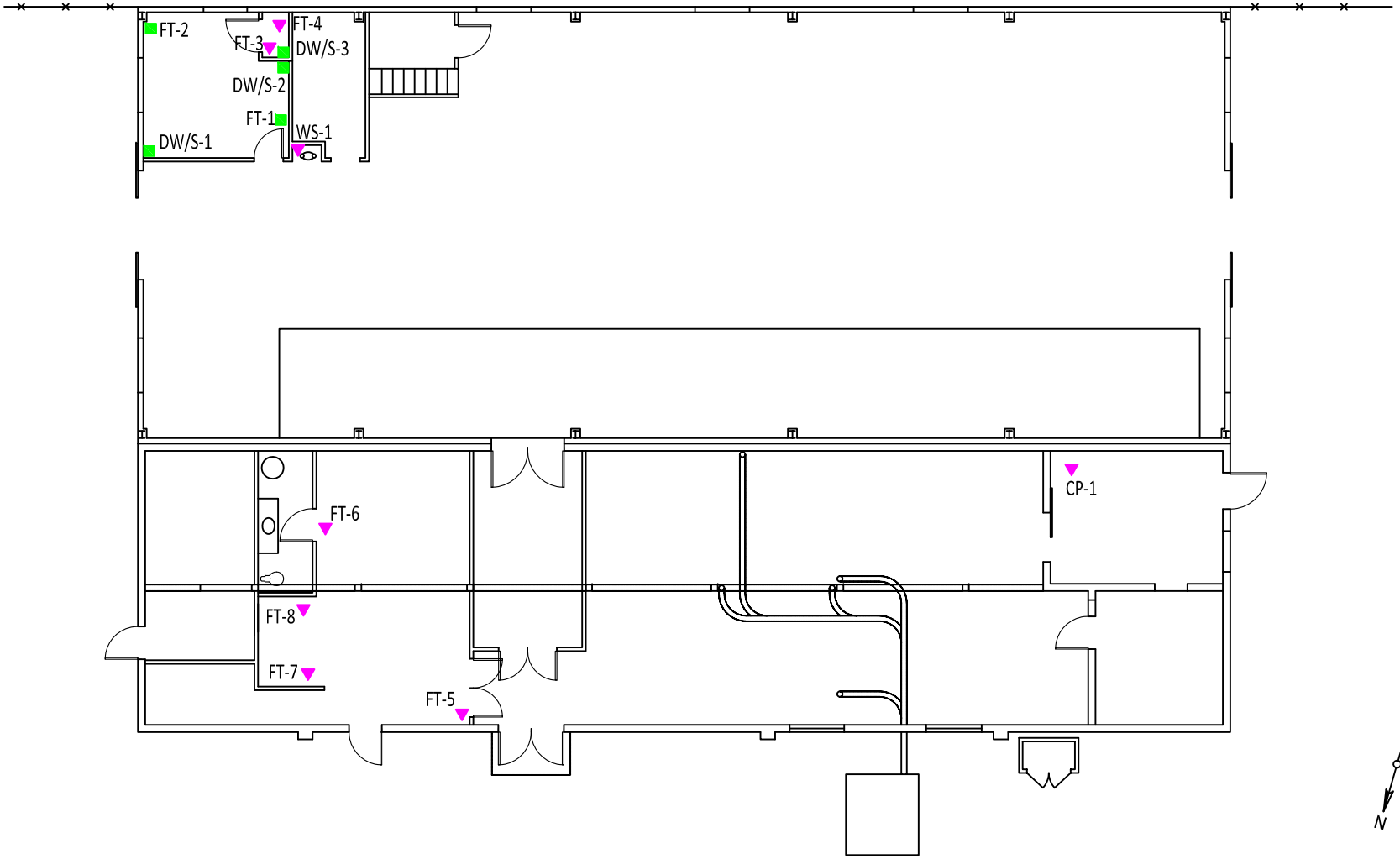
During the site visit, accessible areas were visually surveyed for the presence of suspect asbestos containing materials (ACM) and lead-based paints (LBP). Inaccessible areas, such as above ceilings or behind walls may have not been surveyed; therefore, all ACM and/or LBP may not have been identified. Areas inspected were those designated by the scope of services. As with any similar survey of this nature, actual conditions exist only at the precise locations from which bulk samples were collected and/or LBP samples measured. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. No other warranty, expressed or implied, is made.

Under this scope of services, ACES assumes no responsibility regarding response actions (e.g. O&M Plan, encapsulation, abatement, removal, worker notification, etc.) initiated as a result of these findings. It is important to note that the Building Owner has a number of responsibilities and obligations as found under 40 CFR 745 (also known as Title X) including notification and/or disclosure of all information concerning LBP to workers and buyers. ACES assumes no liability for the duties and responsibilities of the Building Owner with respect to compliance with these regulations. Compliance with regulations and response actions are the sole responsibility of the Building Owner and should be conducted in accordance with local, state and/or federal requirements, and should be performed by appropriately qualified and licensed personnel, as warranted.

ACES, by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies any conditions at the site that may present a potential danger to public health, safety, or the environment. It is the client's responsibility to notify the appropriate local, state, or federal public agencies as required by law, or otherwise to disclose, in a timely manner, any information that may be necessary to prevent any danger to public health, safety, or the environment. The contents of this report should not be construed in any way as a recommendation to purchase, sell, or further develop the project site.

# APPENDIX 1

# FIGURES




**LEGEND**

Sample ID # — CT-2 ■ Approximate Sample Location - Asbestos Not Detected

Sample ID # — FT-2 ▼ Approximate Sample Location - Asbestos Detected

**BLDG AS 124**

PROJ. NUM.: 2017 - 10 - 104

DATE: February __, 2019

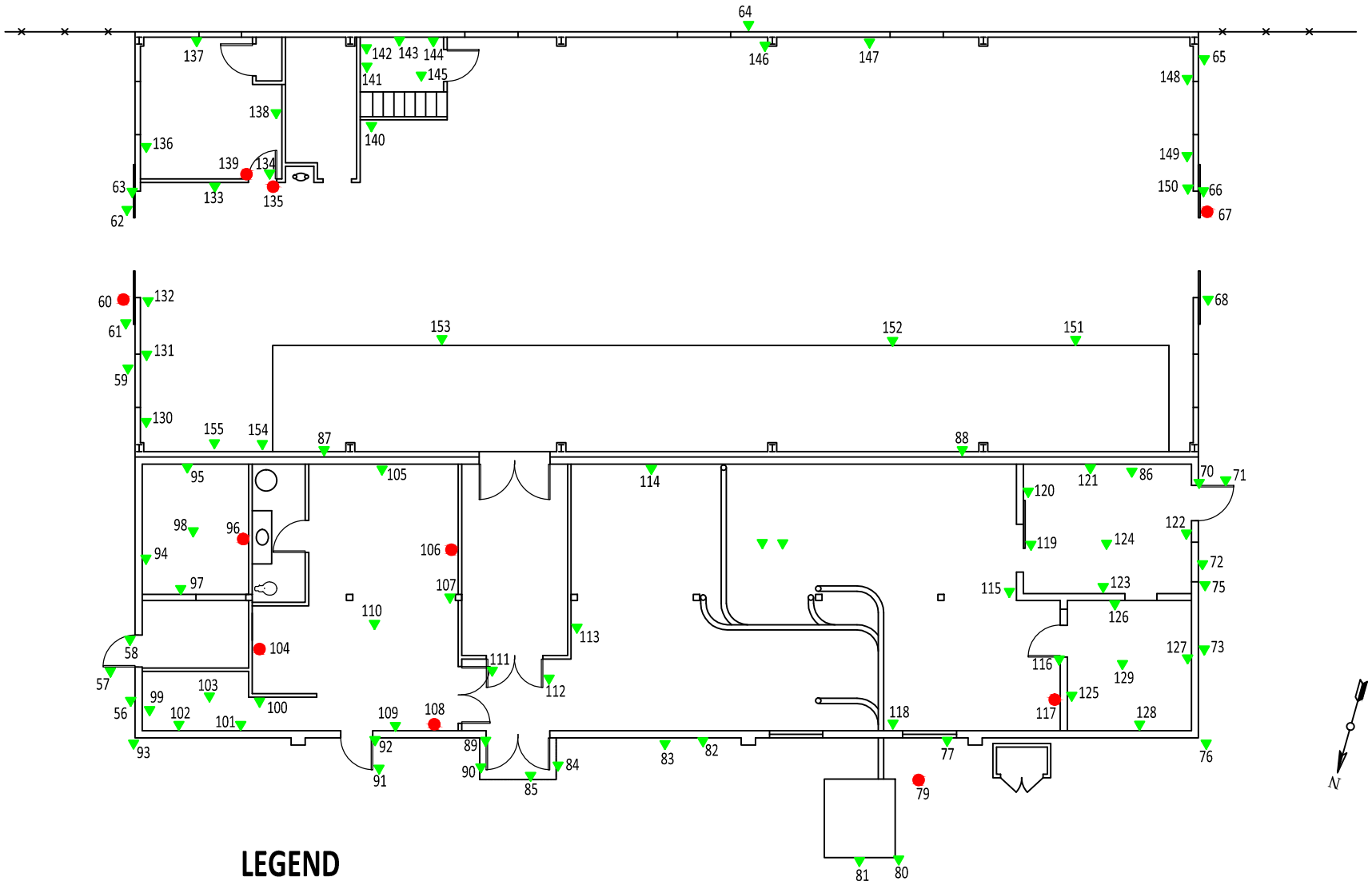
SAMPLE LOCATION PLAN

ALLIED CONSULTING & ENVIRONMENTAL SERVICES
SHELBY, NORTH CAROLINA
P.O. BOX 2426 (28151-2426) 704-600-6255
409 E. MARION ST. (28150) FAX 704-482-5596

**DELIVERY ORDER 0018**
**INTERIOR/EXTERIOR REPAIRS, BLDG. AS 124**
**MARINE CORPS AIR STATION - NEW RIVER**
**JACKSONVILLE, NORTH CAROLINA**

FIGURE

**1**




## LEGEND

Sample ID # 1 — APPROXIMATE SAMPLE LOCATION - NO LEAD-BASED PAINT IDENTIFIED

Sample ID # 1 — APPROXIMATE SAMPLE LOCATION - LEAD-BASED PAINT IDENTIFIED

## BLDG AS 124

PROJ. NUM.: 2017 - 10 - 104

DATE: February 11, 2019

SAMPLE LOCATION PLAN

ALLIED CONSULTING & ENVIRONMENTAL SERVICES
SHELBY, NORTH CAROLINA
P.O. BOX 2426 (28151-2426) 704-600-6255
409 E. MARION ST. (28150) FAX 704-482-5596

**DELIVERY ORDER 0018**
**INTERIOR/EXTERIOR REPAIRS, BLDG. AS 124**
**MARINE CORPS AIR STATION - NEW RIVER**
**JACKSONVILLE, NORTH CAROLINA**

FIGURE

**2**

# APPENDIX 2

# ASBESTOS ANALYTICAL RESULTS

# CHAIN OF CUSTODY

# EMSL Analytical, Inc.

**376 Crompton Street Charlotte, NC 28273**

Tel/Fax: (704) 525-2205 / (704) 525-2382

http://www.EMSL.com / charlottelab@emsl.com


**EMSL Order:** 411707866
**Customer ID:** ALLC25
**Customer PO:**
**Project ID:**

**Attention:** Dewitt Whitten
Allied Consulting & Environmental Svs
P.O. Box 2426
Shelby, NC 28151

**Project:** AS-124/ 2017-10-104

**Phone:** (704) 232-0152
**Fax:**
**Received Date:** 10/12/2017 11:40 AM
**Analysis Date:** 10/18/2017
**Collected Date:** 10/11/2017

## *Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy*

| Sample | Description | Appearance | Non-Asbestos % Fibrous | Non-Asbestos % Non-Fibrous | Asbestos % Type |
|---|---|---|---|---|---|
| FT-1-Floor Tile<br>*411707866-0001* | 12x12 Floor Tile & Mastic | Gray<br>Non-Fibrous<br>Homogeneous | | 35% Ca Carbonate<br>65% Non-fibrous (Other) | None Detected |
| FT-1-Mastic<br>*411707866-0001A* | 12x12 Floor Tile & Mastic | Tan<br>Non-Fibrous<br>Homogeneous | | 8% Ca Carbonate<br>92% Non-fibrous (Other) | None Detected |
| FT-2-Floor Tile<br>*411707866-0002* | 12x12 Floor Tile & Mastic | Gray<br>Non-Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>60% Non-fibrous (Other) | None Detected |
| FT-2-Mastic<br>*411707866-0002A* | 12x12 Floor Tile & Mastic | Tan<br>Non-Fibrous<br>Homogeneous | | 5% Ca Carbonate<br>95% Non-fibrous (Other) | None Detected |
| FT-3-Floor Tile<br>*411707866-0003* | 9x9 Floor Tile & Mastic | Brown/Gray<br>Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>54% Non-fibrous (Other) | 6% Chrysotile |
| FT-3-Mastic<br>*411707866-0003A* | 9x9 Floor Tile & Mastic | Black<br>Fibrous<br>Homogeneous | 1% Cellulose | 8% Ca Carbonate<br>91% Non-fibrous (Other) | None Detected |
| FT-4-Floor Tile<br>*411707866-0004* | 9x9 Floor Tile & Mastic | Brown<br>Non-Fibrous<br>Homogeneous | | 20% Ca Carbonate<br>74% Non-fibrous (Other) | 6% Chrysotile |
| FT-4-Mastic<br>*411707866-0004A* | 9x9 Floor Tile & Mastic | Black<br>Non-Fibrous<br>Homogeneous | <1% Cellulose | 5% Ca Carbonate<br>95% Non-fibrous (Other) | None Detected |
| DW/S-1-Drywall<br>*411707866-0005* | Drywall/ Spackling | Gray<br>Fibrous<br>Homogeneous | 8% Cellulose | 92% Non-fibrous (Other) | None Detected |
| DW/S-1-Joint Compound<br>*411707866-0005A* | Drywall/ Spackling | White<br>Non-Fibrous<br>Homogeneous | | 30% Ca Carbonate<br>70% Non-fibrous (Other) | None Detected |
| DW/S-2-Drywall<br>*411707866-0006* | Drywall/ Spackling | Gray<br>Fibrous<br>Homogeneous | 8% Cellulose | 92% Non-fibrous (Other) | None Detected |
| DW/S-2-Joint Compound<br>*411707866-0006A* | Drywall/ Spackling | White<br>Non-Fibrous<br>Homogeneous | | 10% Ca Carbonate<br>90% Non-fibrous (Other) | None Detected |
| DW/S-3-Drywall<br>*411707866-0007* | Drywall/ Spackling | Gray<br>Non-Fibrous<br>Homogeneous | 10% Cellulose | 90% Non-fibrous (Other) | None Detected |
| DW/S-3-Joint Compound<br>*411707866-0007A* | Drywall/ Spackling | White<br>Non-Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>60% Non-fibrous (Other) | None Detected |
| WS-1<br>*411707866-0008* | Wall Section at Water Fountain | Gray<br>Fibrous<br>Homogeneous | 5% Cellulose | 10% Ca Carbonate<br>70% Non-fibrous (Other) | 15% Chrysotile |

Initial report from: 10/18/2017 14:38:14

**EMSL Analytical, Inc.**
**376 Crompton Street Charlotte, NC 28273**
Tel/Fax: (704) 525-2205 / (704) 525-2382
http://www.EMSL.com / charlottelab@emsl.com

**EMSL Order:** 411707866
**Customer ID:** ALLC25
**Customer PO:**
**Project ID:**

## *Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy*

| | | | Non-Asbestos | | Asbestos |
|---|---|---|---|---|---|
| **Sample** | **Description** | **Appearance** | **% Fibrous** | **% Non-Fibrous** | **% Type** |
| FT-5-Floor Tile<br>*411707866-0009* | White 12x12 Floor Tile & Mastic | White<br>Non-Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>60% Non-fibrous (Other) | None Detected |
| FT-5-Tan Mastic<br>*411707866-0009A* | White 12x12 Floor Tile & Mastic | Tan<br>Non-Fibrous<br>Homogeneous | | 5% Ca Carbonate<br>95% Non-fibrous (Other) | None Detected |
| FT-5-Black Mastic<br>*411707866-0009B* | White 12x12 Floor Tile & Mastic | Black<br>Fibrous<br>Homogeneous | 1% Cellulose | 5% Ca Carbonate<br>91% Non-fibrous (Other) | 3% Chrysotile |
| FT-6-Floor Tile<br>*411707866-0010* | White 12x12 Floor Tile & Mastic | Tan<br>Non-Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>60% Non-fibrous (Other) | None Detected |
| FT-6-Tan Mastic<br>*411707866-0010A* | White 12x12 Floor Tile & Mastic | Tan<br>Non-Fibrous<br>Homogeneous | | 5% Ca Carbonate<br>95% Non-fibrous (Other) | None Detected |
| FT-6-Black Mastic<br>*411707866-0010B* | White 12x12 Floor Tile & Mastic | Black<br>Non-Fibrous<br>Homogeneous | | 96% Non-fibrous (Other) | 4% Chrysotile |
| FT-7-Floor Tile<br>*411707866-0011* | Gray 12x12 Floor Tile & Mastic | Gray<br>Non-Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>60% Non-fibrous (Other) | None Detected |
| FT-7-Mastic<br>*411707866-0011A* | Gray 12x12 Floor Tile & Mastic | Black<br>Fibrous<br>Homogeneous | 1% Cellulose | 96% Non-fibrous (Other) | 3% Chrysotile |
| FT-8-Floor Tile<br>*411707866-0012* | Gray 12x12 Floor Tile & Mastic | Gray<br>Non-Fibrous<br>Homogeneous | | 40% Ca Carbonate<br>60% Non-fibrous (Other) | None Detected |
| FT-8-Mastic<br>*411707866-0012A* | Gray 12x12 Floor Tile & Mastic | Black<br>Non-Fibrous<br>Homogeneous | | 96% Non-fibrous (Other) | 4% Chrysotile |
| CP-1<br>*411707866-0013* | Ceiling Panel | Gray/White<br>Fibrous<br>Heterogeneous | | 15% Ca Carbonate<br>73% Non-fibrous (Other) | 12% Chrysotile |

Analyst(s)
*Eric Loomis (12)*
*Lacy Searcy (14)*

Lee Plumley, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. Charlotte, NC NVLAP Lab Code 200841-0, VA 3333 00312

Initial report from: 10/18/2017 14:38:14

EMSL ANALYTICAL, INC.

Asbestos Lab Services Chain of Custody

**EMSL Order Number** *(Lab Use Only)*: 411707866

Charlotte, NC
376 Crompton Street
Charlotte, NC 28273
PHONE: (704) 525-2205
FAX: (704) 525 2382

| | |
|---|---|
| Company: Allied Consulting & Environmental Services, LLC | EMSL-Bill to: ☑ Same ☐ Different<br>If Bill to is Different note instructions in Comments**<br>*Third Party Billing requires written authorization from third party* |
| Street: P. O. Box 2426 | |
| City/State/Zip: Shelby, NC 28151 | |
| Report To (Name): DeWitt Whitten | Fax: 7044825596 |
| Telephone: 7042320152 | Email Address: dewitt@aces-env.com |
| Project Name/Number: AS-124 / 2017-10-104 | |
| Please Provide Results: Email / Purchase Order: | State Samples Taken: NC |

Turnaround Time (TAT) Options* – Please Check:

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☒ 1 Week ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

**PCM - Air** ☐ Check if samples are from NY
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

**PLM - Bulk (reporting limit)**
- ☒ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

**TEM – Air** ☐ 4-4.5hr TAT (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

**TEM - Bulk**
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

**TEM – Water:** EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

**TEM - Dust**
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

**Soil/Rock/Vermiculite**
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

**Other:**
- ☐

☐ Check For Positive Stop – Clearly Identify Homogenous Group | Filter Pore Size (Air Samples): ☐ 0.8µm ☐ 0.45µm

Samplers Name: DeWitt Whitten | Samplers Signature: [signature]

| Sample # | Sample Description | Volume/Area (Air) HA # (Bulk) | Date/Time Sampled |
|---|---|---|---|
| FT-1,2 | 12x12 Floor Tile & mastic | | 11 Oct 2017 AM |
| FT-3,4 | 9x9 Floor Tile & mastic | | " |
| DW/S-1,2,3 | Drywall / Spackling | | " |
| WS-1 | Wall Section @ Water Fountain | | " |
| FT-5,6 | White 12x12 Floor Tile & mastic | | " |
| FT-7,8 | Gray 12x12 Floor Tile & mastic | | " |
| CP-1 | Ceiling Panel | | " |
| | | | |

Client Sample # (s): see above | Total # of Samples: 13

Relinquished (Client): [signature] Date: 12 Oct 2017 Time: 1137

Received (Lab): Kyle Nloon Date: 10/12/17 Time: 11:40AM W/IN

Comments/Special Instructions:

**APPENDIX 3**

**ASBESTOS REPORT BY OTHERS**

## Friable ACM identified

| DESCRIPTION | LOCATION | Date | Quantity |
|---|---|---|---|
| PIPE INSULATION DEBRIS | SOUTHEAST LOFT AREA, JOINTS OF TnG WOOD FLOORING, UNDER FLOORING AT HOLES, AREA CONTAMINATION | 3/2/2010 | 120 SF |
| PIPE INSULATION DEBRIS | SOUTHEAST LOFT AREA, JOINTS OF TnG WOOD FLOORING, UNDER FLOORING AT HOLES, AREA CONTAMINATION | 9/16/2014 | 120 SF |
| PIPE INSULATION DEBRIS | SOUTHEAST LOFT AREA, JOINTS OF TnG WOOD FLOORING, UNDER FLOORING AT HOLES, AREA CONTAMINATION | 7/29/2015 | 120 SF |
| PIPE INSULATION DEBRIS | SOUTHEAST LOFT AREA, JOINTS OF TnG WOOD FLOORING, UNDER FLOORING AT HOLES, AREA CONTAMINATION | 5/14/2014 | 120 SF |

## Non-friable ACM identified

| DESCRIPTION | LOCATION | Date | Quantity |
|---|---|---|---|
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 8/31/1999 | 130 SF |
| TRANSITE-TYPE CEILING PANELS | NORTHSIDE CENTER AND WEST ROOM CEILINGS | 8/31/1999 | 1,500 SF |
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 8/31/1999 | 50 SF |
| WINDOW GLAZING MATERIAL | METAL WINDOWS, INTERIOR SIDE LOWER (OLD GLAZE); EXTERIOR SIDE EAST AND WEST WAREHOUSE UPPER WINDOWS (SEE ALSO HM06) | 5/8/2007 | 288 LF |
| ROOFING MATERIAL, | SOUTHEAST LOFT, SOUTH CENTER; INTERIOR DEBRIS FROM DRIPPING ROOF w/HM07/08 AFFIXED | 3/2/2010 | 2 SF |
| TRANSITE PANEL MATERIAL | SOUTHEAST LOFT, SOUTH CENTER DEBRIS (ATTACHED TO HM22) | 3/2/2010 | 1 SF |
| 12" GREEN FLOOR TILE AND ADHESIVE | NORTHEAST STORAGE CUBBY, NORTH OF HEAD | 3/2/2010 | 12 SF |
| ROOFING SEALANT, SILVER | SOUTHSIDE PITCHED METAL ROOF COATING THROUGHOUT | 3/2/2010 | 4,400 SF |
| 12" BEIGE w/BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE AREA AND NORTHEAST RESTROOM AREAS (RENOVATED/ NEW) | 5/8/2007 | 130 SF |

| | | | | |
|---|---|---|---|---|
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 5/8/2007 | 50 | SF |
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 5/8/2007 | 130 | SF |
| TRANSITE-TYPE CEILING PANELS | NORTHWEST ROOM CEILINGS | 5/8/2007 | 220 | SF |
| WINDOW GLAZING MATERIAL | METAL WINDOWS, INTERIOR SIDE LOWER (OLD GLAZE); EXTERIOR SIDE EAST AND WEST WAREHOUSE UPPER WINDOWS (SEE ALSO HM06) | 3/2/2010 | 288 | LF |
| TRANSITE-TYPE CEILING PANELS | NORTHSIDE CENTER AND WEST ROOM CEILINGS | 11/7/2002 | 1,500 | SF |
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 3/2/2010 | 130 | SF |
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 11/7/2002 | 50 | SF |
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 5/14/2014 | 50 | SF |
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 3/2/2010 | 50 | SF |
| TRANSITE-TYPE CEILING PANELS | NORTHWEST ROOM CEILINGS | 3/2/2010 | 220 | SF |
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 11/7/2002 | 130 | SF |
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 7/29/2015 | 50 | SF |
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 7/29/2015 | 130 | SF |
| TRANSITE-TYPE CEILING PANELS | NORTHWEST ROOM CEILING | 7/29/2015 | 220 | SF |
| 12" BEIGE w/BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE AREA AND NORTHEAST RESTROOM AREAS (RENOVATED/ NEW) | 7/29/2015 | 130 | SF |
| WINDOW GLAZING MATERIAL | METAL WINDOWS, INTERIOR SIDE LOWER (OLD GLAZE); EXTERIOR SIDE EAST AND WEST WAREHOUSE UPPER WINDOWS (SEE ALSO HM06) | 7/29/2015 | 288 | LF |
| ROOFING MATERIAL, | SOUTHEAST LOFT, SOUTH CENTER; INTERIOR DEBRIS FROM DRIPPING ROOF w/HM07/08 AFFIXED | 7/29/2015 | 2 | SF |
| 12" GREEN FLOOR TILE AND ADHESIVE | NORTHEAST STORAGE CUBBY, NORTH OF HEAD | 7/29/2015 | 12 | SF |
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 5/14/2014 | 130 | SF |
| TRANSITE-TYPE CEILING PANELS | NORTWEST ROOM CEILING | 5/14/2014 | 220 | SF |
| 12" BEIGE w/BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE AREA AND NORTHEAST RESTROOM AREAS (RENOVATED/ NEW) | 5/14/2014 | 130 | SF |

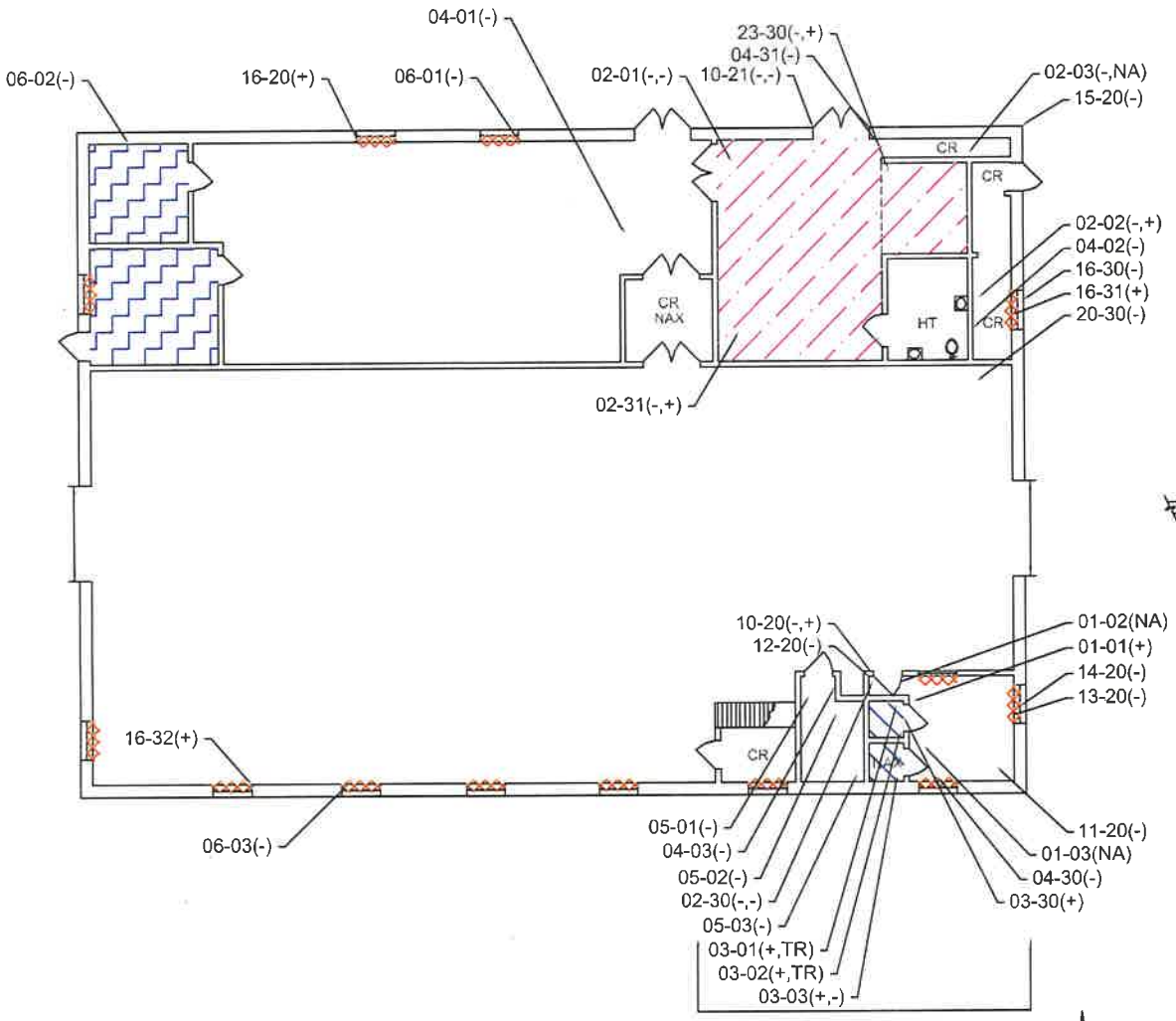
| | | | | |
|---|---|---|---|---|
| WINDOW GLAZING MATERIAL | METAL WINDOWS, INTERIOR SIDE LOWER (OLD GLAZE); EXTERIOR SIDE EAST AND WEST WAREHOUSE UPPER WINDOWS (SEE ALSO HM06) | 5/14/2014 | 288 | LF |
| ROOFING MATERIAL, | SOUTHEAST LOFT, SOUTH CENTER; INTERIOR DEBRIS FROM DRIPPING ROOF w/HM07/08 AFFIXED | 5/14/2014 | 2 | SF |
| 12" GREEN FLOOR TILE AND ADHESIVE | NORTHEAST STORAGE CUBBY, NORTH OF HEAD | 5/14/2014 | 12 | SF |
| ROOFING SEALANT, SILVER | SOUTHSIDE PITCHED METAL ROOF COATING THROUGHOUT | 5/14/2014 | 4,400 | SF |
| TRANSITE PANEL MATERIAL | SOUTHEAST LOFT, SOUTH CENTER DEBRIS (ATTACHED TO HM22) | 5/14/2014 | 1 | SF |
| ROOFING SEALANT, SILVER | SOUTHSIDE PITCHED METAL ROOF COATING THROUGHOUT | 7/29/2015 | 4,400 | SF |
| TRANSITE PANEL MATERIAL | SOUTHEAST LOFT, SOUTH CENTER DEBRIS (ATTACHED TO HM22) | 7/29/2015 | 1 | SF |
| 9" BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE CLOSETS/ STORAGE | 9/16/2014 | 50 | SF |
| TRANSITE-TYPE WALL PANELS | NORTHWEST ROOMS, CENTER DIVIDING WALL | 9/16/2014 | 130 | SF |
| TRANSITE-TYPE CEILING PANELS | NORTHWEST ROOM CEILING | 9/16/2014 | 220 | SF |
| 12" BEIGE w/BROWN FLOOR TILE AND ADHESIVE | SOUTHEAST OFFICE AREA AND NORTHEAST RESTROOM AREAS (RENOVATED/ NEW) | 9/16/2014 | 130 | SF |
| WINDOW GLAZING MATERIAL | METAL WINDOWS, INTERIOR SIDE LOWER (OLD GLAZE); EXTERIOR SIDE EAST AND WEST WAREHOUSE UPPER WINDOWS (SEE ALSO HM06) | 9/16/2014 | 288 | LF |
| ROOFING MATERIAL, | SOUTHEAST LOFT, SOUTH CENTER; INTERIOR DEBRIS FROM DRIPPING ROOF w/HM07/08 AFFIXED | 9/16/2014 | 2 | SF |
| 12" GREEN FLOOR TILE AND ADHESIVE | NORTHEAST STORAGE CUBBY, NORTH OF HEAD | 9/16/2014 | 12 | SF |
| ROOFING SEALANT, SILVER | SOUTHSIDE PITCHED METAL ROOF COATING THROUGHOUT | 9/16/2014 | 4,400 | SF |
| TRANSITE PANEL MATERIAL | SOUTHEAST LOFT, SOUTH CENTER DEBRIS (ATTACHED TO HM22) | 9/16/2014 | 1 | SF |

# *Tested Non ACM or REMOVED Materials*

| *DESCRIPTION* | *LOCATION* | *Date* | *Quantity* |
|---|---|---|---|
| DRYWALL AND JOINT MATERIAL | SOUTH EAST STORAGE/ OFFICE (EAST OF STAIRS) | 8/31/1999 | |

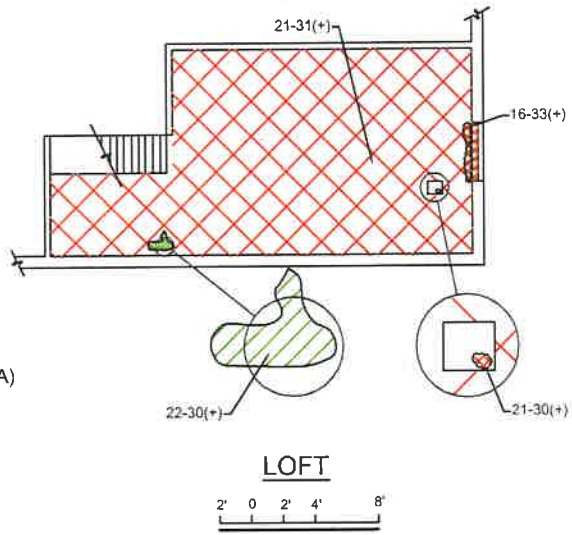
| | | |
|---|---|---|
| BUILT-UP ROOFING | NORTHSIDE FLAT ROOFING SYSTEM | 8/31/1999 |
| PIPE INSULATION SEALANT | OVERHEAD STEAM PIPING SYSTEMS ON FIBERGLASS | 5/8/2007 |
| DRYWALL AND JOINT MATERIAL | SOUTHEAST PASSAGE BY FOUNTAIN (REPAIRED WALL) | 5/8/2007 |
| INTERIOR CAULKING, | COVERED WINDOWS | 5/8/2007 |
| INTERIOR CAULKING, | OLD METAL WINDOWS | 5/8/2007 |
| DRYWALL AND JOINT MATERIAL | SOUTHEAST OFFICE/ STORAGE, NORTHEAST HEADS/ LOCKER; NORTHSIDE CENTER ROOMS | 8/31/1999 |
| 12" BEIGE FLOOR TILE AND ADHESIVE | NORTHEAST HEADS, LOCKER ROOM | 8/31/1999 |
| WINDOW GLAZING MATERIAL | METAL WINDOWS THROUGHOUT, INTERIOR SIDE (SEE ALSO HM16) | 8/31/1999 |
| LINOLEUM AND ADHESIVE, | SOUTHEAST OFFICE | 8/31/1999 |
| EXTERIOR CAULKING, | NORTHSIDE ROOF GUTTER SEAMS | 5/8/2007 |
| TEXTURED WALL AND CEILING MATERIAL | BRUSHED MATERIAL, INTERIOR AND EXTERIOR WALLS | 5/14/2014 |
| MISCELLANEOUS SEALANT | SOUTHEAST EXTERIOR GROUND LEVEL, ABANDONED UNDERGROUND STEAM LINES | 5/14/2014 |
| FIBERGLASS INSULATION SEALANT | EAST CENTER STEAM VALVE PIPING AND OVERHEAD LINES THROUGHOUT | 3/2/2010 |
| RESIDUAL MASTIC | NORTH CENTRAL STOREROOM HALL/ PASSAGE | 5/14/2014 |
| LINOLEUM AND ADHESIVE, | LINOLEUM AND ADHESIVE, | 5/8/2007 |
| LINOLEUM AND ADHESIVE, | SOUTHEAST OFFICE (TWO LAYERS OF ACM FLOORING) | 11/7/2002 |
| BUILT-UP ROOFING, BLACK | NORTHSIDE FLAT ROOFING SYSTEM | 5/8/2007 |
| BUILT-UP ROOFING | NORTHSIDE FLAT ROOFING SYSTEM | 11/7/2002 |
| 12" BEIGE FLOOR TILE AND ADHESIVE | NORTHEAST HEADS, LOCKER ROOM | 11/7/2002 |
| 12" BEIGE FLOOR TILE AND ADHESIVE | NORTHEAST HEADS, LOCKER ROOM | 5/8/2007 |
| 12" BEIGE FLOOR TILE AND ADHESIVE | NORTHEAST HEADS, LOCKER ROOM | 5/14/2014 |
| 12" BEIGE FLOOR TILE AND ADHESIVE | NORTHEAST HEADS, LOCKER ROOM | 3/2/2010 |
| DRYWALL AND JOINT MATERIAL | SOUTHEAST OFFICE/ STORAGE, NORTHEAST HEADS/ LOCKER; NORTHSIDE CENTER ROOMS | 3/2/2010 |

NOTE: PREVIOUS ACM [HM01] HAS BEEN REMOVED.




DANGER

TSI DEBRIS UNDER DECKING VISIBLE THROUGH HATCH.




NAX NOT ACCESSIBLE
CR CONCRETE
HT HARD TILE

SAMPLE LEGEND ID

01-01 (+,-)

SAMPLE IDENTIFICATION

POSITIVE (+) NEGATIVE (-) OR TRACE (TR) FOR THE PRESENCE OF ASBESTOS

HOMOGENOUS MATERIAL

## BUILDING AS124
## FIRST FLOOR

7' 0' 7' 14' 28'

N

ACM LEGEND

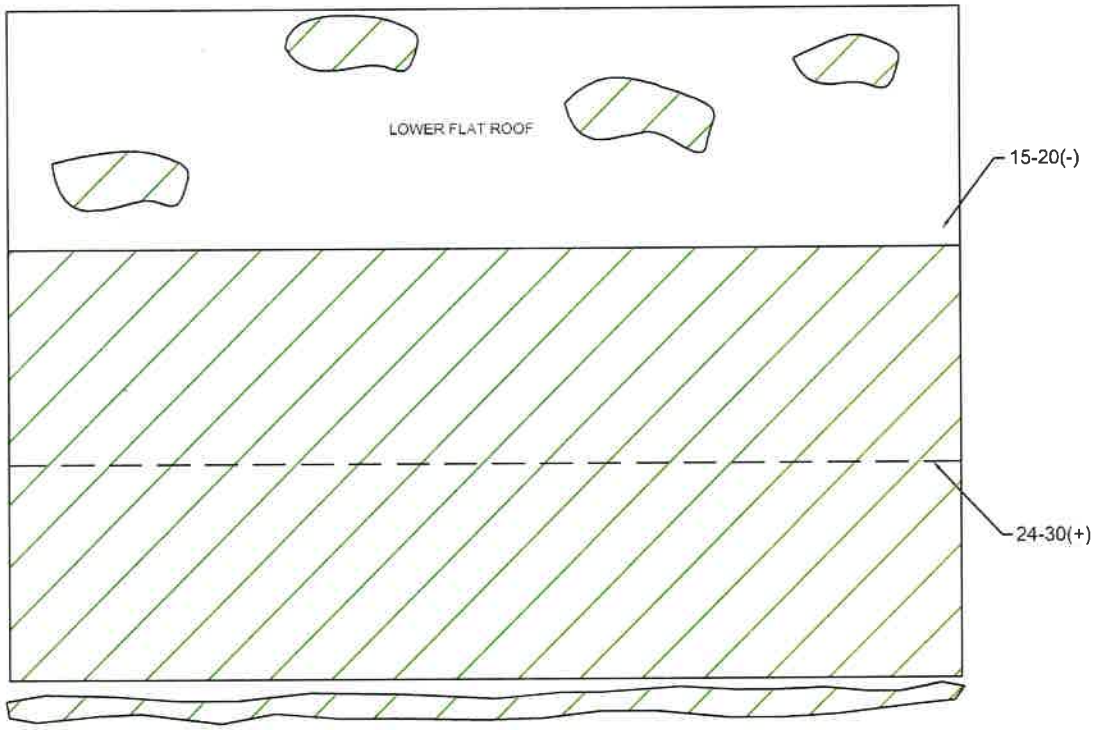
- MASTIC UNDER 12" BEIGE, 12" GREEN FLOOR TILE [HM02,23]
- 9" BROWN FLOOR TILE [HM03]
- TRANSITE PANEL MATERIAL, CEILING AND WALL [HM07,08]
- WINDOW GLAZING MATERIAL, INTERIOR [HM16]
- CONTAMINATED AREA, PIPE INSULATION DEBRIS [HM21]
- ROOFING MATERIAL, TAR, TILE MATERIAL, DEBRIS [HM22]

REVISIONS

MCB CAMP LEJEUNE, NC

CY2015 ASBESTOS INSPECTION
AS124-01
MCB CAMP LEJEUNE, NC

NOTE: [HM24] HAS STARTED TO COME OFF AND LITTERS LOWER ROOF AND GROUND BOTH SIDES OF BUILDING.




SAMPLE LEGEND ID

SAMPLE IDENTIFICATION

01-01 (+,-)

POSITIVE (+), NEGATIVE (-), OR TRACE (TR) FOR THE PRESENCE OF ASBESTOS

HOMOGENEOUS MATERIAL

## BUILDING AS124
## ROOF

7' 0' 7' 14' 28'

N

ACM LEGEND

ROOFING SILVER COAT. W / DEBRIS [HM24]

REVISIONS

MCB CAMP LEJEUNE, NC

CY2015 ASBESTOS INSPECTION
AS124-R
MCB CAMP LEJEUNE, NC

# APPENDIX 4

# XRF FIELD DATA SHEETS

| XRF LBP TESTING DATA SHEET | | |
|---|---|---|
| **PROJECT NAME/ADDRESS/UNIT NO.** AS-124; USMC Air Station; Jacksonville, NC | **PROJECT NO.** 2017 – 10 - 104 | **DATE** 11 October 2017 |
| **XRF MODEL/SERIAL NO.** INNOVX LBP 4000 #11916 | **INSPECTOR NAME/NO.** DeWitt Whitten, NCRA 220118 | **SIGNATURE** |

| SAMPLE # | SUBSTRATE[1] | COMPONENT | COLOR[2] | TEST LOCATION | LEVEL | XRF READING | UNITS[3] | CLASSIFICATION[4] |
|---|---|---|---|---|---|---|---|---|
| 56 | CMU | Wall | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 57 | M | Door | Br | See Figure 2 | 1st | 0.12 | mg/cm$^2$ | N |
| 58 | M | Door frame | Br | See Figure 2 | 1st | 0.15 | mg/cm$^2$ | N |
| 59 | M | Wall | OW | See Figure 2 | 1st | 0.20 | mg/cm$^2$ | N |
| 60 | M | Window | W | See Figure 2 | 1st | 1.32 | mg/cm$^2$ | P |
| 61 | M | Door guide | Gr | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 62 | M | Door | OW | See Figure 2 | 1st | 0.02 | mg/cm$^2$ | N |
| 63 | M | Door frame | OW | See Figure 2 | 1st | 0.42 | mg/cm$^2$ | N |
| 64 | M | Wall | OW | See Figure 2 | 1st | 0.57 | mg/cm$^2$ | N |
| 65 | M | Wall | OW | See Figure 2 | 1st | 0.13 | mg/cm$^2$ | N |
| 66 | M | Door frame | OW | See Figure 2 | 1st | 1.53 | mg/cm$^2$ | P |
| 67 | M | Door | OW | See Figure 2 | 1st | 0.18 | mg/cm$^2$ | N |
| 68 | M | Door guide | Gr | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 70 | M | Door frame | Br | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 71 | M | Door | Br | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 72 | C | Window sill | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 73 | CMU | Wall | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 75 | B | Window surround | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 76 | M | Downspout | W | See Figure 2 | 1st | 0.13 | mg/cm$^2$ | N |
| 77 | C | Window sill | OW | See Figure 2 | 1st | 0.14 | mg/cm$^2$ | N |

1) M – metal
W – wood
DW – drywall
B – Brick
C – Concrete
CMU – Concrete Masonry Unit
P – Plaster

2) W- White
B – Blue
Y – Yellow
Bk – Black
Gr – Gray
O – Orange
Pr – Purple
R – Red
G – Green
T – Tan
Br – Brown
OW – Off-white
P - Pink
C – Clear

3) mg/cm2 – milligrams/square centimeter

4) N – Negative
P – Positive

| XRF LBP TESTING DATA SHEET | | |
|---|---|---|
| **PROJECT NAME/ADDRESS/UNIT NO.** AS-124; USMC Air Station; Jacksonville, NC | **PROJECT NO.** 2017 – 10 - 104 | **DATE** 11 October 2017 |
| **XRF MODEL/SERIAL NO.** INNOVX LBP 4000 #11916 | **INSPECTOR NAME/NO.** DeWitt Whitten, NCRA 220118 | **SIGNATURE** |

| SAMPLE # | SUBSTRATE[1] | COMPONENT | COLOR[2] | TEST LOCATION | LEVEL | XRF READING | UNITS[3] | CLASSIFICATION[4] |
|---|---|---|---|---|---|---|---|---|
| 79 | M | Bollard | Y | See Figure 2 | 1st | 1.44 | mg/cm$^2$ | P |
| 80 | M | Column | B | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 81 | M | Frame | B | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 82 | CMU | Wall | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 83 | M | Band at roof | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 84 | M | Canopy | G | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 85 | M | Underside of canopy | OW | See Figure 2 | 1st | 0.23 | mg/cm$^2$ | N |
| 86 | M | Wall | OW | See Figure 2 | 1st | 0.22 | mg/cm$^2$ | N |
| 87 | M | Roof | Silver | See Figure 2 | 1st | 0.16 | mg/cm$^2$ | N |
| 88 | M | Roof | Silver | See Figure 2 | 1st | 0.70 | mg/cm$^2$ | N |
| 89 | M | Door frame | Gr | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 90 | M | Door | Gr | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 91 | M | Door | Gr | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 92 | M | Door frame | Gr | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 93 | M | Downspout | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 94 | CMU | Wall | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 95 | CMU | Wall | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 96 | W | Wood | OW | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 97 | DW | Wood | OW | See Figure 2 | 1st | 0.13 | mg/cm$^2$ | N |
| 98 | W | Ceiling | OW | See Figure 2 | 1st | 0.14 | mg/cm$^2$ | N |

1) M – metal
W – wood
DW – drywall
B – Brick
C – Concrete
CMU – Concrete Masonry Unit
P – Plaster

2) W- White
B – Blue
Y – Yellow
Bk – Black
Gr – Gray
O – Orange
Pr – Purple
R – Red
G – Green
T – Tan
Br – Brown
OW – Off-white
P - Pink
C – Clear

3) mg/cm2 – milligrams/square centimeter

4) N – Negative
P – Positive

| XRF LBP TESTING DATA SHEET | | |
|---|---|---|
| **PROJECT NAME/ADDRESS/UNIT NO.** AS-124; USMC Air Station; Jacksonville, NC | **PROJECT NO.** 2017 – 10 - 104 | **DATE** 11 October 2017 |
| **XRF MODEL/SERIAL NO.** INNOVX LBP 4000 #11916 | **INSPECTOR NAME/NO.** DeWitt Whitten, NCRA 220118 | **SIGNATURE** |

| SAMPLE # | SUBSTRATE[1] | COMPONENT | COLOR[2] | TEST LOCATION | LEVEL | XRF READING | UNITS[3] | CLASSIFICATION[4] |
|---|---|---|---|---|---|---|---|---|
| 99 | CMU | Wall | OW | See Figure 2 | 1st | 0.40 | mg/cm$^2$ | N |
| 100 | DW | Wall | OW | See Figure 2 | 1st | 0.02 | mg/cm$^2$ | N |
| 101 | CMU | Wall | OW | See Figure 2 | 1st | 0.17 | mg/cm$^2$ | N |
| 102 | M | Pipe support | OW | See Figure 2 | 1st | 0.01 | mg/cm$^2$ | N |
| 103 | W | Ceiling | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 104 | DW | Wall | W | See Figure 2 | 1st | > 1.0 | mg/cm$^2$ | P |
| 105 | CMU | Wall | W | See Figure 2 | 1st | 0.03 | mg/cm$^2$ | N |
| 106 | DW | Wall | W | See Figure 2 | 1st | > 1.0 | mg/cm$^2$ | P |
| 107 | DW | Column surround | W | See Figure 2 | 1st | 0.23 | mg/cm$^2$ | N |
| 108 | CMU | Wall | W | See Figure 2 | 1st | > 1.0 | mg/cm$^2$ | P |
| 109 | W | Beam (between columns) | W | See Figure 2 | 1st | 0.18 | mg/cm$^2$ | N |
| 110 | W | Ceiling | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 111 | W | Door | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 112 | W | Door frame | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 113 | W | Column surround | W | See Figure 2 | 1st | 0.20 | mg/cm$^2$ | N |
| 114 | CMU | Wall | W | See Figure 2 | 1st | 0.10 | mg/cm$^2$ | N |
| 115 | CMU | Wall | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 116 | W | Door | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 117 | DW | Wall | W | See Figure 2 | 1st | 1.52 | mg/cm$^2$ | P |
| 118 | CMU | Wall | W | See Figure 2 | 1st | 0.04 | mg/cm$^2$ | N |

1) M – metal
W – wood
DW – drywall
B – Brick
C – Concrete
CMU – Concrete Masonry Unit
P – Plaster

2) W- White
B – Blue
Y – Yellow
Bk – Black
Gr – Gray
O – Orange
Pr – Purple
R – Red
G – Green
T – Tan
Br – Brown
OW – Off-white
P - Pink
C – Clear

3) mg/cm2 – milligrams/square centimeter

4) N – Negative
P – Positive

| XRF LBP TESTING DATA SHEET | | |
|---|---|---|
| **PROJECT NAME/ADDRESS/UNIT NO.** AS-124; USMC Air Station; Jacksonville, NC | **PROJECT NO.** 2017 – 10 - 104 | **DATE** 11 October 2017 |
| **XRF MODEL/SERIAL NO.** INNOVX LBP 4000 #11916 | **INSPECTOR NAME/NO.** DeWitt Whitten, NCRA 220118 | **SIGNATURE** |

| SAMPLE # | SUBSTRATE[1] | COMPONENT | COLOR[2] | TEST LOCATION | LEVEL | XRF READING | UNITS[3] | CLASSIFICATION[4] |
|---|---|---|---|---|---|---|---|---|
| 119 | M | Fire door | W | See Figure 2 | 1st | 0.12 | mg/cm$^2$ | N |
| 120 | CMU | Wall | W | See Figure 2 | 1st | 0.05 | mg/cm$^2$ | N |
| 121 | CMU | Wall | W | See Figure 2 | 1st | 0.05 | mg/cm$^2$ | N |
| 122 | CMU | Wall | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 123 | W | Wall | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 124 | W | Ceiling | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 125 | Clay block | Wall | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 126 | Clay block | Wall | W | See Figure 2 | 1st | 0.27 | mg/cm$^2$ | N |
| 127 | CMU | Wall | W | See Figure 2 | 1st | 0.03 | mg/cm$^2$ | N |
| 128 | CMU | Wall | W | See Figure 2 | 1st | 0.15 | mg/cm$^2$ | N |
| 129 | W | Ceiling | W | See Figure 2 | 1st | 0.01 | mg/cm$^2$ | N |
| 130 | M | Horizontal stringer | Gr | See Figure 2 | 1st | 0.09 | mg/cm$^2$ | N |
| 131 | M | Wall | Gr | See Figure 2 | 1st | 0.20 | mg/cm$^2$ | N |
| 132 | M | Column | Gr | See Figure 2 | 1st | 0.06 | mg/cm$^2$ | N |
| 133 | W | Wall | OW | See Figure 2 | 1st | 0.25 | mg/cm$^2$ | N |
| 134 | W | Door | OW | See Figure 2 | 1st | 0.07 | mg/cm$^2$ | N |
| 135 | W | Door frame | OW | See Figure 2 | 1st | 2.34 | mg/cm$^2$ | P |
| 136 | DW | Wall | Peach | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 137 | DW | Wall | Peach | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 138 | DW | Wall | Peach | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |

1) M – metal
W – wood
DW – drywall
B – Brick
C – Concrete
CMU – Concrete Masonry Unit
P – Plaster

2) W- White
B – Blue
Y – Yellow
Bk – Black
Gr – Gray
O – Orange
Pr – Purple
R – Red
G – Green
T – Tan
Br – Brown
OW – Off-white
P - Pink
C – Clear

3) mg/cm2 – milligrams/square centimeter

4) N – Negative
P – Positive

| XRF LBP TESTING DATA SHEET | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **PROJECT NAME/ADDRESS/UNIT NO.** AS-124; USMC Air Station; Jacksonville, NC | | | | **PROJECT NO.** 2017 – 10 - 104 | | | **DATE** 11 October 2017 | |
| **XRF MODEL/SERIAL NO.** INNOVX LBP 4000 #11916 | | | **INSPECTOR NAME/NO.** DeWitt Whitten, NCRA 220118 | | | **SIGNATURE** | | |
| **SAMPLE #** | **SUBSTRATE[1]** | **COMPONENT** | **COLOR[2]** | **TEST LOCATION** | **LEVEL** | **XRF READING** | **UNITS[3]** | **CLASSIFICATION[4]** |
| 139 | W | Door casing/frame | W | See Figure 2 | 1st | 3.26 | mg/cm$^2$ | P |
| 140 | DW | Wall | W | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 141 | M | Ceiling beam | Silver | See Figure 2 | 1st | 0.07 | mg/cm$^2$ | N |
| 142 | M | Roof stringer | Silver | See Figure 2 | 1st | 0.09 | mg/cm$^2$ | N |
| 143 | M | Wall | Silver | See Figure 2 | 1st | 0.04 | mg/cm$^2$ | N |
| 144 | M | Roof stringer | Silver | See Figure 2 | 1st | 0.16 | mg/cm$^2$ | N |
| 145 | M | Ceiling beam | Silver | See Figure 2 | 1st | 0.08 | mg/cm$^2$ | N |
| 146 | M | Column | Silver | See Figure 2 | 1st | 0.11 | mg/cm$^2$ | N |
| 147 | M | Horizontal stringer | Silver | See Figure 2 | 1st | 0.08 | mg/cm$^2$ | N |
| 148 | M | Wall | Silver | See Figure 2 | 1st | 0.15 | mg/cm$^2$ | N |
| 149 | M | Horizontal stringer | Silver | See Figure 2 | 1st | 0.02 | mg/cm$^2$ | N |
| 150 | M | Column | Silver | See Figure 2 | 1st | 0.03 | mg/cm$^2$ | N |
| 151 | M | Racking | Orange | See Figure 2 | 1st | 0.63 | mg/cm$^2$ | N |
| 152 | M | Racking | Orange | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 153 | M | Racking | G | See Figure 2 | 1st | 0.00 | mg/cm$^2$ | N |
| 154 | M | Horizontal stringer | Silver | See Figure 2 | 1st | 0.08 | mg/cm$^2$ | N |
| 155 | M | Wall | Silver | See Figure 2 | 1st | 0.10 | mg/cm$^2$ | N |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

1) M – metal
W – wood
DW – drywall
B – Brick
C – Concrete
CMU – Concrete Masonry Unit
P – Plaster

2) W- White
B – Blue
Y – Yellow
Bk – Black
Gr – Gray
O – Orange
Pr – Purple
R – Red
G – Green
T – Tan
Br – Brown
OW – Off-white
P - Pink
C – Clear

3) mg/cm2 – milligrams/square centimeter

4) N – Negative
P – Positive

March 2016

# Marine Corps Base (MCB) Camp Lejeune Contractor Environmental Guide

**Prepared For:**

**Marine Corps Installations East-Marine Corps Base Camp Lejeune**

**Version Number 3**

Michael Baker INTERNATIONAL

**Prepared By:**
**Michael Baker International, Inc.**

PAGE INTENTIONALLY BLANK

# TABLE OF CONTENTS

Table of Contents ..... i

Record of Changes ..... ix

Certification Page ..... xi

List of Acronyms and Abbreviations ..... xiii

Contractor's Phone Directory ..... xix

1.0 Contractor Environmental Guide Overview ..... 1-1
- 1.1. Key Definitions and Concepts ..... 1-3
  - 1.1.1. Key Definitions ..... 1-3
  - 1.1.2. Key Concepts ..... 1-4
- 1.2. Installation Background ..... 1-5
  - 1.2.1. Environmental Management Division and Environmental Affairs Department ..... 1-6
  - 1.2.2. Expectations ..... 1-7
- 1.3. Overview of Requirements ..... 1-8
  - 1.3.1. Contractor Environmental Guide ..... 1-9
  - 1.3.2. Environmental and EMS Training ..... 1-10
- 1.4. Points of Contact ..... 1-12
- 1.5. Overview Map ..... 1-13

2.0 Environmental Management System ..... 2-1
- 2.1. Key Definition and Concepts ..... 2-2
  - 2.1.1. Key Definitions ..... 2-2
  - 2.1.2. Key Concepts ..... 2-3
- 2.2. Overview of Requirements ..... 2-5
- 2.3. Environmental Management System ..... 2-6
- 2.4. EMS Responsibilities ..... 2-8
- 2.5. Contractor Environmental Guide and EMS ..... 2-9

3.0 Training ..... 3-1
3.1. Key Definitions and Concepts ..... 3-2
3.1.1. Key Definitions ..... 3-2
3.1.2. Key Concepts ..... 3-3
3.1.3. Environmental Management System ..... 3-4
3.2. Overview of Requirements ..... 3-4
3.3. Training Requirements ..... 3-4
3.3.1. General Environmental Awareness ..... 3-4
3.3.2. Environmental Management System ..... 3-5
3.3.3. Recordkeeping ..... 3-5

4.0 Air Quality ..... 4-1
4.1. Key Definitions and Concepts ..... 4-1
4.1.1. Key Definitions ..... 4-1
4.1.2. Key Concepts ..... 4-2
4.1.3. Environmental Management System ..... 4-3
4.2. Overview of Requirements ..... 4-4
4.3. Permit Requirements ..... 4-5
4.4. Additional Activities of Concern ..... 4-6

5.0 Environmental Emergency Planning and Response ..... 5-1
5.1. Key Definitions and Concepts ..... 5-1
5.1.1. Key Definitions ..... 5-2
5.1.2. Key Concepts ..... 5-3
5.1.3. Environmental Management System ..... 5-4
5.2. Overview of Requirements ..... 5-4
5.3. Spill Notification ..... 5-6
5.3.1. POL/Hazardous Materials Spill Notification Procedures ..... 5-6
5.3.2. Wastewater Spill and Water Line Break Notification ..... 5-8
5.4. Follow-Up ..... 5-9

6.0 Cultural Resources ..... 6-1
6.1. Key Definitions and Concepts ..... 6-1

6.1.1. Key Definitions ..... 6-1
6.1.2. Key Concepts ..... 6-3
6.1.3. Environmental Management System ..... 6-3
6.2. Overview of Requirements ..... 6-4
6.3. Procedures ..... 6-7

7.0 Hazardous Materials/Hazardous Waste Management .... 7-1
7.1. Key Definitions and Concepts ..... 7-1
7.1.1. Key Definitions ..... 7-2
7.1.2 Key Concepts ..... 7-5
7.1.3 Environmental Management System ..... 7-8
7.2. Overview of Requirements ..... 7-11
7.3. Hazardous Materials Requirements ..... 7-14
7.4. Universal Waste Requirements ..... 7-16
7.5. Hazardous Waste Requirements ..... 7-18
7.5.1. Storage ..... 7-19
7.5.2. Manifesting and Disposal ..... 7-21
7.6. Non–RCRA-Regulated Waste Requirements ..... 7-22
7.6.1. Used Oil and Oil Filters ..... 7-22
7.6.2. Used Antifreeze ..... 7-24
7.6.3. Petroleum-Contaminated Wipes and Oily Rags . 7-25
7.6.4. Used Electronic Equipment ..... 7-25
7.6.5. New and Used Batteries (Not Regulated as Universal Waste) ..... 7-25

8.0 Asbestos ..... 8-1
8.1. Key Definitions and Concepts ..... 8-1
8.1.1. Key Definitions ..... 8-1
8.1.2. Key Concepts ..... 8-3
8.1.3. Environmental Management System ..... 8-4
8.2. Overview of Requirements ..... 8-5
8.3. Responsibilities Before a Demolition or Renovation Project ..... 8-6
8.3.1. Identification of ACM and PACM ..... 8-7

8.3.2. Notification ..... 8-8
8.3.3. Removal ..... 8-8
8.3.4. Training ..... 8-9
8.4. Responsibilities During a Demolition or Renovation Project ..... 8-9
8.5. Disposal of ACM Waste ..... 8-10

9.0 Lead-Based Paint ..... 9-1
9.1. Key Definitions and Concepts ..... 9-1
9.1.1. Key Definitions ..... 9-1
9.1.2. Key Concepts ..... 9-3
9.1.3. Environmental Management System ..... 9-3
9.2. Overview of Requirements ..... 9-4
9.3. Responsibilities Before Renovation or Demolition ..... 9-6
9.4. Permits ..... 9-8
9.5. Disposal ..... 9-8
9.6. Training ..... 9-9

10.0 Natural Resources ..... 10-1
10.1. Key Definitions and Concepts ..... 10-1
10.1.1. Key Definitions ..... 10-2
10.1.2. Key Concepts ..... 10-3
10.1.3. Environmental Management System ..... 10-5
10.2. Overview of Requirements ..... 10-6
10.3. National Environmental Policy Act ..... 10-10
10.4. Timber ..... 10-11
10.5. Threatened and Endangered Species ..... 10-13
10.6. Wetlands ..... 10-14
10.6.1. Avoidance ..... 10-14
10.6.2. Permits ..... 10-15
10.6.3. Impacts ..... 10-18
10.6.4. Mitigation ..... 10-19
10.7. Temporary Construction ..... 10-20

11.0 Stormwater ..... 11-1
11.1. Key Definitions and Concepts ..... 11-1
11.1.1. Key Definitions ..... 11-2
11.1.2. Key Concepts ..... 11-5
11.1.3. Environmental Management System ..... 11-8
11.2. Overview of Requirements ..... 11-9
11.3. Prior to Site Work ..... 11-11
11.3.1. Construction Notifications ..... 11-12
11.3.2. Familiarity with the Stormwater Phase I Industrial Permit ..... 11-12
11.3.3. Familiarity with the Stormwater Phase II Municipal Permit ..... 11-13
11.3.4. Project-Specific Construction Permits ..... 11-13
11.4. Responsibilities During Site Work ..... 11-16

12.0 Solid Waste, Recycling, and Pollution Prevention (P2). 12-1
12.1. Key Definitions and Concepts ..... 12-1
12.1.1. Key Definitions ..... 12-2
12.1.2. Key Concepts ..... 12-3
12.1.3. Environmental Management System ..... 12-4
12.2. Overview of Requirements ..... 12-5
12.3. Solid Waste Requirements ..... 12-7
12.3.1. MCB Camp Lejeune Landfill Acceptable Waste Streams ..... 12-9
12.4. Recycling Requirements ..... 12-14
12.4.1. Recycling Center ..... 12-15
12.4.2. Other Recyclables ..... 12-16
12.5. Pollution Prevention and Green Procurment ..... 12-17

13.0 Potential Discovery of Undocumented Contaminated Sites ..... 13-1
13.1. Key Definitions and Concepts ..... 13-2
13.1.1. Key Definitions ..... 13-2
13.1.2. Key Concepts ..... 13-3

13.1.3. Environmental Management System ..... 13-3
13.2. Overview of Requirements..... 13-3
13.3. Unforeseen Site Condition Procedures..... 13-4
13.3.1. Petroleum, Oil, and Lubricants ..... 13-5
13.3.2. Munitions and Ordnance..... 13-6

14.0 Permitting ..... 14-1
14.1. Key Definitions and Concepts..... 14-1
14.1.1. Key Definitions..... 14-1
14.1.2. Key Concepts ..... 14-2
14.1.3. Environmental Management System ..... 14-3
14.2. Overview of Requirements..... 14-3
14.3. Project Permits and Approvals ..... 14-3
14.3.1. Stormwater (Section 11.0) ..... 14-4
14.3.2. Asbestos (Section 8.0) ..... 14-5
14.3.3. Lead-Based Paint (Section 9.0)..... 14-5
14.3.4. Air Quality (Section 4.0)..... 14-6
14.3.5. Wetlands (Section 10.6)..... 14-7
14.3.6. Drinking Water/Wastewater ..... 14-8

# List of Tables

Table 1-1. Contacts in Case of a Spill..... 1-13
Table 2-1. Practices Identified Under MCB Camp Lejeune's EMS ..... 2-10
Table 5-1. Environmental Emergency Response Contacts..... 5-3
Table 12-1. Base Landfill Requirements ..... 12-11

# List of Figures

Figure 1-1. Environmental Management Division (MCB Camp Lejeune) Organization Chart ..... 1-7
Figure 1-2. Environmental Affairs Department (MCAS New River) Organization Chart ..... 1-7
Figure 1-3. Overview Map..... 1-14
Figure 2-1. Plan, Do, Check, Act Cycle ..... 2-4
Figure 2-2. Potential Interactions of Construction and Demolition Activities with the Environment..... 2-7
Figure 6-1. Possible Cultural Resource Discovery Flow Chart 6-8
Figure 7-1. Diamond Hazard Label ..... 7-7

# Attachments and Appendix

Attachment 2-1 MCB Camp Lejeune's Environmental Policy Statement
Attachment 3-1 Spill Reporting Form
Attachment 4-1 Weekly Hazardous Waste (HW) Site Inspection Form MCB Camp Lejeune
Attachment 4-2 Weekly Hazardous Waste (HW) Site Inspection Form MCAS New River
Appendix General EMS & Environmental Awareness Training for Contractors & Vendors

PAGE INTENTIONALLY BLANK

# RECORD OF CHANGES

| Date | Description of Changes | Page # | Name/Initials |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

PAGE INTENTIONALLY BLANK

# CERTIFICATION PAGE

I certify that I have read, understood, and accept this document and all attachments, and that all those within my party working on a job site within Marine Corps Base Camp Lejeune and/or Marine Corps Air Station New River will comply with the environmental policies and regulations herein. I am aware that there are penalties for not complying with this Guide.

_____

Signature

_____

Date

PAGE INTENTIONALLY BLANK

# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACM | Asbestos-Containing Material |
| AHERA | Asbestos Hazard and Emergency Response Act |
| AHPA | Archaeological and Historic Preservation Act |
| ARPA | Archeological Resource Protection Act |
| ASHARA | Asbestos School Hazard Abatement Reauthorization Act |
| ASD | Accumulation Start Date |
| ASO | Air Station Order |
| | |
| BMP | Best Management Practice |
| BO | Base Order |
| | |
| C&D | Construction and Demolition |
| CAA | Clean Air Act |
| CAMA | Coastal Area Management Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability |
| CETEP | Comprehensive Environmental Training and Education Program |
| CFC | Chlorofluorocarbon |
| CFR | Code of Federal Regulations |
| CG | Commanding General |
| CWA | Clean Water Act |
| CZMA | Coastal Zone Management Act |
| | |
| DHHS | Department of Health and Human Services |
| DLADS | Defense Logistics Agency Disposition Services |
| DM | Decision Memorandum |

| | |
|---|---|
| DMM | Discarded Military Munitions |
| DoD | Department of Defense |
| DoN | Department of Navy |
| DOT | Department of Transportation |
| DRMS | Defense Reutilization and Marketing Service |
| | |
| EA | Environmental Assessment |
| EAD | Environmental Affairs Department |
| ECON | Environmental Conservation Branch |
| EISA | Energy Independence and Security Act |
| EHS | Extremely Hazardous Substances |
| ELLAP | Environmental Lead Laboratory Accreditation Program |
| EMD | Environmental Management Division |
| EMS | Environmental Management System |
| EO | Executive Order |
| EOD | Explosives and Ordnance Disposal |
| EPA | Environmental Protection Agency |
| EPR | Extended Producer Responsibility |
| EPCRA | Emergency Planning and Community Right-to-Know Act |
| EPEAT | Electronic Product Environmental Assessment Tool |
| | |
| FAR | Federal Acquisition Regulation |
| FIFRA | Federal Insecticide, Fungicide, and Rodenticide Act |
| FSC | Facilities Support Contracts |
| FWS | Fish and Wildlife Service |
| | |
| GIS | Geographic Information System |
| GP | Green Procurement |
| | |
| HAP | Hazardous Air Pollutants |

| | |
|---|---|
| HCFC | Hydrochlorofluorocarbon |
| HCS | Hazard Communication Standard |
| HHCU | Health Hazards Control Unit (North Carolina) |
| HM | Hazardous Material |
| HMTA | Hazardous Materials Transportation Act |
| HQMC | Headquarters Marine Corps |
| HQW | High Quality Water |
| HVAC | Heating, Ventilation, and Air Conditioning |
| HW | Hazardous Waste |
| HWMP | Hazardous Waste Management Plan |
| | |
| IGI&S | Installation Geospatial Information & Services |
| INRMP | Integrated Natural Resources Management Plan |
| IRP | Installation Restoration Program |
| | |
| LBP | Lead-Based Paint |
| LDA | Land-Disturbing Activities |
| LQG | Large Quantity Generator |
| | |
| MAG | Marine Aircraft Group |
| MCAS | Marine Corps Air Station |
| MCB | Marine Corps Base |
| MCM | Minimum Control Measure |
| MCIEAST | Marine Corps Installations East |
| MCO | Marine Corps Order |
| MEC | Munitions and Explosives of Concern |
| MEF | Marine Expeditionary Force |
| MRF | Materials Recovery Facility |
| MS4 | Municipal Separate Storm Sewer Systems |
| MSW | Municipal Solid Waste |
| | |
| NAPL | Non-Aqueous Phase Liquid |

| | |
|---|---|
| NC | North Carolina |
| NCAC | North Carolina Administrative Code |
| NCDAQ | North Carolina Department of Air Quality |
| NCDCM | North Carolina Division of Coastal Management |
| NCDEQ | North Carolina Department of Environmental Quality |
| NCDFR | North Carolina Division of Forest Resources |
| NCDMS | North Carolina Division of Mitigation Services |
| NCDWR | North Carolina Division of Water Resources |
| NEPA | National Environmental Policy Act |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NHPA | National Historic Preservation Act |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| NRC | National Response Center |
| NRHP | National Register of Historic Places |
| | |
| ODS | Ozone-Depleting Substance |
| OPA | Oil Pollution Act |
| ORW | Outstanding Resource Water |
| OSHA | Occupational Safety and Health Administration |
| OWS | Oil-Water Separator |
| | |
| P2 | Pollution Prevention |
| PACM | Presumed Asbestos-Containing Material |
| PCB | Polychlorinated biphenyl |
| POC | Point of Contact |
| POL | Petroleum, Oil, and Lubricant |
| PPA | Pollution Prevention Act |
| ppm | Parts Per Million |

| | |
|---|---|
| PPV | Public-Private Venture |
| PWD | Public Works Division |
| | |
| QRP | Qualified Recycling Program |
| | |
| RACM | Regulated Asbestos-Containing Material |
| RCRA | Resource Conservation and Recovery Act |
| RCRS | Resource Conservation and Recovery Section |
| | |
| ROICC | Resident Officer in Charge of Construction |
| RRP | Renovation, Repair, and Painting |
| | |
| SAA | Satellite Accumulation Area |
| SARA | Superfund Amendments & Reauthorization Act |
| SDS | Safety Data Sheet |
| SHPO | State Historic Preservation Officer |
| SPCC | Spill Prevention Control and Countermeasures |
| SSPP | Strategic Sustainability Performance Plan |
| SWDA | Solid Waste Disposal Act |
| SWPPP | Stormwater Pollution Prevention Plan (Also referred to as SPPP in NC) |
| | |
| T&P | Treatment and Processing |
| TCLP | Toxic Characteristic Leaching Procedure |
| TSD | Treatment, Storage, and Disposal |
| TSI | Thermal System Insulation |
| | |
| ULCP | Unit Level Contingency Plan |
| USC | United States Code |
| USACE | United States Army Corps of Engineers |
| USMC | United States Marine Corps |
| UW | Universal Waste |

| | |
|---|---|
| UXO | Unexploded Ordnance |
| XRF | X-Ray Fluorescence |

# CONTRACTOR'S PHONE DIRECTORY

In the event of an emergency, refer to the emergency numbers below. All non-emergency contractor inquiries regarding the operations at Marine Corps Base (MCB) Camp Lejeune and Marine Corps Air Station New River should be directed to the Resident Officer in Charge of Construction (ROICC) or Contract Representative. The ROICC or Contract Representative will either directly contact or refer contractors to the appropriate Division or Organization.

**Emergency and Important Non-Emergency Numbers**

Fire and Emergency Services Division.....911
Ambulance.....911
Hearing Impaired.....(910) 451-4444
CHEMTREC (Emergency 24-hour/Outside MCB Camp Lejeune).....(800) 424-9300
Hazardous Chemical Spill.....911
Military Police.....911
National Response Center (Outside MCB Camp Lejeune).....(202) 372-2428
Toll Free.....(800) 424-8802
Provost Marshall Office.....911

**Marine Corps Base Camp Lejeune**

Operator/ Directory Assistance.....(910) 451-1113
Confined Space Program Manager.....(910) 451-5725
Environmental Management Division.....(910) 451-5003
-Environmental Compliance Branch.....(910) 451-5837

Asbestos Management
Resource Conservation and Recovery Section
(910) 451-1482
Hazardous Material Consolidation Site/Free Issue
.....(910) 451-1482
Recycling Center, Building 982.....(910) 451-4214
-Environmental Conservation Branch.....(910) 451-5063
Fish & Wildlife
Forestry Management
NEPA
Conservation Law Enforcement
.....(910) 451-2196/5226
-Environmental Quality Branch.....(910) 451-5068
Air Quality
Underground Storage Tanks
Water Quality
Explosives and Ordnance Disposal.....(910) 451-0558
Public Works Division.....(910) 451-5307
-Construction Project Managers.....(910) 451-2583
-Contracts Branch.....(910) 451-2582
-Officer In Charge of Construction (Main)..(910) 451-2581
-Public Works Base Utility Director.....(910) 451-5024
Water Line Break/Wastewater Line Break.....(910) 451-7190 (x225)
-Public Works Solid Waste Division/Landfill
.....(910) 451-2946
Range Control.....(910) 451-3064
Regional Geospatial Information & Services (Installation Manager).....(910) 451-8915
Safety Department.....(910) 451-5725

**Marine Corps Air Station New River**

Confined Space Program.....(910) 449-4964
Consolidated Hazardous Material Reutilization and
Inventory Management Program.....(910) 449-4531/4533
Environmental Affairs Department
(Director).....(910) 449-5441
-Environmental Affairs Department (Environmental
Manager).....(910) 449-5442
-Environmental Affairs Department (GIS
Manager).....(910) 449-6144
-Environmental Affairs Department (Hazardous
Waste).....(910) 449-5997
-Conservation Law Enforcement.....(910) 449-0108
Explosives Safety Officer.....(910) 449-5443
Military Police (Non-Emergency).....(910) 449-4248/4249
Public Works Division.....(910) 449-6506
-Officer In Charge of Construction.....(910) 449-5587
Safety Department.....(910) 449-4527

PAGE INTENTIONALLY BLANK

# 1.0 CONTRACTOR ENVIRONMENTAL GUIDE OVERVIEW

Environmental protection is an integral part of the Marine Corps mission in order to protect public health, preserve environmental quality, comply with regulatory requirements, and develop and strengthen relationships between the Marine Corps community and external stakeholders. The purpose of the MCB Camp Lejeune Contractor Environmental Guide is to assist contractors working aboard Marine Corps Installations East's (MCIEAST's) Marine Corps Base (MCB) Camp Lejeune and Marine Corps Air Station (MCAS) New River in maintaining the mission by complying with Federal and State environmental laws and regulations, as well as the United States Marine Corps (USMC) and installation environmental policies. This guide is written in accordance with Marine Corps Order (MCO) P5090.2A and designed to answer many of the environmental questions that arise, as well as to provide pertinent information on environmental topics and training requirements.

**This document should be used only as a *guide* to the environmental issues contractors may face while working aboard MCB Camp Lejeune and MCAS New River.**

**NOTE:** This document should be used only as a guide to the environmental issues contractors may face while working

aboard MCB Camp Lejeune and MCAS New River. It is expected that contractors will work closely with the Environmental Management Division (EMD) at MCB Camp Lejeune, the Environmental Affairs Department (EAD) at MCAS New River, and Contract Representatives regarding environmental management issues, concerns, and/or questions. Should the need arise, this guide provides contractors with EMD, EAD, and emergency response points of contact (POCs). All initial inquiries should be directed to the Resident Officer in Charge of Construction (ROICC) or Contract Representative, who will either direct the contractor or contact the appropriate environmental office if additional clarification regarding an environmental issue is necessary.

**Contact the ROICC or Contract Representative with any questions.**

**NOTE:** It is very important to note that this guide is designed to provide requirements specific to MCB Camp Lejeune-issued contracts. It is the contractor's responsibility to know and comply with all Federal, State, and local regulations. MCB Camp Lejeune environmental personnel will assist contractors with compliance issues; however, the primary burden of regulatory identification, familiarity, and compliance lies with the contractor. This training ***does not*** replace any required regulatory environmental training or certification as per contract requirements. All required environmental training should be completed ***prior*** to working at MCIEAST installations.

**NOTE:** It is the contractor's responsibility to review the project-specific contract and specifications. Additional environmental requirements, submissions, and/or meetings not documented in this guide may be required.

## 1.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are used throughout this guide. If you have any questions about these definitions or concepts, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

### 1.1.1. Key Definitions

- **Environment.** Surroundings, to include all surface water, groundwater, drinking water supply, land surface or subsurface area, or ambient air within the United States or under the jurisdiction of the United States, including manmade structures, indoor air environments, natural resources, and archeological and cultural resources.
- **Environmental Management Division.** MCB Camp Lejeune's division responsible for environmental issues and compliance at MCB Camp Lejeune.
- **Environmental Affairs Department.** MCAS New River's department responsible for environmental issues and compliance at MCAS New River.
- **Environmental Management System (EMS).** A systematic approach for integrating environmental

considerations and accountability into day-to-day decisionmaking and long-term planning processes across all missions, practices, and functions. The EMS institutionalizes processes for continual environmental improvement and reducing risks to mission through ongoing planning, review, and preventive or corrective action.

### 1.1.2. Key Concepts

- **Environmental Requirement.** A defined standard pertaining to environmental compliance, pollution prevention (P2), or natural/cultural resources, subject to uniform application. Environmental requirements may be in the form of a law, regulation, Executive Order (EO), policy, ordinance, permit, Base Order (BO), or other form that prescribes a standard.
- **Executive Order.** Legally binding orders given by the President, as head of the Executive Branch, to direct Federal agencies and officials in their execution of congressionally established laws or policies.
- **MCB Camp Lejeune.** Throughout this document, MCB Camp Lejeune includes all MCB Camp Lejeune real property and contracts for work performed at MCAS New River and all outlying fields associated with MCB Camp Lejeune.
- **Marine Corps Order.** A directive of continuing authority or information, meant to be a permanent reference and requiring continuing action, issued by Headquarters Marine Corps (HQMC). In accordance

with MCO 5215.1K (10 May 2007), all MCOs shall, where applicable: establish, describe, or change existing policy, programs and major activities, and organizations; define missions; assign responsibilities; issue procedural guidance; and be written in standardized format.

- **Resident Officer In Charge of Construction.** The ROICC administers construction contracts and is the contractor's first line of contact with the government.
- **Regulatory Requirements.** Government (including Federal, State, and local) environmental regulations implemented by environmental statutes. Federal regulations often establish minimum standards for State and local governments' implementing programs.
- **Statutory Requirements.** Federal environmental statutes are laws that generally require compliance by U.S. Department of Defense (DoD) installations.

## 1.2. INSTALLATION BACKGROUND

MCB Camp Lejeune was established in 1941 in Onslow County, along the southern coast of North Carolina (NC). MCB Camp Lejeune is just south of MCAS New River. MCB Camp Lejeune takes advantage of 156,000 acres and 11 miles of beach capable of supporting amphibious operations, 32 gun positions, 48 tactical landing zones, three state-of-the-art training facilities, and 80 live fire ranges for its training mission.

The primary function of MCB Camp Lejeune is national defense, providing a home installation for the II Marine Expeditionary Force (MEF), 2nd Marine Division, 2nd Force Service Support Group, and other combat units and support commands. MCB Camp Lejeune's mission is to maintain combat-ready units for expeditionary deployment. MCB Camp Lejeune maintains and utilizes supply warehouses, maintenance shops, hazardous material storage, nonhazardous and hazardous waste storage, bulk fuel storage and transfer facilities, fleet parking, housing areas, recreational areas, two golf courses, and a marina.

MCAS New River is the principal USMC helicopter operating location on the East Coast and supports aircrew training in the H-53 helicopter. It is also the evaluation and prospective bed-down site for the V-22 Osprey. The mission of MCAS New River is to provide the necessary support for its Marine Aircraft Group (MAG) tenant units, MAG-26 and MAG-29.

### 1.2.1. Environmental Management Division and Environmental Affairs Department

MCB Camp Lejeune's EMD, within the Installation and Environment Department, is responsible for all natural resource and environmental matters aboard the installation. EMD works closely with MCB Camp Lejeune personnel, educating and training them to comply with environmental laws while accomplishing the military mission.

The EAD at MCAS New River works closely with the EMD on environmental compliance and protection matters. Due to

various joint operations, MCB Camp Lejeune and MCAS New River participate together in one EMS. See Figure 1-1 and Figure 1-2 for organization charts of EMD and EAD.

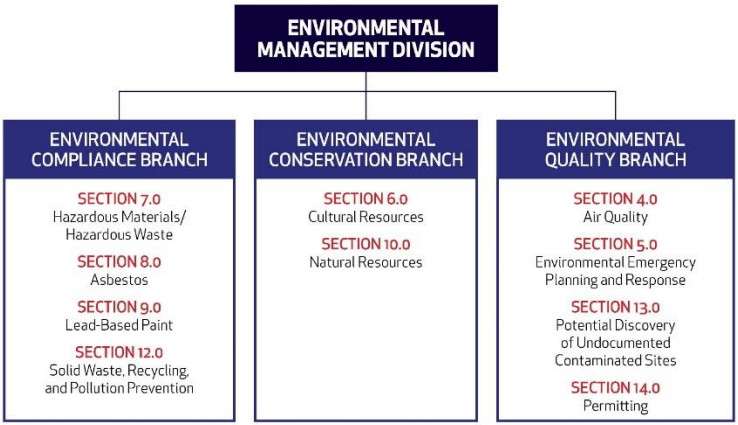



***Figure 1-1. Environmental Management Division (MCB Camp Lejeune) Organization Chart***

***Figure 1-2. Environmental Affairs Department (MCAS New River)***
***Organization Chart***

### 1.2.2. Expectations

Contractors aboard the installation, which are committed to strict compliance with environmental laws and regulations,

assist MCB Camp Lejeune in providing the best possible training facilities for today's Marines and Sailors, while honoring our environmental responsibilities and objectives. Violation of environmental laws may result in severe civil or criminal penalties and fines.

## 1.3. OVERVIEW OF REQUIREMENTS

Contractors operating aboard MCB Lejeune and MCAS New River must be aware of and adhere to all applicable environmental regulations and requirements, which include but may not be limited to the following:

- **EO 12088, Federal Compliance with Pollution Control Standards (October 13, 1978).** Requires all facilities owned by or leased to or by the military to be designed, operated, and maintained in compliance with all applicable environmental standards. Military and civilian personnel must cooperate with Federal, State, and local environmental protection agencies and comply with applicable standards and criteria issued by these agencies to the extent permitted by law.
- **EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management.** Requires Federal agencies to comply with applicable Federal, State, local, and host nation environmental laws and regulations. Additionally, requirements include more widespread use of EMSs as the framework for sustainability management.

- **EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance.** Requires Federal agencies to meet various sustainability goals, to include the reduction of greenhouse gas emissions. Applicable provisions for meeting these goals are to be included in acquisition and service contracts.
- **MCO P5090.2A, Environmental Compliance and Protection Manual (26 August 2013).** USMC policies and responsibilities for compliance with environmental statutes and regulations, as well as the management of USMC environmental programs.

### 1.3.1. Contractor Environmental Guide

This guide consists of the following information:

- MCB Camp Lejeune Contractor Environmental Guide
  - EMS overview and requirements
  - Environmental program-specific requirements
- MCB Camp Lejeune General EMS and Environmental Awareness Training for Contractors and Vendors
- Signature Page

**Prior to beginning work onsite, or within 30 days of beginning work onsite, all contractors and their employees performing work aboard MCB Camp Lejeune must review these materials and complete EMS and General Environmental Awareness training.**

Prior to beginning work onsite, or within 30 days of beginning work onsite, all contractors and their employees performing work aboard MCB Camp Lejeune must review these materials and complete EMS and General Environmental Awareness training. This guide summarizes the EMS and environmental programs at MCB Camp Lejeune, as well as key requirements associated with the various environmental issues contractors may encounter while performing work aboard the installation. Contractors are expected to work with their ROICC or Contract Representatives and EMD/EAD when environmental concerns or issues arise.

### 1.3.2. Environmental and EMS Training

In accordance with Department of Defense (DoD) instructions and MCOs, EMD has implemented a Comprehensive Environmental Training and Education Program (CETEP). The goal of the CETEP is to ensure that appropriate environmental instruction and related information are provided to all levels of the Marine Corps in the most effective and efficient manner to achieve full compliance with all applicable environmental training

requirements. A major component of the CETEP is to provide general environmental awareness training to all individuals associated with the installation, including contractors.

**All contractors are required to receive both EMS and general environmental awareness training at the level necessary for their job function.**

In addition to CETEP requirements, MCB Camp Lejeune has implemented an installation-wide EMS. The EMS highlights the fact that the authority and principal responsibility for controlling environmental impacts belong to those commands, units, offices, and personnel (including contractors) whose activities have the potential to impact the environment.

All contractors are required to receive both EMS and general environmental awareness training at the level necessary for their job function. This guide satisfies these training requirements (See the Appendix).

As such, contractors working aboard MCB Camp Lejeune will do the following:

- Conduct job responsibilities in compliance with environmental regulations and in conformance with EMS requirements.
- Complete all applicable environmental training and maintain associated records as per contract requirements.

- Complete EMS and general environmental awareness training, and be aware of and understand the MCB Camp Lejeune Environmental Policy.
- Contact their ROICC or Contract Representative immediately regarding environmental and/or EMS issues.

Prior to beginning work onsite or within 30 days, all contractors must sign and date the signature page and return it to the installation Contract Representative. Anyone who works on a contract at any point during the contract period must receive this information and training.

## 1.4. POINTS OF CONTACT

EMD Branches and phone numbers are found in the Contractor's Phone Directory on pages xv and xvi of this Guide. All initial inquiries regarding an environmental issue should be directed to the ROICC or Contract Representative, who will either directly contact or refer the contractor to the appropriate environmental office if additional clarification is necessary. In the case of a spill or environmental emergency, immediately dial 911. Additional emergency response procedures are provided in Section 5.0 of this Guide.

***Table 1-1. Contacts in Case of a Spill***

| For spills of: | Call: | Follow-up: |
|---|---|---|
| Hazardous waste | **911** | Spill Report |
| Unknown materials | **911** | Spill Report |
| Material on a permeable surface | **911** | Spill Report |
| Any amount of a POL or Hazardous Material | **911** | Spill Report |
| Material that reaches stormwater inlets or waterways | **911** | |
| Nonhazardous waste | (910) 451-1482 | 911 |

## 1.5. OVERVIEW MAP

Figure 1-3 provides an overview map that displays the locations of installation facilities discussed throughout this Guide.

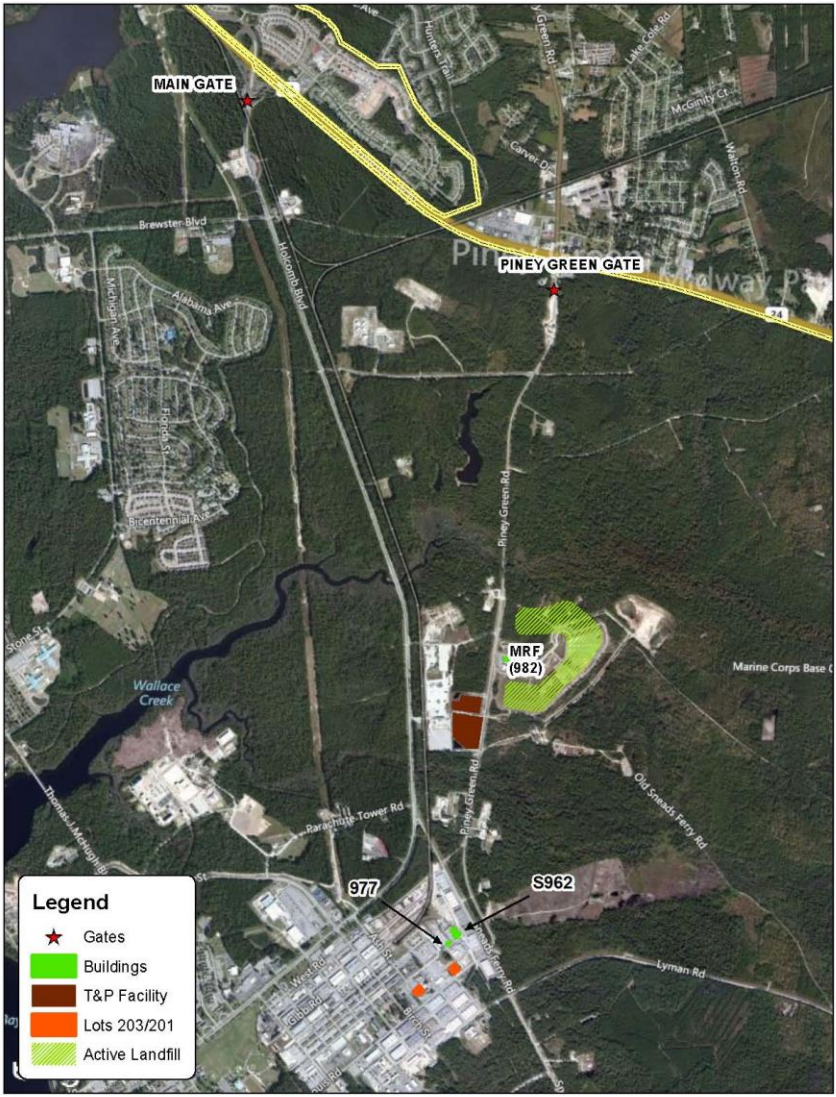



***Figure 1-3. Overview Map***

# 2.0 ENVIRONMENTAL MANAGEMENT SYSTEM

**Three key principles of the Environmental Policy are to comply with relevant environmental laws and regulations, prevent pollution, and continually improve our EMS.**

MCB Camp Lejeune and MCAS New River jointly operate an EMS, which provides a systematic way of continually implementing environmental requirements and evaluating performance. The EMS is founded on the principles of MCB Camp Lejeune's Environmental Policy, which is endorsed by the Commanding General (CG). Three key principles of the Environmental Policy are to:

- Comply with relevant environmental laws and regulations;
- Prevent pollution; and
- Continually improve the EMS.

The EMS promotes sustained mission readiness through actively identifying and implementing opportunities for efficient resource use. The USMC implements EMS at all levels to continually improve environmental compliance programs and meet evolving EOs and DoD requirements for mission sustainability. The EMS highlights the fact that the authority and principal responsibility for controlling environmental impacts belong to those commands, units,

offices, and personnel (including contractors and vendors) whose activities have the potential to impact the environment.

## 2.1. KEY DEFINITION AND CONCEPTS

The following key definitions and concepts are associated with an EMS. Please consult the ROICC or Contract Representative with any questions about these definitions or concepts.

**Please consult the ROICC or Contract Representative with any questions.**

### 2.1.1. Key Definitions

- **Environment.** Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation.
- **Environmental Aspect.** A characteristic of an organization's activities, products, or services that may cause, in normal operation or upset mode, an impact to an environmental or other resource. Each practice may have several aspects.
- **Environmental Impact.** An effect, beneficial or adverse, of a practice's aspect on an environmental or other resource. Each practice may have several impacts.
- **Environmental Resources.** Sensitive environmental receptors (e.g., air, water, natural

resources) or cultural or historic assets at MCB Camp Lejeune or MCAS New River, in the surrounding community, within the ecosystem, or beyond, that may be impacted by the operation of practices.

- **Practice.** A unit process that supports a military mission and may impact environmental resources. (It is the ability to impact an environmental resource that is key to defining a practice. However, practices may also impact other resources.)
- **Practice Owner.** Person(s) responsible for control of practices. EMS procedures use the term *practice owner* when the assignment of more specific responsibilities is left to the owning organizations.
- **Requirement.** Legislation, regulation, or policy issued by any Executive, Federal, State, local, DoD, Department of Navy (DoN), or USMC authority that addresses environmental considerations and requires action.

### 2.1.2. Key Concepts

- **Environmental Management System.** A systematic approach for integrating environmental considerations and accountability into day-to-day decisionmaking and long-term planning processes across all missions, activities, and functions. The EMS institutionalizes processes for continual environmental improvement and for reducing risks to mission through ongoing planning, review, and preventive or corrective action.

- **Environmental Policy.** Public commitment by senior leaders to the management of the installation's environmental affairs, including environmental compliance, pollution prevention, natural/cultural resource management, cleanup, risk to mission, and continual improvement of the EMS.

- **Plan, Do, Check, Act.** Four-step model by which the EMS carries out change – **Plan:** establish objectives and processes; **Do:** implement and execute the plan; **Check:** study and analyze the results; **Act:** take action based on what you learned.

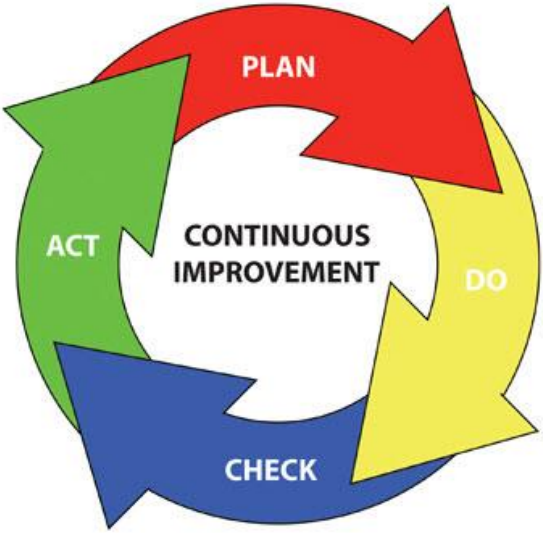



***Figure 2-1. Plan, Do, Check, Act Cycle***

## 2.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard MCB Camp Lejeune and MCAS New River must be aware of and adhere to all applicable regulations and requirements concerning EMS, which include but may not be limited to the following:

- **EO 13148, Greening the Government Through Leadership in Environmental Management.** Mandates that environmental management considerations must be an integral component of Federal Government policies, operations, planning, and management, with the primary goal for each agency to promote the sustainable management of Federal facility lands through the implementation of cost-effective, environmentally sound practices, and programs to reduce adverse impacts to the natural environment.
- **EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management.** Establishes the EMS as the primary management approach for addressing environmental aspects, including energy and transportation aspects, and as the reporting mechanism for communicating progress on meeting performance goals.
- **EO 13514, Leadership in Environmental, Energy, and Economic Performance.** Requires continuing implementation of formal EMSs at all appropriate organizational levels to support the sustainability performance requirements of the Order.

## 2.3. ENVIRONMENTAL MANAGEMENT SYSTEM

An EMS is a systematic way to identify and eliminate or minimize the installation's environmental risk-to-mission. MCB Camp Lejeune's EMS identifies practices and their aspects as a starting point for prioritizing environmental management initiatives. Each installation practice, such as construction/renovation/demolition, equipment operation/maintenance/disposal, landscaping, or pesticide/herbicide management and application, has one or more environmental aspects. Figure 2-2 illustrates the simplified potential interactions of one practice, construction/renovation/demolition, with the environment.

***Figure 2-2. Potential Interactions of Construction and Demolition Activities with the Environment***

## 2.4. EMS RESPONSIBILITIES

Contractors are expected to understand that the practices they support on the installation may interact with and have the potential to impact the environment. Therefore, it is expected that contractors will do the following:

**Contractors are expected to understand that the activities performed on the installation may interact with the environment and have the potential to impact the environment.**

- Review the Contractor Environmental Guide.
- Be aware of the Environmental Policy (Attachment 2-1).
- Conduct practices in a way that avoids and/or minimizes impacts to the environment by complying with all applicable Federal, State, and local environmental regulations and BOs.
- Be familiar with spill response procedures.
- Report all environmental emergencies and spills.
- Report any environmental problems or concerns promptly, and notify the ROICC or Contract Representative.
- Respond to data collection efforts upon request.

## 2.5. CONTRACTOR ENVIRONMENTAL GUIDE AND EMS

The sections of this Contractor Environmental Guide are categorized based on the type of environmental requirements routinely encountered by contractors at MCB Camp Lejeune. The following matrix is derived from MCB Camp Lejeune's EMS Working Group sessions and relates the contents of this guide to the practices aboard MCB Camp Lejeune. It is provided to assist contractors in narrowing down specific requirements that may apply to onsite activities.

***Table 2-1. Practices Identified Under MCB Camp Lejeune's EMS***

| **MCB Camp Lejeune 2015 Practices** | **Env. Emergency Response/ Spill Response, Section 5.0** | **HM/HW, Section 7.0** | **Potential Discovery of Undocumented Contaminated Sites, Section 13.0** | **Asbestos, Section 8.0** | **Lead-Based Paint, Section 9.0** | **Stormwater, Section 11.0** | **Solid Waste, Recycling, and P2, Section 12.0** | **Training, Section 3.0** | **Cultural Resources, Section 6.0** | **Permitting, Section 14.0** | **Air Quality, Section 4.0** | **Natural Resources, Section 10.0** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Battery management | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | ● | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | | ● | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | | |
| Boat operation/ maintenance | | ● | | | | | | | | | ● | |
| Boat, ramp, dock cleaning | | | | | | ● | | | | | | |
| Boiler operation | | ● | | | | | | | | | ● | |
| Building operation/ maintenance/ repair | | ● | | ● | | | ● | | | | | |
| Channel dredging | | | | | | ● | | | | | | |
| Chlorination | | ● | | | | | | | | | ● | |
| Composting | | | | | | ● | ● | | | | | |
| Construction/demo/ renovation | | | | ● | ● | ● | ● | | ● | | | |
| Cooling tower operation and maintenance | | ● | | | | | | | | | | |
| De-greasing | | ● | | | | | | | | | ● | |
| Drinking water management | | ● | | | | | | | | | | |
| Engine operation and maintenance | | ● | | | | | | | | | ● | |
| Equipment operation/ maintenance/disposal | | ● | | ● | | | ● | | | | | |
| Erosion/ runoff control | | | | | | ● | | | | | | ● |
| Fish stocking | | | | | | | | | | | | |

| MCB Camp Lejeune 2015 Practices | Env. Emergency Response/ Spill Response, Section 5.0 | HM/HW, Section 7.0 | Potential Discovery of Undocumented Contaminated Sites, Section 13.0 | Asbestos, Section 8.0 | Lead-Based Paint, Section 9.0 | Stormwater, Section 11.0 | Solid Waste, Recycling, and P2, Section 12.0 | Training, Section 3.0 | Cultural Resources, Section 6.0 | Permitting, Section 14.0 | Air Quality, Section 4.0 | Natural Resources, Section 10.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fueling and fuel mgt./ storage | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | ● | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | ● | | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | ● | |
| Grease traps | | | | | | | ● | | | | | |
| Habitat management | | ● | | | | | | | | | ● | ● |
| HCP operation | | ● | | | | | | | | | | |
| HM storage | | ● | | | | ● | | | | | ● | |
| HM transportation | | ● | | | | | | | | | ● | |
| HW disposal offsite transport | | ● | | | | | ● | | | | | |
| HW satellite accumulation area | | ● | | | | | | | | | ● | |
| HW storage (<90 days) | | ● | | | | | | | | | | |
| HW transportation | | ● | | ● | ● | | | | | | ● | |
| Land clearing | | | | | | ● | ● | | ● | | | ● |
| Landfill gas energy recovery system | | | | | | | | | | | | |
| Landscaping | | ● | | | | ● | | | | | | |
| Laundry | | ● | | | | | | | | | | |
| Live fire range operation | | ● | | | | ● | | | | | ● | ● |
| Livestock operation | | | | | | ● | ● | | | | | |
| Metal working | | ● | | | | | ● | | | | ● | |
| Non-destructive inspection | | ● | | | | | | | | | | |
| ODS/ halon management | | ● | | | | | | | | | ● | |
| Packaging/unpack-aging | | | | | | | ● | | | | | |

| MCB Camp Lejeune 2015 Practices | Env. Emergency Response/ Spill Response, Section 5.0 | HM/HW, Section 7.0 | Potential Discovery of Undocumented Contaminated Sites, Section 13.0 | Asbestos, Section 8.0 | Lead-Based Paint, Section 9.0 | Stormwater, Section 11.0 | Solid Waste, Recycling, and P2, Section 12.0 | Training, Section 3.0 | Cultural Resources, Section 6.0 | Permitting, Section 14.0 | Air Quality, Section 4.0 | Natural Resources, Section 10.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Paint booth | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | | | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | ● | |
| Paint gun cleaning | | ● | | | | | | | | | ● | |
| Paint removal | | ● | | | ● | | ● | | | | ● | |
| Painting | | ● | | | | | ● | | | | ● | |
| Parts replacement | | ● | | ● | | | ● | | | | | |
| Pesticide/herbicide mgt. and application | | ● | | | | ● | | | | | | |
| Polishing | | ● | | | | | ● | | | | ● | |
| Pumping station/ force main | | ● | | | | | | | | | | |
| Range residue clearance | | ● | | | | ● | ● | | | | | |
| Recreational facilities operation | | ● | | | | | ● | | | | | |
| Road construction and maintenance | | | | | | ● | ● | | ● | ● | ● | ● |
| Rock-crushing operations | | | | | | | ● | | | | ● | |
| Roofing kettle | | ● | | | | | | | | | | |
| Sewers | | | | | | | | | | | | |
| Sidewalk and road deicing | | ● | | | | ● | | | | | | |
| Soil excavation/grading | | | | | | ● | | | ● | | | ● |
| Solid waste collection/transportation | | | | | | | ● | | | | ● | |
| Storage tank management | | ● | | | | | ● | | | | ● | |

| MCB Camp Lejeune 2015 Practices | Env. Emergency Response/ Spill Response, Section 5.0 | HM/HW, Section 7.0 | Potential Discovery of Undocumented Contaminated Sites, Section 13.0 | Asbestos, Section 8.0 | Lead-Based Paint, Section 9.0 | Stormwater, Section 11.0 | Solid Waste, Recycling, and P2, Section 12.0 | Training, Section 3.0 | Cultural Resources, Section 6.0 | Permitting, Section 14.0 | Air Quality, Section 4.0 | Natural Resources, Section 10.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stormwater collection/ conveyance | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | ● | | Applicable to All Practices Conducted Aboard MCB Camp Lejeune | | | | |
| Surface washing | | | | | | | | | | | | |
| Swimming pool operation and maintenance | | ● | | | | | | | | | | |
| Timber management | | | | | | | | | | | | ● |
| Universal waste storage/ collection | | ● | | | | | | | | | | |
| Urban wildlife management | | | | | | | ● | | | | | ● |
| UXO/EOD operations | | ● | | | | | | | | | ● | |
| Vehicle maintenance | | ● | | | | | ● | | | | ● | |
| Vehicle parking | | | | | | ● | | | | | | |
| Wash rack | | | | | | ● | | | | | | |

PAGE INTENTIONALLY BLANK

# Attachment 2-1

# MCB Camp Lejeune's Environmental Policy Statement

PAGE INTENTIONALLY BLANK

## COMMANDING GENERAL'S ENVIRONMENTAL POLICY STATEMENT

The protection and enhancement of our natural environment is a valuable tool in sustaining the training and support mission of Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ). As MCIEAST-MCB CAMLEJ prepares for the increasing demands on facilities, training areas, ranges, and quality-of-life services that support the readiness of our forces, we are committed to protecting human health, conserving natural and cultural resources, and complying with regulatory requirements.

The MCIEAST-MCB CAMLEJ Environmental Management System (EMS) promotes sustained mission readiness through actively identifying and implementing solutions and opportunities for efficient resource use. Through the EMS, MCIEAST-MCB CAMLEJ will continually assess daily operations in order to identify and implement improvements to its practices that will ensure compliance with governing regulations and meet the sustainability objectives of Executive Orders 13514 and 13423. In this endeavor, MCIEAST-MCB CAMLEJ will:

- Continue proactive compliance with all environmental laws, regulations, and U. S. Marine Corps policies.
- Integrate natural and cultural resource management with the military mission whenever practical.
- Incorporate sound environmental practices into all of our operations and business decisions.
- Implement pollution prevention initiatives, waste diversion, recycling, and waste minimization programs.
- Assess and remediate contaminated sites aboard the Base that are the result of past disposal practices or spills and leaks of hazardous materials.
- Implement energy efficiency and water conservation management projects.
- Procure sustainable products, including biobased, environmentally preferable, energy efficient, water efficient, and recycled–content products.
- Collaborate with local communities and regulatory agencies to enhance stewardship of the environment, create goodwill and build trust.
- Educate our Marines, Sailors, and Civilian Marines about their responsibility to protect our natural environment, stressing the important role each individual plays in an effective EMS.

Join me in applying these environmental management principles to protect and enhance our natural environment, while strengthening the combat readiness of our forces and the quality-of-life services to our warriors and their families.

R. F. CASTELLVI
Brigadier General, U.S. Marine Corps
Commanding General
Marine Corps Installations East-Marine Corps Base Camp Lejeune

PAGE INTENTIONALLY BLANK

# 3.0 TRAINING

**To minimize the environmental impact of MCB Camp Lejeune operations, all contractors are required to receive both EMS and general environmental awareness training at the level necessary for their job function.**

The contractor is responsible for ensuring that every employee completes a program of classroom instruction or on-the-job training that teaches the employee to perform his or her duties in compliance with Federal, State, and local regulatory requirements.

To minimize the environmental impact of MCB Camp Lejeune operations, all civilian and military personnel, including contractors, are required to receive both EMS and general environmental awareness training at the level necessary for their job function. Use of the Contractor Environmental Guide satisfies these training requirements. A training presentation is provided in the Appendix.

**NOTE:** The contractor is responsible for knowing and complying with Federal, State, and local regulations. MCB Camp Lejeune environmental personnel will assist contractors with compliance issues; however, the primary burden of regulatory identification, familiarity, and compliance lies with the contractor. This training ***does not***

replace any required regulatory training as per contract requirements. Required training should be completed ***prior*** to working at MCB Camp Lejeune.

## 3.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with contractor training. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

### 3.1.1. Key Definitions

- **Explicitly Required Training.** Training expressly required by specific laws, regulations, or policies that apply due to the nature of work assignments, job functions, and/or specific licensing or certification requirements mandated by environmental laws, regulations, or policies.
- **Implicitly Required Training.** Instruction/information that is not expressly required by laws, regulations, or policies, but that may be reasonably inferred as being required to maintain compliance or is determined through EMS to reduce overall environmental risk.

### 3.1.2. Key Concepts

- **Comprehensive Environmental Training and Education Program (CETEP).** The USMC training program designed to ensure that high-quality, efficient, and effective environmental training, education, and information are provided at all levels of the USMC.
- **Environmental Management System (EMS).** The part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the Environmental Policy.
- **EMS Training.** All contractors are required to receive EMS training at the level necessary for their job function.
- **General Environmental Awareness Training.** Instruction designed to ensure that MCB Camp Lejeune and MCAS New River personnel become familiar with the installation environmental policies and programs for regulatory compliance, natural resource conservation, P2, and environmental protection. General EMS and Environmental Awareness Training for contractors and vendors is required for all MCB Camp Lejeune contractors. The training presentation is included as an Appendix to this document.

### 3.1.3. Environmental Management System

Training is potentially applicable to all EMS practices conducted aboard MCB Camp Lejeune.

## 3.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard MCB Lejeune and MCAS New River must be aware of and adhere to all applicable regulations and requirements concerning training, which include but may not be limited to the following:

- **Executive Order 13423.** Strengthening Federal Environmental, Energy, and Transportation Management. Requires implementation of an EMS at all appropriate organizational levels.

## 3.3. TRAINING REQUIREMENTS

### 3.3.1. General Environmental Awareness

In accordance with DoD instructions and MCO, the EMD at MCB Camp Lejeune has implemented a CETEP. A major component of the CETEP is to provide general environmental awareness training to all individuals associated with the installation, including contractors and vendors. Prior to or within 30 days of beginning work onsite, all contractors and their employees performing work aboard

**Prior to or within 30 days of beginning work onsite, all contractors are required to receive both EMS and general environmental awareness training.**

MCB Camp Lejeune must receive general environmental awareness training.

### 3.3.2. Environmental Management System

In addition to CETEP requirements, MCB Camp Lejeune has implemented an installation-wide EMS per EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and DoD and USMC EMS policy. The EMS highlights the fact that the authority and principal responsibility for controlling environmental impacts belong to those commands, units, offices, and personnel (including contractors and vendors) whose activities have the potential to impact the environment.

Prior to or within 30 days of beginning work onsite, all contractors and their employees performing work aboard MCB Camp Lejeune must receive EMS training.

### 3.3.3. Recordkeeping

Upon completion of the training materials included in the Appendix of the Contractor Environmental Guide, each employee must sign the Training Roster. The Contracting Representative must maintain these records in the contract file.

All training records, including other applicable environmental training, must be maintained onsite for review.

PAGE INTENTIONALLY BLANK

# 4.0 AIR QUALITY

The Air Quality Program is responsible for ensuring that the installation complies with all applicable Federal, State, and local air quality regulations. The ROICC or Contract Representative will provide a copy of BO 5090.6A, Air Quality Management, which has additional information.

## 4.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with air quality. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

### 4.1.1. Key Definitions

- **Criteria Pollutants.** Pollutants that the U.S. Environmental Protection Agency (EPA) Administrator has determined will cause or contribute to air pollution, that may reasonably be anticipated to endanger public health and welfare, and for which air quality criteria have been established (i.e., sulfur dioxide, nitrogen oxides,

ground-level ozone, carbon monoxide, lead, and particulate matter).

- **Dust-Causing Activity.** Any activity that has the potential to generate an excess level of dust, including but not limited to construction and demolition (C&D), blasting and sanding, construction of haul roads, land clearing, or fallow fields.
- **Hazardous Air Pollutants.** Air pollutants, as identified within 42 United States Code (USC) 7412, that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects.
- **Ozone-Depleting Substance.** Chemicals, such as certain refrigerants, that cause depletion of the stratospheric ozone layer—primarily chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) and their blends.
- **Particulate Matter.** A criteria air pollutant that includes dust, soot, and other small materials that are released into and transported by air.
- **Title V Operating Permit.** Permit issued under the Clean Air Act (CAA) Amendments of 1990 for all major sources of air pollution. All emission sources at the installation must be listed on the permit.

### 4.1.2. Key Concepts

- **Emission Sources.** Before beginning any emitting activity, please have the ROICC or Contract

Representative contact EMD to determine whether any permitting, monitoring, reporting, testing, and/or recordkeeping requirements apply.

- **Permitted Sources.** Ensure that construction/authorization permits are in place prior to beginning construction and/or prior to the arrival onsite of new or additional emission sources (emergency generators, paint booths, etc.).

### 4.1.3. Environmental Management System

Contractor activities associated with air quality include the following:

- Boat operation/maintenance
- Boiler operation
- Chlorination
- Degreasing
- Engine operation and maintenance
- Fueling and fuel management/storage
- Hazardous material (HM) storage/transportation
- Hazardous waste (HW) satellite accumulation area/HW transportation
- Live fire range operations
- Metal working
- Ozone-depleting substance (ODS)/halon management

- Paint booth operations/paint gun cleaning/paint removal
- Polishing
- Road construction and maintenance
- Rock-crushing operations
- Solid waste collection/transportation
- Storage tank management
- Unexploded ordnance (UXO)/explosives and ordnance disposal (EOD) operations
- Vehicle maintenance

The potential impacts of these activities on the environment include degradation of air quality, degradation of quality of life, and depletion of nonrenewable resources.

## 4.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable regulations and requirements regarding air quality, which include but may not be limited to:

- **Clean Air Act Amendments of 1990.** Protect human health and clean air resources by establishing standards and regulations for the control of air pollutants.
- **Title V Operating Permit.** Operating permit required for any major stationary source that emits or

has the potential to emit 100 tons per year or more of any criteria air pollutant and outlines the requirements to address and ensure air quality compliance.

- **BO 5090.6A, Air Quality Management.** Implements policies and procedures at the installation level that all personnel must follow in order to demonstrate compliance with the Title V permit and USMC requirements.
- **Base Bulletin 5090, Open Burning of Vegetative Debris.** Outlines procedures for conducting open burning in accordance with State regulations and installation procedures.
- **North Carolina Department of Air Quality (NCDAQ) Rules.** Outlines all State-specific air quality rules, control requirements, procedures for permits, and approvals contained in 15A North Carolina Administrative Code (NCAC) 02D, 02H, and 02Q applicable to North Carolina entities.

## 4.3. PERMIT REQUIREMENTS

The installation has a single permit, the CAA Title V Construction and Operating Permit, which includes all stationary air emission sources at the facility; therefore, all permit application submittals to the NCDAQ must be coordinated through the EMD. The NCDAQ will review and process the application and then issue a permit to construct and operate or to modify the emission source(s). A permit is required prior to the construction of any emission source. Timely submittal of the permit application is required to

obtain the final permit prior to commencing construction. The most common types of emission sources at the installation are as follows:

**A permit is required for the construction of any emission source. Timely submittal of the permit application is necessary to ensure the permit is available before commencing construction.**

- Boilers
- Generators
- Engine test stands
- Surface coating/painting operations
- Paint removal (chemical and mechanical), abrasive blasting, or other surface preparation activities
- Fuel storage and fuel dispensing
- Grinding
- Woodworking
- Welding
- ODS/refrigerant recovery and recycling operations (industrial chillers, refrigerators, air conditioning compressors, cleaning agents, etc.)
- Bulk chemical and flammable materials storage

## 4.4. ADDITIONAL ACTIVITIES OF CONCERN

Contact the ROICC or Contract Representative for additional information regarding activities that do not

necessarily require modification to the Title V permit, but that must be coordinated with or tracked by EMD or the NCDAQ. Examples of these activities include, but are not limited to, the following:

- **Use, Maintenance, and Management of Refrigerants and other ODS.** Includes installation, recovery, replacement, conversion, or service of refrigerant-containing equipment (chillers, refrigerators, air conditioning condensers, etc.). All contractors will use Best Management Practices (BMPs) during refrigerant management activities. All Heating, Ventilation, and Air Conditioning (HVAC) technicians will maintain their appropriate State-specific licenses and present them to the ROICC or Contract Representative upon request.
- **Emergency Generators.** Includes the installation and temporary use of emergency generators during electrical failures and construction activities. All contractors will coordinate with the ROICC or Contract Representative to determine if the intended generator may be exempted or must be temporarily permitted for the intended use.
- **Open Burning (e.g., right-of-way clearing, storm debris burning).** Open burning activities aboard MCB Camp Lejeune and MCAS New River must coordinated through EMD and the Fire Department. Open burning activities are only permissible for land clearing and right-of-way maintenance when the following conditions are met:

- The wind direction at the time the burning is initiated is away from any public transport roads within 250 feet so they are not affected by smoke, ash, or other air pollutants from the burning.
- The location of the burning is at least 500 feet from any dwelling, group of dwellings, commercial or institutional establishment, or other occupied structure not located on the property on which the burning is conducted, unless an air curtain burner is used. If an air curtain burner is used, the regional office supervisor may grant exceptions to the setback requirements.
- Heavy oils, asphaltic materials (e.g., shingles and other roofing materials), items containing natural or synthetic rubber, or any materials other than vegetative plant growth are not burned.
- Initial burning must begin between 0800 and 1800. After 1800, no material may be added to the fire until 0800 the following day.
- No fires may be started, and no vegetation may be added to existing fires, when the North Carolina Division of Forest Resources has banned burning for that area.
- Burners that have the potential to burn more than 8,100 tons per year may be subject to Title V air quality permitting requirements.

Situations that require a regulatory exemption evaluation by the NCDAQ Regional Office

Supervisor are coordinated through EMD's Environmental Quality Branch Air Quality Program Manager. The ROICC or Contract Representative will address any additional questions or provide a copy of Base Bulletin 5090, which contains a summary of the installation's open burning requirements.

The four designated sites at MCB Camp Lejeune that are permitted for storing and/or burning storm debris are in the following areas: Mainside at the borrow pit near the Piney Green landfill, Courthouse Bay, Camp Johnson, and Camp Geiger. Only storm debris may be accumulated at these sites. EMD must notify the NCDAQ if the installation intends to burn the storm debris at one of these sites. Contact the ROICC or Contract Representative for more information.

- **Fire training outside of designated fire training pits**. State approval is required to conduct fire training outside of the designated fire training pits. First, complete the Notification of Open Burning for the Training of Firefighting Personnel form. The form is available at the following site: http://daq.state.nc.us/enf/openburn/ob_firetrain.pdf.

  Before the training exercise, an accredited North Carolina Asbestos Inspector must inspect any structure to be burned to ensure that it is free from asbestos. Turn in the completed form to EMD for submittal to NCDAQ and the Division of Public Health, Health Hazards Control Unit. Contact the

ROICC or Contract Representative for additional information.

- **Dust-causing activities (e.g., concrete and rock crushing).** Wet suppression is required during the entire dust-causing operation. Ensure that an adequate water supply is available, and coordinate with the Fire and Emergency Services Division if access to a fire hydrant is necessary. Applicable wet suppression may be required during temporary concrete-crushing operations during C&D activities.

- **Noise Management.** USMC commands engaged in any activity resulting in noise emissions must comply with Federal, State, interstate, and local requirements for the control and management of environmental noise to minimize disruption to the local community. To the maximum extent practicable, personnel should limit the use of power tools, machinery, construction equipment, and other noisy devices to normal working hour

# 5.0 ENVIRONMENTAL EMERGENCY PLANNING AND RESPONSE

Environmental emergency planning and response can reduce injuries, protect employees, reduce asset losses, minimize downtime, and minimize environmental impacts of uncontrolled releases of pollutants to air, land, and water. The purpose of emergency planning is to prepare for, mitigate, respond to, and recover from environmental emergencies while minimizing any potential impacts to human health and the environment. Contractors operating aboard MCB Camp Lejeune must be aware of and adhere to all environmental emergency response procedures and notification requirements to minimize detrimental effects from inadvertent releases.

Procedures relating to emergencies caused by unforeseen site conditions are addressed in Section 5.0of this guide. If an environmental emergency is identified, contact 911 immediately. Additional inquiries should be directed to the ROICC or Contract Representative.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

## 5.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with environmental emergency response and spill response requirements. If you have any

questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

### 5.1.1. Key Definitions

- **Berm.** A mound used to prevent the spread of a contaminant.
- **Discharge.** Any spilling, leaking, pumping, pouring, emitting, emptying, or dumping not explicitly permitted.
- **Navigable waters.** The waters of the United States and territorial seas, including waters that have been or may be used for commerce, waters subject to tidal flow, interstate waters and wetlands, and all other waters (intrastate lakes, rivers, streams, intermittent streams, flats, wetlands, sloughs, prairies, wet meadows, natural ponds, tributaries, etc.).
- **Petroleum, Oil, and Lubricant (POL).** A broad term that includes all petroleum and associated products or oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, vegetable oil, animal oil, sludge, oil refuse, and oil mixed with wastes.
- **Release.** Pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any hazardous

chemical, hazardous substance, or extremely hazardous substance (EHS). Releases may be aboveground, belowground, or to water.

- **Spill Event.** The reportable discharge of oil into or upon the navigable waters of the United States or adjoining shorelines in harmful quantities, as defined by the Code of Federal Regulations (CFR) in 40 CFR 110.

### 5.1.2. Key Concepts

- **Environmental Emergency Response Contacts.** The following table identifies the emergency contact information for various spill scenarios. In addition to these emergency response contacts, the ROICC or Contract Representative should be notified immediately after an incident.

***Table 5-1. Environmental Emergency Response Contacts***

| For spills of: | Call: | Follow-up: |
|---|---|---|
| Hazardous waste | **911** | Spill Report |
| Unknown materials | **911** | Spill Report |
| Material on a permeable surface | **911** | Spill Report |

| For spills of: | Call: | Follow-up: |
|---|---|---|
| Any amount of a POL or Hazardous Material | **911** | Spill Report |
| Material that reaches stormwater inlets or waterways | **911** | |
| Nonhazardous waste | (910) 451-1482 | 911 |

- Contractors have containment and cleanup responsibilities following a spill, and there may be additional follow-up reporting or requirements. Contact the ROICC or Contract Representative for additional guidance.

### 5.1.3. Environmental Management System

Environmental planning and response are potentially applicable to all EMS practices conducted aboard MCB Camp Lejeune.

## 5.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard MCB Lejeune and MCAS New River must be aware of and adhere to all applicable regulations and requirements regarding emergency response

and spill response procedures, which include but may not be limited to the following:

- **Clean Air Act of 1970, Section 112r** Mandates the prevention and control of air emissions and specifies emergency planning where the potential exists for accidental release of hazardous air pollutants.
- **Clean Water Act (CWA) of 1972.** Establishes the basic structure for regulating discharges of pollutants into the waters of the United States. The CWA establishes that there should be no discharges of oil or hazardous substances into or upon the navigable waters of the United States or adjoining shorelines, which may affect natural resources under the management of the United States.
- **Comprehensive Environmental Response, Compensation, and Liability (CERCLA) Act of 1980.** Authorizes a Federal response to any release or threatened release of a hazardous substance into the environment. This act defines hazardous substances by reference to substances that are listed or designated under other environmental statutes.
- **Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, Section 304.** Establishes requirements for reporting a release to ensure a quick response by local emergency responders. Notification requirements apply to two chemical lists: the CERCLA Hazardous Substance list and the EHS list. The “List of Lists” provides a comprehensive identification of hazardous

substances and EHSs. In addition, facilities may be required to submit a list of their hazardous materials inventory maintained onsite or Safety Data Sheets (SDS) to response personnel.

- **Oil Pollution Act (OPA) of 1990.** Addresses oil storage at facilities and emphasizes preparedness and response activities. This act prohibits the harmful discharge of oil and hazardous substances into waters of the United States. The OPA requires contingency planning for "worst case" discharges and demonstrated response capabilities through planning, equipment, training, and exercises.
- **Resource Conservation and Recovery Act (RCRA) of 1976.** Protects human health and the environment from the hazards associated with hazardous waste handling, generation, transportation, treatment, storage, and disposal. Subtitle C of the RCRA requires owners and operators of hazardous waste facilities to develop comprehensive management plans that address spill prevention and cleanup.

## 5.3. SPILL NOTIFICATION

### 5.3.1. POL/Hazardous Materials Spill Notification Procedures

In accordance with MCB Camp Lejeune notification requirements, any discharge of oil or hazardous materials must be immediately reported to the MCB Camp Lejeune Fire Department at 911.

MCB Camp Lejeune maintains a Spill Prevention, Control, and Countermeasures (SPCC) Plan that establishes procedures to prevent oil spills and documents existing oil spill prevention structures, procedures, and equipment. The Installation SPCC Plan provides general information for any type of response actions needed for spills aboard MCB Camp Lejeune. Contractors engaged in the handling and transfer of POL or hazardous materials must develop a Unit-Level Contingency Plan (ULCP) that addresses the spill response for their specific sites and potential spill types. This ULCP must be maintained onsite, and all personnel working within that site must be made aware of its location and use.

**Contractors must develop a Unit-Level Contingency Plan that addresses the spill response for their specific sites and potential spill types.**

In the event of a spill, contact the ROICC or Contract Representative (after contacting emergency responders) to obtain a spill report form. Return the completed spill report form to EMD (fax to (910) 451-3471) and to the ROICC or Contract Representative. A copy of the spill report form is included as Attachment 5-1. The following information must be provided when reporting a spill:

- Name and phone number
- Location of spill (building. number, street)
- Number and type of injuries, if any
- Type and amount of spilled material

- Source of the spill (container, vehicle, etc.)
- Action being taken, if any, to control the spill
- Estimated time of spill

Do not wait to report a spill, even if all of the required information is not immediately available.

### 5.3.2. Wastewater Spill and Water Line Break Notification

Contractors operating aboard MCB Camp Lejeune and MCAS New River must be aware of water and wastewater utilities in their specific work/project area.

**Wastewater Spills**

In the event of a wastewater spill, report the incident to the Public Works Base Utilities at (910) 451-7190 (x225). In addition, report the incident immediately to the ROICC or Contract Representative. The following information must be provided:

- Name and phone number
- Location of spill (building number, street address)
- Type and amount of spilled material
- Source of the spill
- Action being taken, if any, to control the spill
- Estimated time of spill

**Water Line Breaks**

In the event of a water line break, report the incident to the Public Works Base Utilities at (910) 451-7190 (x225). In addition, report the incident immediately to the ROICC or Contract Representative. The following information must be provided:

- Name and phone number
- Location of spill (building number, street address)
- Reason for the break
- Estimated time of the break

## 5.4. FOLLOW-UP

If surface run-off is contaminated, the contractor will, under the advisement of the Fire Department or EMD, construct a temporary berm or containment area. Contaminated surface water will be removed in accordance with all safety and environmental requirements for the installation. Notify the Resource Conservation and Recovery Section (RCRS) at (910) 451-1482); the RCRS will provide concurrence for temporary containment areas and removal of contaminated runoff.

If solid or hazardous waste was generated as the result of a spill, refer to Sections 12.0 and 7.0 of this guide for disposal requirements.

PAGE INTENTIONALLY BLANK

# Attachment 5-1

# Spill Reporting Form

PAGE INTENTIONALLY BLANK

# MARINE CORPS INSALLATIONS EAST
# MARINE CORPS BASE CAMP LEJEUNE
# UNIT LEVEL SPILL FORM

Spill Date: Spill Time:

**RESPONDERS**

Response Initiator: Major Command:

Phone Number: Unit Name:

Fire Department Response: Responder Name:

EMD Respond? Responder Name:

GPS Coordinates: X: Y:

**SPILL IDENTIFICATION**

Spilled Substance: State:

Source (Vehicle, drum, etc.): Building:

Estimated Amount:

Cause of Spill:

Containment/Clean-up Action Taken:

Parties Performing Spill Clean-up/Removal (EMD Turn-in Date):

Additional Assistance Required:

**REPORT CERTIFICATION**

Printed Name/Rank: Signature:

E-mail: Date:

All releases must be reported to the Base Fire Department by calling 911. The Environmental Management Division can be reached by calling (910) 451-1482. Units are required to maintain a copy of all completed spill forms, preferably in their ESOP Binder.

MCIEAST-MCB CAMLEJ/G-F/EMD/5090.9/18 (2/13) PREVIOUS EDITIONS ARE OBSOLETE ADOBE 9.0

Enclosure (4)

PAGE INTENTIONALLY BLANK

# 6.0 CULTURAL RESOURCES

MCB Camp Lejeune enjoys a rich history, and remnants of our past may be found throughout the real properties that make up the installation. All personnel at MCB Camp Lejeune are responsible for ensuring the cultural resources entrusted to the USMC care remain intact and available for future generations. Contractors are responsible for notifying the ROICC or Contract Representative immediately if they encounter suspected archaeological sites, artifacts, or human remains.

## 6.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with cultural resource management. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

### 6.1.1. Key Definitions

- **Archaeological Resource.** Defined by the Archaeological Resources Protection Act (ARPA) as any material remains of past human life or activities

that are at least 100 years old and are capable of providing scientific or human understanding of past human behavior and cultural adaptation, including the site on which the remains are located. Examples include pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials/remains, or any portion or piece of any of the foregoing items or structures. Non-fossilized and fossilized paleontological specimens, or any portion or piece thereof, are not considered archaeological resources unless found in an archaeological context. (According to the National Historic Preservation Act (NHPA) of 1966, some historic properties built within the past 50 years can achieve significance if they are of exceptional importance [National Register Criteria Consideration G].)

- **Cultural Resource.** A generic term for the collective evidence of the past activities and accomplishments of people, including buildings, structures, districts, sites, features, and objects of significance in history, architecture, archaeology, engineering, or culture, per MCO P5090.2A.

- **Effect.** Any condition of a project that may cause a change in the quality of the historic, architectural, archaeological, or cultural character of a property that qualifies it for listing in the National Register of Historic Places (NRHP). A project is considered to have an effect on a historic or cultural property when any aspect of the project changes the integrity of the

location, design, setting, materials, workmanship, feeling, or association of the property that contributes to its significance.

- **Historic Property.** Any prehistoric or historic district, site, building, structure, or object significant in U.S. history, architecture, archaeology, engineering, or culture and included, or eligible for listing in, the NRHP, per the NHPA and MCO P5090.2A.
- **State Historic Preservation Officer.** The person designated to administer the State Historic Preservation Program, including identifying and nominating eligible properties to the NRHP and administering applications for listing historic properties in the NRHP.

### 6.1.2. Key Concepts

- **Notification.** Contractors must notify the ROICC or Contract Representative if they encounter any cultural resources.
- **Policy.** DoD policy is to preserve significant historic and archaeological resources.

### 6.1.3. Environmental Management System

Contractor practices associated with cultural resources include the following:

- Construction/demolition/renovation
- Land clearing

- Road construction and maintenance
- Soil excavation/grading

The potential impacts of these activities on the environment include damage, destruction, alteration, theft, or demolition of historic properties.

## 6.2. OVERVIEW OF REQUIREMENTS

It is DoD policy to integrate the archeological and historic preservation requirements of applicable laws with the planning and management of activities under DoD control; to minimize expenditures through judicious application of options available in complying with applicable laws; and to encourage practical, economically feasible rehabilitation and adaptive use of significant historical resources.

Contractors operating aboard MCB Lejeune and MCAS New River must be aware of and adhere to all applicable regulations and requirements regarding cultural resources, which include but may not be limited to the following:

- **BO 5090.8A.** Sets forth regulations and establishes responsibilities associated with management of archaeological and historic resources aboard MCB Camp Lejeune.
- **Archaeological and Historic Preservation Act (AHPA) of 1974 (16 USC 469 *et seq.)*** Amends the Reservoir Salvage Act to extend its provisions beyond the construction of dams to any terrain alteration resulting from any Federal construction

project or federally licensed project, activity, or program.

- **Archeological Resources Protection Act of 1979 (16 USC 470 et seq.)** Requires Federal land managers to issue permits for the excavation or removal of artifacts from lands under their jurisdiction. The ARPA requires that relevant Native American tribes be notified of permit issuance if significant religious or cultural sites will be affected. It prohibits the excavation, damage, alteration, theft, or defacement of an archaeological site or artifacts unless permitted by the Federal land manager.
- **DoD Directive 4710.1, Archaeological and Historic Resources Management.** Provides policy for the management of archaeological and historic resources on land and in water under DoD control.
- **EO 11593, May 13, 1971.** Requires all Federal agencies to administer cultural properties under their control. Agencies are required to direct their policies, plans, and programs so that significant sites and structures are preserved.
- **Historic Sites, Buildings, and Antiquities Act of 1935 (Public Law 74-292, 16 USC 461 et seq.).** States that it is Federal policy to preserve historic and prehistoric properties of national significance.
- **National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.).** States that it is Federal government policy to preserve important historic, cultural, and natural aspects of our national heritage

and requires the consideration of environmental concerns during project planning and execution.

- **National Historic Preservation Act of 1966 (16 USC 470 et seq.).** Establishes historic preservation as a national policy and requires Federal agencies undertaking actions that may affect NRHP-eligible historic properties to consult State historic preservation offices and the Advisory Council on Historic Preservation. Section 110 of NHPA requires Federal agencies to inventory, evaluate, identify, and protect cultural resources that are determined eligible for listing in the NRHP.
- **Public Buildings Cooperative Use Act of 1976 (Public Law 94-541).** Encourages adaptive reuse of historic buildings as administrative facilities for Federal agencies.
- **Title 36 CFR Part 65, National Historic Landmarks Program.** Identifies and designates National Historic Landmarks, and encourages the long-range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.

## 6.3. PROCEDURES

All contractors are expected to follow these procedures:

- Notify the ROICC or Contract Representative immediately concerning any encounter with suspected archaeological sites, artifacts, human remains, or any other suspected cultural resources during contractor activities.
- Stop work in the immediate area of the discovery until directed by the Contract Representative to resume work.

**Notify the ROICC or Contract Representative immediately concerning any encounter with suspected archaeological sites, artifacts, or human remains during contractor activities.**

Be particularly aware of surroundings when working in a designated historic area. The Camp Lejeune Installation Geospatial Information & Services Office of the Geospatial Services Division can provide resource mapping of known cultural resource areas for all planners, project managers, contractors, and others, through formal request. The ROICC or Contract Representative will assist with making arrangements to request access for Geographic Information System mapping.

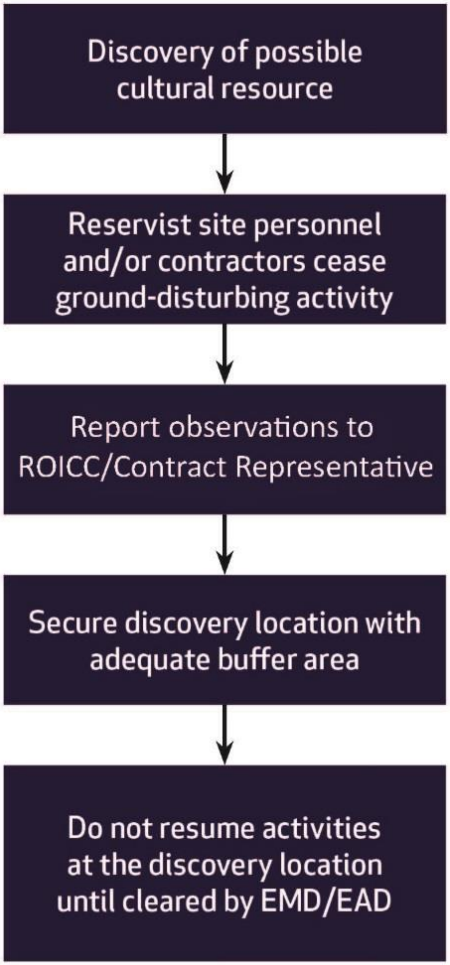



***Figure 6-1. Possible Cultural Resource Discovery Flow Chart***

# 7.0 HAZARDOUS MATERIALS/HAZARDOUS WASTE MANAGEMENT

All persons on a USMC installation are subject to compliance with Federal, State, and local regulations and permit conditions addressing the proper management of hazardous materials and waste. Mishandling these wastes and materials may result in violation notices, fines, and/or penalties. The EPA regulates hazardous wastes through the RCRA, which provides specific regulatory definitions for hazardous waste and its management. The RCRA governs all hazardous waste from the point of generation to ultimate disposal, including hazardous waste generated by contractors aboard MCB Camp Lejeune and MCAS New River. Hazardous materials, including those used by contractors aboard the installation, are also regulated by the EPCRA. Additionally, the North Carolina Department of Environmental Quality (NCDEQ) has issued more stringent rules and regulations governing hazardous materials and hazardous waste management that also apply to contractors.

## 7.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with hazardous materials (HM), hazardous wastes (HW), and their management. If you have any questions or concerns about the information in this section,

**Direct questions or concerns about the information in this section to the ROICC or Contract Representative.**

please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

### 7.1.1. Key Definitions

- **90-day Accumulation Area.** These areas are used to store HW temporarily until it is either manifested and shipped off site for disposal or transferred to a permitted storage facility. HW may be accumulated for up to 90 days in these areas. MCB Camp Lejeune's 90-day accumulation facility is located on Michael Road.
- **Generator.** Any person whose activity or process produces HW or whose activity or process subjects HW to regulation.
- **Hazardous Material.** A chemical compound, or a combination of compounds, posing or capable of posing a significant risk to public health, safety, or the environment as a result of its quantity, concentration, or physical/chemical/infectious properties.
- **Hazardous Waste.** Any discarded material (including solid, liquid, or gas) or combination of discarded materials which, due to quantity, concentration, or physical, chemical, or infectious characteristics may:
    - Cause or significantly contribute to an increase in mortality or cause a serious irreversible or incapacitating reversible illness; or

- Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

- **Manifest.** A document that allows all parties involved in HW management (e.g., generators, transporters, disposal facilities, EPA, State agencies) to track the movement of HW from the point of generation to the point of ultimate treatment, storage, or disposal. All HW manifests for waste generated aboard MCB Camp Lejeune must be reviewed and released by personnel from the Resource Conservation and Recovery Section, EMD, who can be contacted at (910) 451-1482.

- **Non–RCRA-Regulated Waste.** Waste that is not regulated or is exempt from regulation under RCRA HW requirements but has other regulatory requirements for proper management.

- **Satellite Accumulation Area (SAA).** Designated areas at or near the point of generation, where HW is accumulated. Generators may accumulate up to 55 gallons of HW or one quart of acute HW at a satellite area for an indefinite amount of time. When 55 gallons of HW (or 1 quart of acute HW) are exceeded, the generator must date the container and transfer it to an approved 90-day site or long-term HW storage facility within 72 hours. EMD authorization for an SAA must be obtained and posted at the site. EMD authorization will establish individual limits for each SAA. No SAA

authorizations will exceed 55 gallons of HW or 1 quart of acute HW. In accordance with installation policy, HW in an SAA should not be stored longer than 365 days, even if the container is not full.

- **Safety Data Sheet (SDS).** A document that provides information about (1) chemical properties, environmental hazards, and health hazards; and (2) protective measures, along with safety precautions, for handling, storing, and transporting hazardous chemical products. The Hazard Communication Standard (HCS), 29 CFR 1910.1200(g), was revised in 2012 to mandate the use of a single Globally Harmonized System of Classification and Labelling of Chemicals (GHS) by manufacturers, distributors and importers to communicate information on chemical-related hazards. The information contained in the SDS is standardized in a 16-section format. Employers must ensure that the SDSs for all hazardous chemicals in the workplace are readily accessible to employees.
- **Treatment.** Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any HW to neutralize the waste; or to recover energy or material resources from the waste; or to render such waste nonhazardous or less hazardous, safer to transport, store, or dispose of, or amenable for recovery or storage, or reduction in volume.
- **Treatment, Storage, and Disposal (TSD) Facilities.** TSD facilities conduct HW treatment,

storage, or disposal operations and require an RCRA part B permit for final approval to operate. The part B permit is maintained to accurately identify the most current operations at the TSD facility. MCB Camp Lejeune does not have a TSD facility.

- **Universal Waste (UW).** UW regulations streamline HW management standards for batteries, pesticides, mercury-containing equipment, and fluorescent lamps. The regulations govern the collection and management of these widely generated wastes, thus facilitating environmentally sound collection and proper recycling or treatment. In North Carolina, batteries, thermostats, obsolete agricultural pesticides, and fluorescent lamps may be managed under the UW Rule. UW must be transferred off site within 1 year of the date when the material was first identified as waste.

- **Used Oil.** Any oil that has been refined from crude oil or synthetic oil and, as a result of use, storage, or handling, has become unsuitable for its original purpose due to the presence of impurities or loss of original properties. Used oil may be suitable for further use and is economically recyclable; therefore, it is managed as a separate category of material.

### 7.1.2 Key Concepts

- **HW Management.** The systematic control of the collection, source separation, storage, transportation, processing, treatment, recovery, and disposal of HW. In addition, HW Management includes processes to

reduce the HW's effect on the environment and to recover resources from it.

- **HW Minimization.** The USMC policy is to reduce the quantity of HW disposed of by source reduction, recycling, treatment, and disposal. The highest priorities are reducing HW generation, and recycling. The goal of the USMC is to achieve continuous reduction of HW generation through P2 initiatives, BMPs, and use of the best available demonstrated technology.
- **National Fire Protection Association.** The U.S. trade association that creates and maintains private, copyrighted standards and codes, including the diamond hazard label in Figure 7-1, which is used by emergency personnel to quickly and easily identify the risks posed by hazardous materials.

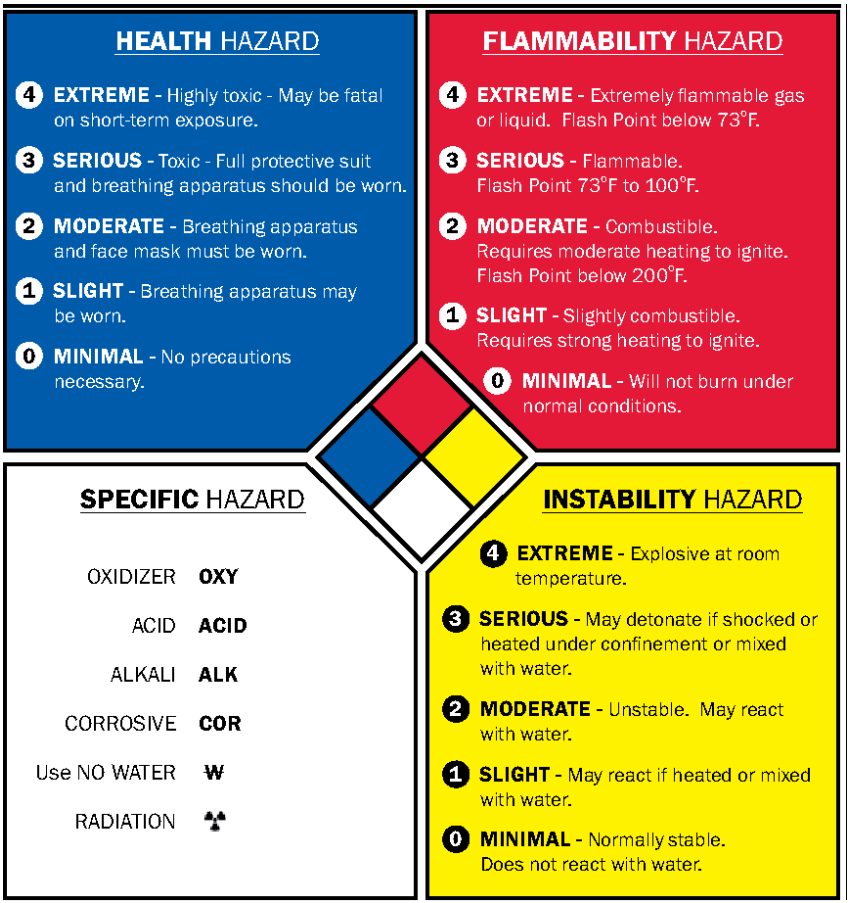



***Figure 7-1. Diamond Hazard Label***

### 7.1.3 Environmental Management System

Contractor practices associated with HM and HW management include, but are not limited to, the following:

Battery management

Boat operation/ maintenance

Boiler operation

Building operation/ maintenance/repair

Chlorination

Cooling tower operation and maintenance

Construction/renovation/ demolition

Degreasing

Drinking water management

Engine operation and maintenance

Equipment operation/ maintenance/disposal

Fueling and fuel management/storage

Habitat management

HCP operation

HM storage

HM transportation

HW disposal offsite transport

HW satellite accumulation area

HW storage (<90 days)

HW transportation

Laboratory

Landscaping

Laundry

Live fire range operations

Metal working

Non-destructive inspection

ODS/halon management

Paint gun cleaning

Paint removal

Painting

Parts replacement

Pesticide/herbicide management and application

Polishing

Pumping station/force main

Range residue clearance

Recreational facilities operation

Roofing kettle

Sidewalk and road deicing

Storage tank management

Swimming pool operation and maintenance

Universal waste storage/collection

UXO/EOD operations

Vehicle maintenance

The potential impacts of these activities on the environment include depletion of the HW landfill, depletion of non-renewable resources, and degradation of soil quality.

## 7.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard MCB Lejeune and MCAS New River must be aware of and adhere to all applicable regulations and requirements regarding HM and HW, which include but may not be limited to the following:

- **BO 5090.9, Hazardous Material/Waste Management/Air Station Order (ASO) 5090.2, Environmental Compliance and Protection Program for MCAS New River.** Establishes procedures and general responsibilities for the disposal of HM and HW under environmental permits and authorizations.
- **Emergency Planning and Community Right-to-Know Act.** Establishes requirements regarding emergency planning and the reporting of hazardous chemical storage and use.
- **Hazardous Material Transportation Act (HMTA) of 1975.** The principal Federal law regulating the transportation of HM. Established to mitigate the risks to health, property, and the environment inherent in the transportation of HM in intrastate, interstate, and foreign commerce. The HMTA is administered by the U.S. Department of Transportation (DOT) and regulates the shipping, marking, labeling, placarding, and recordkeeping requirements for HM, including HW and military munitions.

- **Resource Conservation and Recovery Act of 1976.** Establishes standards for HW generators as necessary to protect human health and the environment by instituting statutory standards for generators and transporters of HW that will ensure the following: proper recordkeeping and reporting; use of a manifest system; use of appropriate labels and containers; containerization and accumulation time; and proper management of TSD facilities. In addition, it gives the EPA and State agencies authority to access facility premises and all records regarding HW management.
- **40 CFR Subchapter I (Parts 260–299), Solid Wastes.** Federal regulations promulgated under the 1976 RCRA that regulate HW management, generators, transporters, and owners or operators of TSD facilities. North Carolina has adopted the Federal HW rules by reference.

Because the installation is designated as a Large Quantity Generator (LQG) of HW, all HW generated aboard MCB Camp Lejeune must meet the regulatory requirements of this generator designation. An LQG may maintain three types of HW accumulation/storage areas: satellite, 90-day, and permitted. Typically, HW is accumulated at an SAA and later transferred to a 90-day or permitted storage area.

Both MCB Camp Lejeune and MCAS New River maintain Hazardous Waste Management Plans (HWMPs) that outline the specific requirements for managing HM and HW. The HWMP identifies and provides guidance to implement all regulatory HW management activities and is available to all

personnel who accumulate, generate, transport (including on-installation transportation), treat, store, or dispose of HW.

**Contractors may be required to submit a Hazardous Waste Management Plan to the ROICC or the Contract Representative prior to beginning work.**

Contractors are responsible for the management of all HM and the ultimate disposition of any HW generated aboard MCB Camp Lejeune during a contract performance period. The ROICC or Contract Representative will contact Environmental personnel, who will provide additional guidance and oversight to verify compliance with applicable Federal, State, and local laws governing the generation, handling, and disposal of HM, HW, UW, used oil, petroleum-contaminated materials, RCRA-regulated HW, and non–RCRA-regulated waste.

Depending on the type of project, contractors may be required to submit a site-specific HWMP to the ROICC or the Contract Representative prior to beginning work. Additionally, the Contracting Officer may require a Contractor Hazardous Material Inventory Log and corresponding SDSs for all materials to be used during the execution of the contract. EMD/EAD will use the SDSs to help contractors establish their Hazardous Material Storage and SAAs.

## 7.3. HAZARDOUS MATERIALS REQUIREMENTS

If a project uses HM:

- Reduce/reuse/recycle when possible; meet contract requirements for recycling.
- Segregate incompatible materials. Consult the SDS or material manufacturers with questions about a material's compatibility. Some examples of incompatible materials likely to be used by contractors are:

**Do not store large quantities of materials. Keep on hand only what can be used.**

  - *Corrosives* (e.g., batteries, stripping and cleaning compounds containing acids or bases) *and Flammables* (e.g., fuels, oils, paints, and adhesives)
  - *Corrosives and Oxidizers* (e.g., peroxide, perchlorates, sodium hypochlorite/bleach, or calcium hypochlorite)
  - *Oxidizers and Flammables*
- All compatible materials should be segregated and stored within designated storage lockers or cabinets (i.e., flammable materials should be stored in designated flammable storage lockers or cabinets, and corrosives should be stored in designated corrosives storage lockers or cabinets).

- Do not store large quantities of materials. Keep on hand only what can be used.
- Maintain an inventory of all HM maintained onsite, with adequate controls in place to prevent unauthorized access.
- Do not dump any HM into floor drains, sinks, oil-water separators (OWSs), or storm drains, or onto the ground.

**Stop work immediately if a project unearths a hazardous material (such as MEC/DMM/UXO) and report the situation to the ROICC or Contract Representative.**

- Store containers that hold 55 gallons or more (including in-use electrical generators and portable equipment) in proper secondary containment. Permanent secondary containment must be inspected weekly, temporary secondary containment must be inspected daily; all inspections and drainage of stormwater from secondary containment must be documented.
- Maintain SDSs and appropriate spill control/cleanup materials onsite at all times.
- Provide HM storage and usage information for regulatory reporting to the appropriate environmental office upon request.
- Stop work immediately if a project unearths any unknown HM (e.g., munitions and explosives of

concern [MEC], discarded military munitions [DMM], or unexploded ordnance [UXO]), and immediately report the situation to the ROICC or Contract Representative.

- Do not leave HM (or HW) onsite once the contract is completed. Remove it from the installation or make arrangements through the ROICC or Contract Representative to contact RCRS or EAD for turn-in procedures upon completion of the contract.

## 7.4. UNIVERSAL WASTE REQUIREMENTS

The NCDEQ allows thermostats, obsolete agricultural pesticides, lamps, and certain types of batteries to be managed as UW. UW has less stringent requirements for storage, transport, and collection, but it must still comply with full HW requirements for final recycling, treatment, or disposal. Federal UW requirements are outlined in 40 CFR 273. Contact the ROICC or Contract Representative regarding any additional direction or questions on the handling of UW.

All UW must be properly containerized, stored, and labeled when the waste is first generated. Containers/areas for accumulating UW must be labeled as follows:

- Words: UNIVERSAL WASTE.
- Content: Noun name found on the specific Hazardous Waste Profile Sheet (DRMS Form 1930), which is available from EMD (e.g., *batteries*,

*fluorescent lamps, pesticides, mercury-containing equipment*).

- Accumulation Start Date (ASD): The ASD must be marked on the subject container as soon as the UW item is placed in the container. Storage of UW cannot exceed 365 days.
- Number of Containers: The number of containers marked reflects the total number of containers disposed of within the current document (i.e., 1 of 1, etc.).

Contractors who need UW accumulation areas should contact the ROICC or Contract Representative, who will contact RCRS or EAD personnel to help contractors establish an accumulation area for UW. Key points for this process:

- The containers must be under the control of the contractor generating the waste and must be closed at all times except when waste is being adding.
- Per installation policy, UW containers/areas must be inspected weekly using the *Weekly Hazardous Waste (HW) Site Inspection Form*, included as Attachment 7-1 and Attachment 7-2. Written records noting discrepancies and corrective actions must be maintained onsite for 3 years. Copies of inspection reports should be provided to the ROICC or Contract Representative.
- When the ASD reaches 1 year, or when the container is full, the waste generator has 72 hours (3 days) to arrange for the transportation of the UW to an RCRA

Part B permitted storage area. Contact the ROICC or Contract Representative to coordinate the removal of the UW when the container is full or the contract is finished.

## 7.5. HAZARDOUS WASTE REQUIREMENTS

The appropriate environmental office must be notified before any HW is generated on projects managed by the ROICC or the Facilities Support Contracts (FSC). Have the ROICC or Contract Representative contact RCRS or EAD with questions regarding whether or not a waste meets the definition of HW. Installation personnel must approve all regulated waste and HW storage locations.

**The appropriate environmental office must be notified before any hazardous waste is generated on projects managed by the ROICC or the FSC.**

If a project generates HW:

- Minimize generation through waste minimization and P2 techniques.
- Have the ROICC or Contract Representative contact RCRS or EAD with questions regarding how to manage the waste. Do not mix waste types (e.g., used oil rags and solvent rags).
- Have the ROICC or Contract Representative contact RCRS or EAD for turn-in procedures as wastes are

generated, to determine if waste can be disposed of on the installation.

- Do not dump any HW into floor drains, sinks, OWSs, or storm drains, or onto the ground. Do not place HW into general/municipal trash dumpsters.
- Ensure that HW drums are properly labeled and lids are secured (wrench tight).
- Ensure that SAAs are managed properly and storage limits are not exceeded; have the ROICC or Contract Representative consult RCRS or EAD prior to creating a new SAA.

### 7.5.1. Storage

All HW must be properly containerized, stored, and labeled at the time the waste is first generated. HW must be stored in containers that meet applicable DOT specifications. HW labels, as required by the EPA and the NCDEQ, must contain the following information:

- Words: HAZARDOUS WASTE.
- Content: Noun name found on the specific Hazardous Waste Profile Sheet (DRMS Form 1930) provided by RCRS or EAD.
- ASD: For HW accumulated in an SAA, the ASD will be affixed once the container is filled or at the 1-year anniversary, whichever comes first.
- Number of Containers: Reflects the total number of containers (e. g., 1 of 1, etc.).

Any HW generated by contractors must be stored in an SAA. Contractors who need an SAA should contact the ROICC or Contract Representative, who will contact RCRS or EAD personnel to help the contractor establish each SAA. A summary of procedures follows:

- The HW generator may accumulate as much as 55 gallons of a specific HW stream (or up to one quart of acute HW) in a container at or near the point of generation.
- The containers must be under the control of the contractor generating the waste and must be kept closed (wrench tight) at all times except when waste is being added.
- HW containers must be inspected weekly using the *Weekly Hazardous Waste (HW) Site Inspection Form*, included as Attachment 7-1 and Attachment 7-2. Written records noting discrepancies and corrective actions must be maintained for a period of 3 years. Copies of inspection reports should be provided to the ROICC or Contract Representative.
- The generating contractor must monitor the level of waste in the SAA container and contact the ROICC or Contract Representative to coordinate disposal or determine if the contractor can turn in the HW to RCRS or EAD before the container is full. If the SAA container becomes full, the generating contractor has 72 hours (3 days) to arrange for the transport of the HW to an RCRA Part B permitted

storage area. Storage of HW in an SAA should not exceed 365 days, even if the container is not full.

### 7.5.2. Manifesting and Disposal

All disposal of HW generated by contractors must be coordinated with the installation. HW and UW generated aboard MCB Camp Lejeune and MCAS New River must be transported off the installation by a permitted HW transporter and must include a *Uniform Hazardous Waste Manifest* form (EPA Form 8700-22) or an equivalent approved manifest. The following procedures must be followed for disposal of HW:

- Use the MCB Camp Lejeune or MCAS New River EPA identification number for disposal of all contractor-generated HW.
- HW may only be transported by authorized personnel or permitted companies. Prior to transportation offsite, the HW generator must ensure that all DOT requirements for labeling, marking, placarding, and containerizing are met. The HW generator must also ensure that the transporter has obtained the installation's EPA identification number for the transportation of HW and that an appropriate waste manifest accompanies each shipment.

**Only personnel from EMD who have been designated in writing by the MCB Camp Lejeune Commanding General can sign the hazardous waste manifest.**

- The HW manifest can only be signed by personnel from the installation who have been designated in writing by the CG. The ROICC or Contract Representative should contact RCRS or EAD about manifesting regulated and non-regulated wastes offsite. Under **NO** circumstances can a contractor, ROICC, or Contract Representative sign a HW manifest or use another EPA identification number for wastes generated at the installation.
- All HW must be submitted to a permitted TSD facility. HW generators must certify that the facility receiving the waste employs the most practical and current treatment, storage, or disposal methods for minimizing present and future threats to human health and the environment.

## 7.6. NON–RCRA-REGULATED WASTE REQUIREMENTS

Non-RCRA-regulated wastes include used oil (when recycled), non-terne (tin and lead alloy) plated oil filters (not mixed with listed waste), CFC refrigerants (from totally enclosed equipment), certain wastes containing Polychlorinated Biphenyl (PCB), asbestos, and batteries not managed as UW.

### 7.6.1. Used Oil and Oil Filters

Used motor oil itself is *not* regulated as HW in North Carolina if it is recycled or burned for energy recovery. If used oil is not recycled, the generator must determine prior to disposal whether it is HW. Used oil must be collected in

drums or another approved container marked “Used Oil.” If the used oil storage container has a volume of 55 gallons or more, it must be stored in secondary containment.

- Do not dump used oil into drains, sinks, or trash containers, or onto the ground.
- Do not store used oil in open buckets or drip pans, damaged or rusted containers, or containers that cannot be fully closed.
- Do not mix used oil with other waste materials.

Terne plated oil filters contain an alloy of tin and lead. They are considered a hazardous waste due to their lead content and are typically located on industrial and heavy duty vehicles and equipment. All other used oil filters are not regulated as HW in North Carolina, as long as they are not mixed with listed HW. To qualify for this exclusion, the following conditions must be met:

- Used oil filters must be gravity hot-drained by puncturing the filter anti-drain back valve or filter dome and hot draining into a “Used Oil” storage drum. “Hot-drained” means that the oil filter is drained at a temperature that approximates the temperature at which the engine operates.
- Any incidental spillage that occurs must be cleaned up with a dry sweep, rags, or “absorbent matting.”
- Drained used oil filters must be collected in a container that is in good condition and is labeled with the words “Drained Used Oil Filters.”

- No other waste streams should be deposited in containers collecting used oil filters for disposal.
- Coordinate with the ROICC or Contract Representative to determine if the drained used oil filters can be given to RCRS or EAD.

### 7.6.2. Used Antifreeze

Antifreeze is composed of regulated chemicals, including ethylene glycol and propylene glycol, and during typical use may become contaminated with traces of fuel or metal particles (i.e., lead, cadmium, or chromium). It may also become HW if it has been mixed with other wastes, such as gasoline or solvents. Additional characterization may be required to determine whether or not used antifreeze is HW. Used antifreeze that is not recycled may be regulated as HW if the results from the Toxic Characteristics Leaching Procedure (TCLP) indicate metal contents that meet or exceed RCRA thresholds.

The State of North Carolina does not regulate used antifreeze as HW, as long as it is recycled by reuse, distillation, filtration, or ion exchange. Used antifreeze must be stored in closed containers on an impermeable concrete surface with adequate spill controls (secondary containment, appropriate stocked spill kits, etc.). Contact the ROICC or Contract Representative to determine if used antifreeze can be given to RCRS or EAD.

### 7.6.3. Petroleum-Contaminated Wipes and Oily Rags

Petroleum-contaminated wipes and oily rags are to be managed as non-regulated waste. Follow these procedures:

- Store oil-contaminated wipes and oily rags in metal containers because of their flammability/combustibility and to protect them from the weather.
- Do not throw these non-regulated waste items into solid waste dumpsters or garbage cans.
- Contact the ROICC or Contract Representative to determine if petroleum-contaminated wipes and oily rags can be given to RCRS or EAD.

### 7.6.4. Used Electronic Equipment

Used electronic equipment may contain lead solder or PCB oils (e.g., light ballast). Turn in these items as they are generated. Have the ROICC or Contract Representative contact RCRS or EAD for proper handling and/or turn-in procedures.

### 7.6.5. New and Used Batteries (Not Regulated as Universal Waste)

- Store compatible batteries together (i.e., lithium batteries should be stored with other lithium batteries).

- Store batteries off the ground to prevent them from coming into contact with water.
- Store lead-acid batteries away from an open flame.
- Place rechargeable batteries in plastic bags before storing them with other rechargeable batteries.
- Do not dispose of batteries unless authorized.
- Have the ROICC or Contract Representative contact RCRS or EAD for proper handling and/or turn-in procedures.

# Attachment 7-1

# Weekly Hazardous Waste (HW) Site Inspection Form
# MCB Camp Lejeune

PAGE INTENTIONALLY BLANK

MCB Camp Lejeune Weekly Hazardous Waste (HW) Site Inspection
Universal Waste (UW)/Satellite Accumulation Area (SAA)

Building Number/location of HW Site: _____
Unit Evaluated: _____
Evaluation Date: _____/_____/_____
Evaluation By (Site Manager): _____
Evaluation Time: _____

| **QUESTION** | **YES** | **NO** | **Location of Discrepancy *and* Proposed Corrective Action** |
|---|---|---|---|
| 1. Is housekeeping maintained in acceptable manner? | | | |
| 2. Is any HW present at the site? | | | |
| 3. Are HW containers properly marked? | | | |
| 4. Are HW containers in serviceable condition? | | | |
| 5. Are container bungs, caps, and openings properly secured? | | | |
| 6. Is a unit spill plan/activation prominently posted? | | | |
| 7. Is 911 spill response sign posted? | | | |
| 8. Are **"Danger-Unauthorized Personnel Keep Out"** signs posted so they may be seen from any approach? | | | |
| 9. Are **"No Smoking"** signs posted? | | | |

| **QUESTION** | **YES** | **NO** | **Location of Discrepancy *and* Proposed Corrective Action** |
|---|---|---|---|
| 10. Does the site have emergency communication system or two-man rule in effect? If the two-man rule is implemented, is a sign posted with the legend "**Two-Man Rule in Effect**"? | | | |
| 11. Are properly charged fire extinguishers, as well as eye wash stations, present and inspected at least monthly? | | | |
| 12. Is the post indicator valve in good operating condition and secured in the closed position, and are there any structural defects such as cracked concrete? | | | |
| 13. Is the proper spill response equipment readily available? | | | |
| 14. Is the site designated and recognizable, and is the EMD Authorization posted within the site as to be visible to personnel placing waste into the container? (SAA site only) | | | |
| 15. Are all HWs properly segregated and stored in the designated site? | | | |
| 16. Are any hazardous materials being stored in the Satellite Accumulation Area or < 90-day storage site? | | | |

# Attachment 7-2

# Weekly Hazardous Waste (HW) Site Inspection Form MCAS New River

PAGE INTENTIONALLY BLANK

**Weekly Hazardous Waste Storage**
**Area Inspection Form**

**Squadron: _____** **Inspector: _____**

**Date: _____** **Signature: _____**

| **Question** | **Yes** | **No** | **Corrective Actions or N/A** |
|---|---|---|---|
| 1. Is the HW container located at or near the point of generation? | | | |
| 2. Is the HW container DOT approved? | | | |
| 3. Is the HW container marked correctly with the words "Hazardous Waste," correct noun name of contents, NSN'S and unit designator? | | | |
| 4. Is the HW container closed and wrench tight when no one is adding to the container? | | | |
| 5. If a funnel is left in place, does that funnel have a plug or ball valve to be considered closed or secured? | | | |
| 6. Is the HW container in good condition? (No excessive rust or dents in critical areas, seals are in place, no bulging or collapsing and no signs of spillage or leakage) | | | |
| 7. Is the Spill Contingency Plan posted and in plain view? | | | |
| 8. Is the SAA Site approval letter from EAD posted at the SAA site? | | | |
| 9. Is the SAA Site limited to Authorized Personnel only? | | | |

| **Question** | **Yes** | **No** | **Corrective Actions or N/A** |
|---|---|---|---|
| 10. Is the HW container below the proper ullage for a liquid to expand? (4 inches from the top) | | | |
| 11. Are SAA HW containers moved to the 90-Day Site within 72 hours when filled to the proper ullage or weight capacity of the container? | | | |
| 12. (90-Day Site only) Are all palletized waste streams correctly marked with "Hazardous Waste" or "Universal Waste," noun name of the waste, NSN and unit designator on the pallet or wall of the waste structure? | | | |
| 13. (90-Day Site only) Are all HW containers turned in prior to the 90th day after the ASD? | | | |
| 14. Are adequate spill response supplies readily available for use in case of spill or leakage? | | | |
| 15. Is there a means of emergency communication between storage facilities and working spaces? | | | |
| 16. Is the SAA site or 90-Day Site in a good state of police? | | | |

# NAVOSHENVTRACEN COMPATIBILITY CHART

| HMUG GROUP | HCC see note 2 | GROUP NAME | EXAMPLES | INCOMPATIBLE MATERIALS | EXAMPLES | REACTION IF MIXED |
|---|---|---|---|---|---|---|
| 1 | C1, C2, C4, C5 | ACIDS | Battery Acid<br>Paint Removers<br>De-Rust Spray | FLAMMABLES/ COMBUSTIBLES<br>ALKALIS/BASES/CAUSTICS<br>OXIDIZERS<br>(HMUG Groups 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 22) | Degreasers, Carbon Removers,<br>Anti-Fogging Compounds | HEAT<br>Gas Generation<br>VIOLENT REACTION |
| 2 | P1 to P7, P9, T4, V3, V6 | ADHESIVES | Epoxies<br>Isocyanates<br>Diethylenetriamine | ACIDS<br>ALKALIS/BASES/CAUSTICS<br>OXIDIZERS<br>(HMUG Group 1, 3, 18) | | HEAT<br>FIRE HAZARD |
| 3 | B1, B2 | ALKALIES BASES/ CAUSTICS | Ammonia<br>Sodium Hydroxide<br>Cleaners | ACIDS/OXIDIZERS<br>FLAMMABLES/COMBUSTIBLES<br>(HMUG Group 1, 2, 6, 8, 9, 10, 11, 14, 17, 18, 19, 20, 22) | Battery acid,<br>Paint Removers,<br>De-Rust Sprays,<br>Paints, Solvents | HEAT<br>Gas Generation<br>VIOLENT REACTION |
| 4 | C1-C4, B1-B3, F2 to F7, T4, T6, V2-V4 | CLEANING COMPOUNDS | Degreasers<br>Carbon Removers<br>Antifogging Compounds | DETERGENTS/SOAPS<br>OXIDIZERS<br>(HMUG Group 1, 7, 18) | Calcium Hypochlorite,<br>Sodium Nitrite,<br>Hydrogen Peroxide | HEAT<br>FIRE HAZARD |
| 5 | G1 to G8 | COMPRESSED GASES | Acetylene, Propane, Nitrogen, Argon, Helium, Oxygen | HEAT SOURCES<br>Consult paragraph C23 for specific handling and storage guidance<br>(HMUG Groups 8, 9, 10, 11, 12, 13, 18, 19) | | FIRE HAZARD<br>EXPLOSION HAZARD |
| 6 | F2 to F6, T6, V2, V3, V6 | CORROSION PREVENTIVE COMPOUNDS | Corrosion Inhibitors<br>Chemical Conversion Compounds | ACIDS/BASES<br>OXIDIZERS<br>IGNITION SOURCES<br>(HMUG Group 1, 3, 18, 20) | | FIRE HAZARD |
| 7 | B3 | DETERGENTS/ SOAPS | Trisodium Phosphate<br>Scouring Powders<br>Disinfectants | ACID-CONTAINING COMPOUNDS<br>(HMUG Group 1, 4, 18) | Battery Acid,<br>Paint Removers<br>De-Rust Sprays | VIOLENT REACTION<br>HEAT |
| 8 | F8, V4, V7 | GREASES | Lithium Grease<br>Silicone<br>Molybdenum | OXIDIZERS<br>ALKALIS/BASES/CAUSTICS<br>(HMUG Group 3, 5, 18) | | FIRE HAZARD<br>HEAT |
| 9 | T6, V4, V6, V7 | HYDRAULIC FLUIDS | Petroleum-Based<br>Synthetic Fire-Resistant | CORROSIVES, OXIDIZERS<br>(HMUG Group 1, 3, 5, 18) | | VIOLENT REACTION |
| 10 | F2 to F4, T4, T6, V2-V6 | INSPECTION PENETRANTS | Petroleum-Based<br>Dyes | CORROSIVES, OXIDIZERS<br>(HMUG Group 1, 3, 5, 18) | Battery Acid<br>Caustic Soda<br>Chlorine laundry bleach<br>Calcium Hypochlorite<br>Hydrogen Peroxide<br>OSA Canisters<br>Paint Removers | |
| 11 | F4, T5, V2, V3, V4, V6 | LUBRICANTS/ OILS | General Purpose, Gear, Turbine, Weapons | | | EXPLOSION HAZARD |
| 12 | F2 to F6, P1, T3, T4, T6, V3-V6 | PAINT MATERIALS | Primers, Enamels, Urethanes, Lacquers, Varnishes, Non-Skid, Thinners | ACIDS, OXIDIZERS<br>(HMUG Group 1, 5, 18) | | HEAT<br>FIRE HAZARD |
| 13 | C1-C4, B1-B3, D1 | PHOTO CHEMICALS | Developers, Stopbath, Toners, Bleaches, Replenishers | ACIDS<br>HEAVY METALS<br>(HMUG Group 1, 18, 20) | | HEAT<br>FIRE HAZARD |
| 14 | F4 | POLISH/WAX COMPOUNDS | Buffing Compounds<br>Metal Polishes<br>General Purpose Waxes | CORROSIVES<br>OXIDIZERS<br>(HMUG Group 1, 3, 18) | | HEAT, FIRE HAZARD<br>VIOLENT REACTION |
| 15 | F2 to F6, T3, T4, T6, V1-V6 | SOLVENTS | Methyl Ethyl Ketone (MEK)<br>Toluene, Xylene<br>Acetone | CORROSIVES<br>OXIDIZERS<br>BATTERIES<br>(HMUG Group 1, 5, 18, 21, 22) | Battery Acid<br>Calcium Hypochlorite<br>Sodium Nitrite<br>Sodium Hydroxide | HEAT<br>FIRE HAZARD |
| 16 | T6, T7, Z1 | THERMAL INSULATION | Asbestos<br>Fiberglass<br>Glass Wool | MATERIAL IS NOT REACTIVE<br>KEEP DRY | | NO REACTION |
| 17 | C1-C4, B1-B3, D1 | WATER TEST/ TREATMENT CHEMICALS | Nitric Acid<br>Mercuric Nitrate<br>Caustic Soda | CORROSIVES<br>OXIDIZERS<br>HEAVY METALS<br>(HMUG Group 1, 3, 18, 20, 21) | | HEAT<br>VIOLENT REACTION |
| 18 | D1 to D4 | OXIDIZERS | Calcium Hypochlorite<br>Laundry Bleach<br>OSA Canisters | PETROLEUM BASED MATERIALS<br>FUELS, SOLVENTS,<br>CORROSIVES, HEAT<br>(HMUG Group 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22) | | FIRE HAZARD<br>VIOLENT REACTION<br>EXPLOSION HAZARD<br>TOXIC GAS GENERATION |
| 19 | F1 to F4, V4, V5, V6 | FUELS | JP4, JP5<br>Gasoline<br>Diesel Fuel | CORROSIVES<br>OXIDIZERS<br>(HMUG Group 1, 3, 5, 18) | Battery Acid<br>Calcium Hypochlorite<br>Sodium Nitrite<br>Sodium Hydroxide | FIRE HAZARD<br>TOXIC GAS GENERATION |
| 20 | T6, V7, Z2 | HEAVY METALS | Mercury<br>Lead<br>Beryllium | CORROSIVES<br>OXIDIZERS<br>WATER TREATMENT/PHOTO CHEMICALS<br>(HMUG Group 1, 3, 6, 13, 17, 18, 20) | | VIOLENT REACTION<br>GENERATION OF TOXIC AND FLAMMABLE GAS |
| 21 | Z4 to Z7 | BATTERIES | Lead-Acid<br>Dry-Cell<br>Alkaline | SOLVENTS<br>HEAVY METALS<br>OXIDIZERS<br>(HMUG Group 15, 17, 18, 20) | Xylene<br>Toluene<br>Alcohol | HEAT<br>VIOLENT REACTION<br>TOXIC GAS GENERATION |
| 22 | T2 to T8 | PESTICIDES | Insecticides, Fungicides<br>Rodenticides<br>Fumigants | CORROSIVES<br>OXIDIZERS<br>(HMUG Group 1, 3, 15, 18) | | TOXIC GAS GENERATION |

1. This chart is to be used as a ***GUIDE ONLY!***
2. Compare the desired HMUG Group/HCC in the left column with the Incompatible Material(s) of that Group in the center column on the same row. Mixing of the HMUG Group/HCC with the Incompatible Material(s) may result in the reaction(s) listed in the right column.
3. Not all applicable HCCs are listed; only the most frequently encountered HCCs (except N1) are listed.

**www.safetycenter.navy.mil/training**

REV 09-03

PAGE INTENTIONALLY BLANK

# 8.0 ASBESTOS

Asbestos was widely used in many products (especially building parts) prior to 1990 for its fire resistance, strength, and affordability. However, exposure to friable asbestos can lead to lung diseases including cancer. Contractors working aboard the installation must follow all Federal, State, and local regulations/specifications for the proper notification, removal, disposal, and management of all asbestos-containing materials (ACM) associated with demolition and renovation projects.

## 8.1. KEY DEFINITIONS AND CONCEPTS

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

The following key definitions and concepts are associated with asbestos and its management. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate EMD program if additional clarification is necessary.

### 8.1.1. Key Definitions

- **Abatement.** Work performed to repair, maintain, remove, isolate, or encapsulate ACM.
- **Asbestos.** Asbestos is the generic term for a group of naturally occurring fibrous silicate minerals, including those that typically exhibit high tensile

strength, flexibility, and resistance to thermal, chemical, and electrical conditions. Asbestos was commonly used in installed products such as roofing shingles, floor tiles, cement pipe and sheeting, roofing felts, insulation, ceiling tiles, fire-resistant drywall, and acoustical products.

- **Asbestos-Containing Material.** Any material containing more than 1 percent asbestos, per 29 CFR 1926.1101.
- **Category I Non-friable ACM.** Asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos, per 40 CFR 61, Subpart M.
- **Category II Non-friable ACM.** Any material, excluding Category I non-friable ACM, containing more than 1 percent asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure, per 40 CFR 61, Subpart M.
- **Demolition.** The wrecking or removal of any load-bearing walls or structure with any related handling operations.
- **Friable.** Any ACM that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure (may include damaged ACM that was previously identified as non-friable), per 40 CFR 763.
- **Glove Bag.** A sealed compartment with attached inner gloves that is used for handling ACM. Glove bags provide a small work area enclosure typically used for small-scale asbestos stripping operations.

- **Presumed Asbestos-Containing Material (PACM).** Thermal system insulation (TSI) and surfacing material found in buildings constructed no later than 1980, per 29 CFR 1926.1101.
- **Regulated Asbestos-Containing Material (RACM).** Includes friable ACM, Category I non-friable ACM that has become friable, Category I non-friable ACM that has been sanded, ground, cut, etc., and Category II non-friable ACM that has a high probability of becoming crumbled, pulverized, or reduced to powder during demolition or renovation, per 40 CFR 61, Subpart M.
- **Removal.** Stripping, chipping, sanding, sawing, drilling, scraping, sucking, and other methods of separating material from its installed location in a building.
- **Renovation.** Altering a facility or its components in any way, including stripping or removal of RACM, per 40 CFR 61, Subpart M.

### 8.1.2. Key Concepts

- **Demolition Notification.** North Carolina law requires notification for all demolition, regardless of whether asbestos is present, 10 working days prior to starting demolition.
- **Disposal.** ACM waste can be accepted at the MCB Camp Lejeune Sanitary Landfill. Work with the ROICC or Contract Representative to coordinate the disposal through the MCB Camp Lejeune Sanitary

Landfill. Asbestos waste is only accepted on Mondays through Thursdays from 0700 to 1000.

- **Removal Requirements.** Permits for asbestos removal or demolition must be obtained when the ACM present exceeds 260 linear feet, 160 square feet, or 35 cubic feet. Additionally, proper work practice procedures must be followed during demolition or renovation operations.
- **Renovation Notification.** If ACM is present within a structure, North Carolina law requires notification of renovation 10 working days prior to starting renovation.

### 8.1.3. Environmental Management System

Contractor practices associated with asbestos management include the following:

- Building operation/maintenance/repair
- Construction/demolition/renovation
- Equipment operation/maintenance/disposal
- HW transportation
- Parts replacement

The potential impacts of these activities on the environment include soil contamination, degradation of water quality and air quality, and the potential exposure of installation occupants.

## 8.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable regulations and requirements regarding ACM, which include but may not be limited to the following:

- **Asbestos General Standard, 29 CFR 1910.1001 – Asbestos.** Applies to all occupational exposures to asbestos in all industries covered by the Occupational Safety and Health Administration (OSHA).
- **Asbestos Hazard and Emergency Response Act (AHERA), 1986.** AHERA was written primarily to provide officials in schools, grades K-12, with rules and guidance for the management of ACM.
- **Asbestos School Hazard Abatement Reauthorization Act, 1992.** This act extended AHERA regulations to cover public and commercial buildings.
- **National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart A, General Provisions, and 40 CFR 61 – Subpart M – National Emission Standard for Asbestos.** Includes standards for asbestos demolition, renovation, and disposal, and administrative requirements.
- **Naval Facilities Engineering Service Center, Facilities Management Guide for Asbestos and Lead.** Summarizes asbestos and lead requirements

that routinely affect facilities operations, to protect workers, building occupants, and the environment.

- **Naval Facilities Guide Specifications and Engineering Control of Asbestos Materials.** Covers the requirements for safety procedures and requirements for the demolition, removal, encapsulation, enclosure, repair, and disposal of ACM.
- **North Carolina Asbestos Hazard Management Program, NC General Statutes, Chapter 130A, Article 19; 10A NCAC 41C.0601–.0608 and .0611.** Incorporates 40 CFR 763 and 29 CFR 1926.1101 by reference and outlines criteria for asbestos exposures in public areas, accreditation of persons conducting asbestos management activities, and asbestos permitting and fee requirements.
- **Safety and Health Regulations for Construction, Asbestos, 29 CFR 1926.1101.** Regulates asbestos in the construction, demolition, alteration, repair, maintenance, or renovation of structures that contain asbestos.

## 8.3. RESPONSIBILITIES BEFORE A DEMOLITION OR RENOVATION PROJECT

Prior to starting a demolition or renovation project, contractors must:

- Determine whether ACM, PACM, and/or RACM are present in the buildings involved in the project.
- Complete the necessary notifications to the State of North Carolina and obtain any necessary permits for the removal of ACM, PACM, and/or RACM.
- Understand what actions to take if ACM, PACM, and/or RACM are unexpectedly encountered during project execution.
- Remove all non-friable and friable ACM in accordance with all Federal, State, and local regulations, prior to demolition activities.
- Know how to properly dispose of ACM, and provide any waste disposal manifests generated for disposal.

**The ROICC or Contract Representative is required to notify Camp Lejeune's Asbestos Program Manager of all work involving asbestos removals, including glove bag projects.**

### 8.3.1. Identification of ACM and PACM

**Form DHHS 3768 *must* be posted onsite during all permitted projects.**

Contract documents will identify the presence of known ACM, PACM, and RACM. Contact the ROICC or Contract Representative with questions regarding the presence of these materials as identified in the contract documents. An inspection conducted by a Health Hazards

Control Unit (HHCU)-licensed asbestos inspector may be necessary to confirm the location and quantities of any ACM, PACM, and/or RACM and determine if any previously unidentified materials are present.

### 8.3.2. Notification

To maintain accurate files and records, the ROICC or Contract Representative is required to notify the Asbestos Program Manager, who is part of the Installations and Environment Department, of all work involving asbestos removals, including glove bag projects.

**A demolition/ renovation notification form, DHHS 3768, must be submitted to the NC HHCU 10 working days before demolition activities, regardless of whether asbestos is present.**

The North Carolina Department of Health and Human Services (DHHS) Form 3768, *Asbestos Permit Application and Notification for Demolition and Renovation*, must be submitted to the North Carolina HHCU 10 working days in advance of demolition activities, regardless of whether asbestos is present. This form must be posted onsite during the entire duration of the project. Have the ROICC or Contract Representative contact the Asbestos Program Manager with questions or concerns about requirements for notification of demolition or renovation.

### 8.3.3. Removal

Any ACM, PACM, and/or RACM present must be removed before the area is disturbed during renovation or demolition

activities (except in certain rare instances). Certification and handling requirements for asbestos removal are provided in 10A NCAC 41C and the Asbestos NESHAP. Refer to these regulations for detailed requirements.

### 8.3.4. Training

North Carolina regulations require that all persons who perform asbestos management activities in the State of North Carolina must be accredited by the North Carolina HHCU under the appropriate accreditation category (i.e., Building Inspector, Project Supervisor, and/or Abatement Worker). Training documentation should be available upon request.

## 8.4. RESPONSIBILITIES DURING A DEMOLITION OR RENOVATION PROJECT

North Carolina regulations require that DHHS Form 3768, *Asbestos Permit Application and Notification for Demolition and Renovation*, be acquired by the contractor and posted onsite during all permitted projects. Contractors must post this form when the project will remove the following: at least 260 linear feet, 160 square feet, or 35 cubic feet of RACM or asbestos that might become regulated as a result of handling. The form must also be posted for nonscheduled asbestos removal that will exceed these numbers in a calendar year.

During a renovation or demolition project, if the contractor suspects the presence of additional ACM (other than the materials identified in contract documents), the contractor

must immediately report the suspected area to the ROICC or Contract Representative. Before proceeding, the facility must be inspected by an asbestos inspector licensed by the North Carolina HHCU. The individual performing the asbestos survey will coordinate with the ROICC or Contract Representative throughout the process. A legible copy of the building inspection report must be provided to the North Carolina HHCU prior to each demolition and upon request for renovations; a building inspection report will be acceptable only if the inspection was performed during the 3 years prior to the demolition. A copy of the report should also be forwarded to the Asbestos Program Manager.

**During a renovation or demolition project, a contractor who suspects additional ACM is present must immediately report the suspected area to the ROICC or Contract Representative.**

For specific work procedures and requirements for glove bag projects, refer to 29 CFR 1926.1101.

## 8.5. DISPOSAL OF ACM WASTE

Contractors can dispose of ACM waste at the MCB Camp Lejeune Sanitary Landfill after first coordinating with the MCB Camp Lejeune Landfill office through the ROICC or Contract Representative. The contractor must provide the MCB Camp Lejeune Landfill with Form DHHS 3787, *North Carolina Health Hazards Control Unit's Asbestos*

*Waste Shipment Record.* The contractor must submit this form to the North Carolina HHCU for all permitted asbestos removal projects.

PAGE INTENTIONALLY BLANK

# 9.0 LEAD-BASED PAINT

Lead was used in paint for its color and water-resistant properties until it was banned in 1978 for its highly toxic properties that may cause a range of health problems, especially in young children. Improper removal of lead-based paint (LBP) may result in paint chips and dust, which may contaminate a structure inside and out. The North Carolina DHHS regulations require any person who performs an inspection, risk assessment, or abatement to be certified. North Carolina DHHS also requires a person to obtain a permit for conducting an abatement of a child-occupied facility or target housing.

## 9.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with LBP activities. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate Environmental Department or Safety Representative if additional clarification is necessary.

### 9.1.1. Key Definitions

- **Abatement.** The permanent removal or elimination of all LBP hazards.
- **Demolition.** The removal of any load-bearing walls or structure.

- **Inspection.** A surface-by-surface investigation to determine the presence of LBP, and a report explaining the results of the investigation.
- **Lead-Based Paint.** Surface coatings that contain lead in amounts equal to or in excess of 1.0 milligram per square centimeter, as measured by X-ray fluorescence (XRF) or laboratory analysis, or more than 0.5 percent by weight, per 40 CFR 745.
- **Lead-Containing Paint.** Surface coatings that contain lead in any amount greater than the laboratory reporting limit but less than 1.0 milligram per square centimeter, or less than 0.5 percent by weight, per 29 CFR 1926.62 and 29 CFR 1910.1025 (also contained in 40 CFR 745 Subpart L, and adopted by the State of North Carolina under North Carolina General Statute Chapter 130A, Article 19A).
- **Renovation.** Alteration of a facility or its components in any way.
- **Target Housing.** Any housing constructed before 1978, with the exception of housing for the elderly and persons with disabilities (unless a child under the age of 6 lives there) and residential dwellings where the living areas are not separated from the sleeping areas (efficiencies, studio apartments, dormitories, etc.).

### 9.1.2. Key Concepts

- **Disposal.** Analysis is required to determine proper disposal of waste (non-hazardous or hazardous). A Toxic Characteristic Leaching Procedure (TCLP) analysis must be conducted to determine whether lead levels have exceeded 5 parts per million (ppm), which is the RCRA threshold for HW determination.
- **LBP Survey.** A LBP survey is required prior to disturbing painted surfaces, to determine whether the paint meets the criteria of lead containing over 1.0 milligram per square centimeter or over 0.5 percent by weight.
- **Training.** LBP training requirements set forth by the OSHA must be followed by all personnel involved in all LBP removal activities. MCB Camp Lejeune Base Safety tracks this training for contract staff, as the Safety Office houses the Lead Program Manager.

### 9.1.3. Environmental Management System

Contractor practices associated with LBP include the following:

- Construction/demolition/renovation
- HW transportation
- Paint removal

The potential impacts of these activities on the environment include the potential degradation of soil, water, and air

environments, and the potential exposure of installation occupants.

## 9.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable Federal, State, and local regulations and requirements regarding LBP activities, which include but may not be limited to the following:

- **Naval Facilities Engineering Service Center, Facilities Management Guide for Asbestos and Lead.** Summarizes asbestos and lead requirements that routinely impact facilities operations, in order to protect workers, building occupants, and the environment.
- **Lead-Based Paint Hazard Management Program, NC General Statutes, Chapter 130A, Article 19A. Section 130A-453.01 through 453.11.** Requires a person who performs an inspection, risk assessment, abatement, or abatement design work in a child-occupied facility (daycare center, pre-school, etc.) or housing built before 1978 to be certified and establishes the requirements for certification, including the oversight of required training. It also requires a person who conducts an abatement of a child-occupied facility or target housing to obtain a permit for the abatement; establishes work practice standards for LBP abatement activities; and has adopted requirements included in 40 CFR Part 745, Subpart L and 40 CFR Part 745, Subpart D.

- **Lead-Based Paint Hazard Management Program for Renovation, Repair, and Painting (RRP), 10A NCAC 41C.0900.** Common renovation activities may create hazardous lead dust and chips by disturbing LBP, which may be harmful to adults and children. This article requires that dust sampling technicians, firms, and individuals performing renovation, repair, and painting projects for compensation that disturb LBP in housing and child-occupied facilities built before 1978 be certified and follow specific work practices to prevent lead contamination. Child-occupied facilities include, but are not limited to, child care facilities and schools (with children under the age of 6) that were built before 1978.

- **10A NCAC 41C.0800, Lead-Based Paint Hazard Management Program.** Requires (1) all individuals and firms involved in LBP activities to be certified and (2) all LBP activities to be carried out in accordance with 40 CFR 745.

- **29 CFR 1926, Safety and Health Regulations for Construction.** Contains the OSHA requirements for construction activities where workers may come into contact with lead.

- **40 CFR Part 745, Lead-Based Paint Poisoning Prevention in Certain Residential Structures.** Ensures that (1) LBP abatement professionals, including workers, supervisors, inspectors, risk assessors, and project designers, are well trained in conducting LBP activities; and (2) inspections for the

identification of LBP, risk assessments for the evaluation of LBP hazards, and abatements for the permanent elimination of LBP hazards are conducted safely, effectively, and reliably by requiring certification of professionals.

## 9.3. RESPONSIBILITIES BEFORE RENOVATION OR DEMOLITION

**Buildings constructed prior to 1978 are assumed to contain LBP.**

Ordinary renovation and maintenance activities may create dust that contains lead, but following lead-safe work practices may help mitigate or prevent lead hazards. The North Carolina RRP Program (10A NCAC 41C.0900) mandates that contractors, property managers, and others working for compensation in homes and child-occupied facilities built before 1978 be trained in and use lead-safe work practices. In addition, it mandates that contractors provide the owner and occupants with *The Lead-Safe Certified Guide to Renovate Right* information pamphlet, which is found at the following website: http://epi.publichealth.nc.gov/lead/pdf/RenovateRight.pdf

Individuals must be certified by the State of North Carolina to perform RRP activities for compensation in housing and child-occupied facilities built before 1978. A firm engaged in regulated renovation activities (such as RRP that disturbs more than 6 square feet of interior painted surfaces or 20 square feet of exterior painted surfaces, or dust sampling after renovation) must be a certified renovation firm.

To address the hazards associated with the improper abatement or removal of LBP, any person who performs an inspection, risk assessment, abatement, or abatement design work in a child-occupied facility (child development centers, preschools, etc.) or housing built before 1978 must be certified by the State of North Carolina. Any person who conducts an abatement of a child-occupied facility or target housing must also obtain a permit for the abatement. Individuals conducting LBP abatement activities in North Carolina, such as inspections, risk assessments, LBP hazards abatement, clearance testing, or abatement project design in housing and child-occupied facilities built before 1978, must be certified by the State of North Carolina. A firm engaged in abatement activities must be a certified lead abatement firm.

Prior to any renovation or demolition aboard the installation that involves the disturbance of painted surfaces, a LBP survey must be completed by an inspector certified in North Carolina, retained through the ROICC or Public Works Division (PWD). Certain projects will use PWD staff to conduct the sampling, and other projects will use contracted personnel. Buildings constructed prior to 1978 are assumed to contain LBP; therefore, no LBP survey is necessary. The LBP survey (through sampling and analysis) will determine whether painted surfaces meet the criteria of LBP (lead content equal to or greater than 1.0 milligram per square centimeter as measured by XRF or lab analysis, or 0.5 percent by weight). Naval Facilities Guide Specifications and contract documents must be implemented for contracts where LBP is to be abated/removed prior to demolition or renovation.

If the area is to be reoccupied, final clearance must be conducted, including a visual inspection and sample collection, prior to reoccupation. Clearance on all projects involving abatement must be provided by a certified risk assessor or a certified LBP inspector. Clearance for RRP projects may be conducted by a certified risk assessor, certified LBP inspector, or certified dust sampling technician.

## 9.4. PERMITS

Contractors must obtain a North Carolina LBP Abatement Permit from North Carolina DHHS when lead paint is removed from targeted structures (child-occupied facilities or housing built prior to 1978).

## 9.5. DISPOSAL

**If the LBP survey determines that LBP will be abated as part of a renovation or demolition project, analytical samples must be taken to determine whether the material is hazardous.**

If the LBP survey determines that LBP will be abated as part of a renovation or demolition project, the contractor must take analytical samples to determine whether the waste material is hazardous. Usually, a TCLP sample is collected from a "representative" sample of the material removed. The laboratory conducting the sample analysis must be accredited by the Environmental Lead Laboratory Accreditation Program. A list of these accredited labs is available by contacting (703) 849-8888 or visiting

http://apps.aiha.org/qms_aiha/public/pages/reports/publicScopeView.aspx?ProgramCode=37&Version=2.

If the LBP is removed from the underlying building material, then the paint is the waste stream. If the LBP is removed with the building material, then both materials are considered the waste stream.

If the lead content is below HW regulatory disposal levels, consult the ROICC or Contract Representative to determine whether if the contract allows for the disposal of the material in the MCB Camp Lejeune Sanitary Landfill. Lead waste is only accepted on Mondays through Thursdays from 0700 to 1000.

If the abated LBP is above HW regulatory levels, refer to Section 7.0 of this guide for information on HW management and disposal requirements.

## 9.6. TRAINING

Before the project begins, workers who are subject to lead exposure during abatement or removal activities must be trained according to the OSHA regulations in 29 CFR 1926.62 concerning lead exposure in construction, and they must receive all training and certification specified by 10A NCAC 41C.0800 and 10A NCAC 41C.0900. The contractor is responsible for providing this training before initiating any work aboard MCB Camp Lejeune.

PAGE INTENTIONALLY BLANK

# 10.0 NATURAL RESOURCES

The installation has stewardship and recovery responsibilities over the natural resources on the installation. These responsibilities are regulated under numerous laws described in this section. The installation ensures compliance with these laws through an interdisciplinary process of review and coordination of all activities occurring on the installation.

Contractors working on the installation are responsible for complying with conditions and measures imposed on their work as a result of this process; these responsibilities include preserving the natural resources within the project boundaries and outside the limits of permanent work, restoring work sites to an equivalent or improved condition after the work is complete, and confining construction activities to the limits of the work indicated or specified. The contractor is advised that the installation is subject to strict compliance with Federal, State, and local wildlife laws and regulations. The contractor must not disturb wildlife (birds, nesting birds, mammals, reptiles, amphibians, and fish) or the native habitat adjacent to the project area except when indicated or specified.

## 10.1. KEY DEFINITIONS AND CONCEPTS

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

The following key definitions and concepts are associated with natural resources management. If you have any questions or concerns

about the information in this section or require assistance regarding any wildlife matters (snakes, nesting birds, nuisance wildlife, etc.) on the site or within the project area, please consult the ROICC or Contract Representative, who will contact the Environmental Conservation Branch.

### 10.1.1. Key Definitions

- **Conservation.** The planned management, use, and protection of natural resources to provide their sustained use and continued benefit to present and future generations.
- **Ecosystem.** A dynamic, natural complex of living organisms interacting with each other and with their associated nonliving environment.
- **Habitat.** An area where a plant or animal species lives, grows, and reproduces, and the environment that satisfies its life requirements.
- **Natural Resource.** Soil, water, air, plants, and animals, according to the Natural Resources Conservation Service.
- **Endangered or Threatened Species.** Federally listed taxon that is "in danger of extinction throughout all or a significant portion of its range" or "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
- **Riparian Buffer.** Vegetated area bordering a body of water, such as a stream, lake, or pond.

- **Wetland.** Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas, per the EPA.

### 10.1.2. Key Concepts

- **Coastal Zone Management Act (CZMA) of 1972.** Requires each installation to ensure that its operations, activities, projects, and programs affecting the coastal zone in or on coastal lands or waters are consistent with the federally approved Coastal Zone Management Plan of the State.

- **Ecosystem Management.** A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural processes; is cognizant of natural processes' time scales; recognizes social and economic viability within functioning ecosystems; is adaptable to complex, changing requirements; and is realized through effective partnerships among private, local, State, tribal, and Federal interests. Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are a part of the whole.

- **Integrated Natural Resources Management Plan (INRMP).** A planning document using ecosystem management principles to direct the management and conservation of installation natural resources, which includes all elements of natural resources management applicable to the installation.
- **National Environmental Policy Act.** Requires Federal agencies, including the USMC, to consider the environmental impacts of projects prior to implementation. All projects that support military training, minor and major military construction, maintenance, and natural resources management actions are reviewed for potential environmental impacts. Contractors must obtain and review any NEPA documentation associated with their projects. All NEPA documentation can be obtained from the ROICC or Contract Representative.
- **Threatened and Endangered Species.** Specific requirements regarding protected areas on the installation apply to contractor activities. Eight federally threatened and endangered species are currently managed at MCB Camp Lejeune – red-cockaded woodpecker, green sea turtle, loggerhead sea turtle, rough-leaved loosestrife, seabeach amaranth, piping plover, red knot, and American alligator. In addition, as of March 25, 2015, the U.S. Fish and Wildlife Service lists six species as threatened and nine as endangered for Onslow County, NC. Consult the ROICC or Contract Representative to determine if there are any project

requirements regarding threatened or endangered species.

- **Timber.** Contractors must ensure that the ROICC or Contract Representative notify the EMD's Forest Management Program prior to conducting site work. Timber will not be released to contractors without the approval of the Forest Management Program.
- **Waters of the United States.** All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce; interstate waters; the territorial seas; impoundments; tributaries; adjacent waters including wetlands, ponds, lakes, oxbows, and impoundments; waters determined to have a significant nexus; Carolina bays; Pocosins; and waters within the 100-year floodplain or within 4,000 feet of the high tide line or ordinary high water mark; per 33 U.S.C. 1251 *et seq*. Section 328.3.
- **Wetlands.** Any work in installation waters or wetlands requires a permit prior to the start of an activity.

### 10.1.3. Environmental Management System

Contractor practices associated with natural resources include the following:

- Erosion/runoff control
- Fish stocking
- Habitat management

- Land clearing
- Live fire range operations
- Road construction and maintenance
- Soil excavation/grading
- Timber management
- Urban wildlife management

The potential impacts of these activities on the environment include air emissions, sedimentation, eutrophication of surface waters (addition of nutrients that stimulate aquatic plant growth and depletes oxygen), degradation of habitat, impacts to marine mammals, damage to commercial and noncommercial timber, impacts to endangered species and natural resources, and degradation of soil quality.

## 10.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable regulations and requirements regarding natural resources, which include but may not be limited to the following:

- **Bald and Golden Eagle Protection Act of 1940, as Amended (16 USC 688 *et seq.*).** Prohibits taking, possessing, and transporting bald eagles and golden eagles and importing and exporting their parts, nests, or eggs. The definition of “take” includes pursue, shoot, shoot at, poison, wound, capture, trap, collect, molest, or disturb.

- **BO 5090.11A, Protected Species Program.** Sets forth regulations and establishes responsibilities to ensure the conservation of threatened and endangered species and species at risk aboard MCB Camp Lejeune.
- **BO 5090.12, Environmental Impact Review Procedures.** Implements NEPA 1969 and NEPA policy and guidance in Chapter 12 of MCO P5090.2A.
- **Clean Water Act of 1972.** Establishes the basic structure for regulating wastewater discharges and placing fill materials into the waters of the United States.
- **CZMA of 1972 (16 USC 1451 *et seq.*).** Requires that Federal actions affecting any land/water use or coastal zone natural resource be implemented consistent with the enforceable policies of an approved State coastal management program. Requires concurrence from the State before taking an action affecting the use of land, water, or natural resources of the coastal zone.
- **Endangered Species Act of 1973 (16 USC 1531 *et seq.*).** Requires all Federal agencies to carry out programs to conserve federally listed endangered and threatened species of plants and wildlife.
- **EO 11990, Protection of Wetlands, 24 May 1977.** Addresses Federal agency actions required to identify and protect wetlands, minimize the risk of wetlands destruction or modification, and preserve

and enhance the natural and beneficial values of wetlands.

- **EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, 10 January 2001.** Requires each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a plan to promote the conservation of migratory bird populations.

- **Marine Mammal Protection Act of 1972 (MMPA), as Amended (16 USC 1361 *et seq.*).** Mandates a moratorium on the killing, capturing, harming, and importing of marine mammals and marine mammal products. The MMPA also prohibits the taking of any marine mammal, including to harass, hunt, capture, collect, or kill any marine mammal, including any of the following: collection of dead animals or their parts, restraint or detention of a marine mammal, tagging a marine mammal, the negligent or intentional operation of an aircraft or vessel, or any other negligent or intentional act that results in disturbing or molesting a marine mammal.

- **Migratory Bird Treaty Act of 1918, as Amended (16 USC 703 *et seq.*).** Protects migratory birds (listed in 50 CFR 10.13) and their nests and eggs and establishes a permitting process for the taking of migratory birds by establishing a Federal prohibition to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause

to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird."

- **MCO P5090.2A, Environmental Compliance and Protection Manual.** Provides guidance and instruction to installations to ensure the protection, conservation, and management of watersheds, wetlands, natural landscapes, soils, forests, fish and wildlife, and other natural resources as vital USMC assets.
- **NEPA 1969 (42 U.S.C. 4321 *et seq*.).** Requires Federal agencies, including the USMC, to consider the environmental impacts of projects before the decisionmaker proceeds with the implementation. All projects that support military training, major and minor military construction, maintenance, and natural resources management actions are reviewed for potential environmental impacts.
- **Rivers and Harbors Act of 1899.** Prohibits the excavation, filling, or alteration of the course, condition, or capacity of any port, harbor, or channel without prior approval from the Chief of Engineers.
- **Sikes Act of 1960, as Amended (16 USC 670 *et seq*.).** Requires military installations to manage natural resources for multipurpose uses and public access appropriate for those uses, as well as ensuring no net loss to training, testing or other defined

missions of the installation through the development and implementation of an INRMP.

- **Neuse River Basin Riparian Buffer Rules (15A NCAC 02B.0233).** Require a 50-foot riparian buffer that is divided into two zones. The 30 feet closest to the water (Zone 1) must remain undisturbed. The outer 20 feet (Zone 2) may include managed vegetation, such as lawns or shrubbery. The riparian buffer rules also require diffuse flow of stormwater runoff. The buffers apply to intermittent streams, perennial streams, lakes, ponds, estuaries, and modified natural streams that are depicted on the most recent printed version of the soil survey map prepared by the Natural Resources Conservation Service or the 1:24,000 scale quadrangle topographic map prepared by the U.S. Geologic Survey.

## 10.3. NATIONAL ENVIRONMENTAL POLICY ACT

Staff specialists from various installation departments participate in the NEPA process, which coordinates the review of projects and documents environmental impacts (or lack thereof) for projects before implementation.

The documentation of this review process occasionally includes mandatory conditions affecting the design and construction/ implementation of the project. The documentation, when completed, is provided to the action proponent, who is expected to provide it to the ROICC or Contract Representative.

Consult the ROICC or Contract Representative to obtain or review any NEPA documentation associated with the project. The documentation marks the end of the NEPA review process; it does not constitute approval for the proponent of the action to implement the action. Some contracts may include stipulations from the NEPA document that must be implemented prior to the onset of work to prevent environmental impacts and violations of Federal or State rules and regulations. Stipulations could include replacing monitoring wells if damages occur from contractor operations, stopping work if contamination is encountered, notification that a wetlands permit is required, seasonal restrictions, etc.

**Consult the ROICC or Contract Representative to obtain or review any NEPA documentation associated with the project.**

## 10.4. TIMBER

Potential timber resources are identified during the NEPA process. The contractor is responsible for advising the ROICC or Contract Representative to notify EMD's Forest Management Program prior to beginning site work. Additionally, the ROICC or Contract Representative and/or contractor is required to notify the Forest Management Program if the contract has been amended with modifications to the site location.

MCB Camp Lejeune manages its forest in accordance with the installation INRMP. The Forest Management Program

maintains first right of refusal for all timber products on construction projects and will determine whether the Government will harvest the timber or release it to the contractor. The Government retains exclusive rights to all forest products on construction projects. If the Government elects to harvest the timber, only merchantable timber will be removed.

Contractors must adhere to the following requirements when performing site work that may impact timber resources:

**Protect existing trees that are to remain in place and that may be injured, bruised, defaced, or otherwise damaged by construction operations.**

- Do not remove, cut, deface, injure, or destroy trees or shrubs without authorization from the ROICC or Contract Representative.
- Do not fasten or attach ropes, cables, or guy wires to nearby trees for anchorages without authorization from the ROICC or Contract Representative. (If these actions are authorized, the contractor is responsible for any resultant damage.)
- Protect trees that are to remain in place and that may be injured, bruised, defaced, or otherwise damaged by construction operations.
- With the ROICC or Contract Representative's approval, use approved methods of excavation to

remove trees with 30 percent or more of their root systems destroyed.

- With the ROICC or Contract Representative's approval, remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features.

Please refer to Section 12.0 for disposal information for land-clearing debris.

## 10.5. THREATENED AND ENDANGERED SPECIES

**Entry into a threatened or endangered species site or shorebird nesting area marked with signs and/or white paint is prohibited without written permission from installation personnel.**

With the exception of improved roadways, entry into a threatened or endangered species site or shorebird nesting area marked with signs and/or white paint is prohibited without written permission from installation personnel. BO 5090.11A lists threatened and endangered species that may be encountered at the installation. The following restrictions apply on the installation unless written permission is explicitly provided:

- Work on Onslow Beach or Brown's Island is not permitted between April 1 and October 31. Traffic

on the beaches should be limited to below the high tide line.

- Vehicles and lighting are prohibited on the beaches overnight between May 1 and October 31.
- Construction activities are prohibited within 1,500 feet of a bald eagle's nest (JD, MC, and IF Training area).
- Cutting or damaging pine trees is not permitted.
- Altering hydrology through excavation, ditching, etc., is prohibited.
- Fish and wildlife must not be disturbed.
- Water flows may not be altered; the native habitat adjacent to the project and critical to the survival of fish and wildlife may not be significantly disturbed, except as indicated or specified.

## 10.6. WETLANDS

### 10.6.1. Avoidance

**Contractors must incorporate avoidance and minimization measures to comply with the national policy to permit no overall net loss of wetlands.**

In accordance with MCO P5090.2A, all facilities and operational actions must avoid, to the maximum degree feasible, wetlands destruction or degradation, regardless of the wetlands size or legal necessity for a permit. Prior to the onset of

construction, coordination with the Environmental Conservation Branch of EMD should have taken place during project design to ensure CWA permitting issues are addressed by the contractor at the earliest opportunity. Contractors must incorporate avoidance and minimization measures to comply with the national policy to permit no overall net loss of wetlands, as well as meeting concept design criteria while incorporating avoidance and minimization measures to protect wetlands, streams, and waters of the United States. Any proposed action that would significantly affect wetlands must be coordinated with the CG of MCB Camp Lejeune.

The contractor must ensure that construction of all buildings, facilities, and related amenities, including earthwork, grading, landscaping, drainage, stormwater management, parking lot and paved roadway, sidewalks, site excavation, sanitary sewer system extensions, and domestic water extensions, avoids, to the maximum degree feasible, wetlands destruction or degradation.

Identified and mapped boundaries of the legally defined wetlands on all USMC lands within the project area will be distributed to the ROICC or Contract Representative for use (if available) and included in all design products, including drawings, plans, and figures.

### 10.6.2. Permits

All unavoidable potential impacts to wetlands or waters of the United States require prior coordination as described in this section. Failure to acquire written authorization for

**If work in wetlands is required, know who is responsible for obtaining permits, and what the terms and conditions of the permits require.**

impacts to wetlands and/or waters of the United States may result in significant project delays or design modifications.

No discharge of fill material, mechanized land clearing, or any other activity is allowed in jurisdictional wetlands or waters of the United States without the proper approvals. The contractor may be responsible for obtaining the following permits (including pre-permit coordination, preparation, and submission of all permit applications after review and concurrence by the installation) and complying with all regulations and requirements stipulated by the State of North Carolina as conditions upon issuance of the permits:

- U. S. Army Corps of Engineers (USACE), Section 404 Permit (individual or applicable nationwide permit); CWA of 1977, as Amended (Public Law 95-217, 33 U. S. C. 1251 et seq.)
- North Carolina Division of Water Resources (NCDWR), Section 401 Water Quality Certification – (15A NCAC 02H) NCDEQ; CWA of 1977, as Amended (Public Law 95-217, 33 U. S. C. 1251 et seq.)
- North Carolina Division of Coastal Management (NCDCM), Federal Consistency Determination (15A NCAC 07) NCDEQ; CZMA of 1972 (16 USC 1451 et seq.)

Two types of activities generally require a permit from the USACE:

- **Activities within navigable waters.** Activities such as dredging, constructing docks and bulkheads, and placing navigation aids require review under Section 10 of the Rivers and Harbors Act of 1899 to ensure that they will not cause an obstruction to navigation.
- **Activities in wetlands and waters of the United States (regulated by Section 404 of the CWA of 1972).** A major aspect of the regulatory program under Section 404 of the CWA is determining which areas qualify for protection as wetlands. Contractors should contact the USACE, the NCDWR, or the NCDCM if there is any question about whether activities could impact wetlands, streams, or protected buffers.

**Contractors working on the installation will not perform any work in waters of the United States or wetlands without an approved permit (even if the work is temporary).**

Contractors working on the installation will not perform any work in waters of the United States or wetlands without an approved permit (even if the work is temporary). Examples of temporary discharges include dewatering of dredged material prior to final disposal and temporary fills for access roadways, cofferdams, storage, and work areas.

### 10.6.3. Impacts

Any disturbance to the soil or substrate (bottom material) of a wetland or water body, including a stream bed or protected buffer, is an impact and may adversely affect the hydrology of an area. Discharges of fill material generally include the following, without limitation:

- Placement of fill material that is necessary for the construction of any structure or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; and causeways or road fills
- Dams and dikes
- Artificial islands
- Property protection or reclamation devices such as riprap, groins, seawalls, breakwaters, revetments, and beach nourishment
- Levees
- Fill for intake and outfall pipes and subaqueous utility lines
- Fill associated with the creation of ponds
- Any other work involving the discharge of fill or dredged material

### 10.6.4. Mitigation

Any facility requirement that cannot be sited to avoid wetlands must be designed to minimize wetlands degradation and must include compensatory mitigation as required by wetland regulatory agencies (USACE and NCDWR) in all phases of project planning, programming, and budgeting.

**The contractor may be required to develop onsite mitigation, consisting of wetland/stream restoration or creation, for all unavoidable wetland and stream impacts, whenever possible and feasible.**

The contractor may be required to develop onsite mitigation, if appropriate, consisting of wetland/stream/buffer restoration or creation, for all unavoidable wetland, stream, and buffer impacts, whenever possible and feasible. Use of USMC lands and lands of other entities may be permissible for mitigation purposes for USMC projects when consistent with EPA and USACE guidelines or permit provisions. Land within the project area suitable for establishment of mitigation may be evaluated by the contractor and used for mitigation where compatible with mission requirements and approved by the CG. Proposals for permanent resource areas must be approved by the Assistant Secretary of the Navy (Installations and Environment) or his/her designee.

Offsite mitigation is preferred and should be coordinated through the North Carolina Division of Mitigation Services or an approved private mitigation bank.

## 10.7. TEMPORARY CONSTRUCTION

Traces of temporary construction facilities, such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other signs of construction, should be removed upon completion of a contract or project. Temporary roads, parking areas, and similar temporarily used areas should be graded to conform to surrounding contours and the area restored, to the degree practical, to its state prior to any disturbing activities.

# 11.0 STORMWATER

MCB Camp Lejeune is responsible for stormwater permits associated with construction, industrial, or municipal activities that discharge to outfalls leading to receiving waters. The most applicable permit for contractors is the construction permit, since the majority of the contractor activities are affiliated with construction/renovation.

However, the contractor is also responsible for adhering to the requirements of the industrial and municipal permits held by MCB Camp Lejeune for all of the contractor activities on the installation. In essence, all contractors for the installation need to know and implement the necessary measures to prevent stormwater runoff and pollution runoff from land-disturbing activities (LDAs) and associated construction permit requirements, as well as industrial and municipal activities. The general requirements for each area, as they apply to contractors, are discussed in the following subsections.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

## 11.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with stormwater. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the

appropriate environmental office if additional clarification is necessary.

### 11.1.1. Key Definitions

- **Best Management Practices.** Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs include structural and nonstructural stormwater controls, operation and maintenance procedures, treatment requirements, and practices to control site runoff (e.g., sediment, spillage or leaks, sludge or waste disposal, or drainage from material storage). See the following website for more information: http://deq.nc.gov/about/divisions/energy-mineral-land-resources/stormwater
- **Certificate of Stormwater Compliance.** A document providing approval for development activities that meet the requirements for coverage under a stormwater general permit.
- **Discharge (Pollutant).** The addition of any pollutant or combination of pollutants to waters of the United States from any point source, including, but not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of any pollutant; this excludes discharges in compliance with a National Pollution Discharge Elimination System (NPDES) permit.

- **Erosion and Sedimentation Control Plan.** Any plan, amended plan, or revision to an approved plan submitted to the North Carolina Division of Land Resources or its delegated authority in accordance with North Carolina General Statute 113A-57. Erosion and Sedimentation Control Plans show the devices and practices that are required to retain sediment generated by the land-disturbing activity within the boundaries of the tract during construction and upon development of the tract. *Note that in North Carolina, the Erosion and Sedimentation Control Plan and the NCG010000 Construction General Permit are considered the Stormwater Pollution Prevention Plan (SWPPP, or SPPP) for a construction site.* See the following website for more information:
  http://deq.nc.gov/about/divisions/energy-mineral-land-resources/stormwater

- **Land Disturbance.** Areas that are subject to clearing, excavating, grading, stockpiling, and placement/removal of earth material.

- **Nonpoint Source Discharge.** All discharges from stormwater runoff that cannot be attributed to a discernible, confined, and discrete conveyance. *(See also point source discharge, below.)*

- **Point Source Discharge.** Any discernible, confined, and discrete conveyance, including but specifically not limited to, any pipe, ditch, channel, tunnel conduit, well, discrete fissure, container, rolling stock, or concentrated animal feeding operation from

which pollutants are or may be discharged to waters of the State. *(See also nonpoint source discharge, above.)*

- **Stormwater (Runoff).** The portion of precipitation (rain and/or snowmelt) that does not naturally infiltrate into the ground or evaporate but flows via overland flows, channels, or pipes into a defined surface-water channel or stormwater system during and immediately following a storm event. As the runoff flows over the land or impervious surfaces (such as streets, parking lots, and building rooftops), it accumulates sediment and/or other pollutants that could pollute receiving streams.
- **Stormwater Associated with Construction Activities.** The discharge of stormwater from construction activities, including clearing, grading, and excavating, that result in a land disturbance of equal to or greater than 1 acre, per 40 CFR 122.
- **Stormwater Associated with Industrial Activities.** The discharge from any conveyance that is used for collecting and conveying stormwater and which is directly related to manufacturing, processing, or raw materials storage areas from an applicable industrial plant or activity, per 40 CFR 122.
- **Stormwater Associated with Municipal Activities.** The discharge of stormwater from municipal activities, including public works shops, vehicle maintenance shops, and other municipal activities, with the potential to cause stormwater pollution.

### 11.1.2. Key Concepts

- **Energy Independence and Security Act (EISA).** In December 2007, Section 438 of EISA was issued. This section requires that Federal facility projects over 5,000 square feet must "maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to temperature, rate, volume, and duration of flow." In January 2010, the DoD Policy of Implementing Section 438 of the EISA was issued; this document includes a flowchart with implementation steps.
- **Good Housekeeping.** Good housekeeping practices refer to the maintenance of a clean and orderly facility to prevent potential pollution sources from coming into contact with stormwater. The practices include procedures to reduce the possibility of mishandling materials or equipment. Good housekeeping practices benefit stormwater quality and also provide for a clean, safe place for employees and clients. *Note that good housekeeping is one of the six minimum control measures (MCMs) of the MS4 permit requirements.*
- **Low Impact Development (LID).** LID is a holistic approach that incorporates site-specific ecosystem and watershed-based considerations for planning and design. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source. LID seeks to control

non-point source pollutants "nature's way," through the application of plant-soil-water mechanisms that maintain and protect the ecological and biological integrity of receiving waters and wetlands.

- **National Pollution Discharge Elimination System.** The national program for issuing, modifying, revoking, reissuing, terminating, monitoring, and enforcing permits. The NPDES stormwater program regulates stormwater discharges from three potential stormwater sources, as follows:
    - **Construction Activities.** LDAs that disturb 1 or more acres need an NPDES permit. At a minimum, these permits require the development of a site-specific Erosion and Sedimentation Control Plan to address sediment controls during construction and upon development of the tract. As previously noted, the Erosion and Sedimentation Control Plan and the NCG010000 Construction General Permit are considered the SWPPP for a construction site in North Carolina. In the applicable areas of the installation, a State Stormwater Management Permit and coverage under the Construction General Permit may be required. *Note that construction site runoff control is also one of the six MCMs of the Municipal Separate Storm Sewer Systems (MS4) permit requirements.*
    - **Industrial Activities.** Owners and operators of industrial facilities that fall into any of the 30 industrial sectors identified by EPA stormwater

regulations need an NPDES Phase I permit if stormwater is discharged directly into surface water (or MS4). The permit regulations specify steps that facility operators must take prior to becoming eligible for permit coverage and actions that must be taken to continue coverage under an existing permit. These steps and actions include, but are not limited to, effluent limits, monitoring, inspection, sampling, reporting, and corrective action requirements.

- **Municipal Separate Storm Sewer Systems.** Owners and operators of MS4s need an NPDES Phase II permit. An MS4 is a system of pipes and drainage ditches within an urbanized area used to collect storm runoff and convey it to receiving waters. Polluted runoff is commonly transported through MS4s, from which it is often discharged untreated into local waterbodies.

- **Operational Requirements.** Equipment, discharge, and material use requirements that apply to all construction and industrial activities.

- **Post-Construction Requirements.** The management of stormwater generated on a stable, established site after the construction process is complete. The State Stormwater Management Program sets forth requirements for post-construction stormwater runoff control. *Note that post construction is one of the six MCMs of the MS4 permit requirements.*

- **Stormwater Pollution Prevention Plan.** A plan required by permits provided under NPDES that provides guidance to prevent stormwater pollution from construction, industrial, or municipal activities. *Note that the terminology for this plan (and associated acronym) varies somewhat from State to State.*

### 11.1.3. Environmental Management System

Contractor practices associated with stormwater include the following:

- Boat, ramp, dock cleaning
- Channel dredging
- Composting
- Construction/demolition/renovation
- Erosion/runoff control
- Fueling and fuel management/storage
- HM storage
- Land clearing
- Laundry
- Landscaping
- Livestock operations
- Pesticide/herbicide management and application
- Range residue clearance

- Road construction and maintenance
- Sewers
- Sidewalk and road deicing
- Soil excavation/grading
- Stormwater collection/conveyance
- Surface washing
- Vehicle parking
- Wash rack

Other activities that contractors could be involved in that may cause stormwater pollution include:

- Grounds maintenance (herbicide, pesticides, fertilizer, etc.)
- Outdoor material storage
- Building/roof repairs
- Industrial activities

The potential impacts of these activities on the environment include degradation of water quality and damage to public and private property due to flooding.

## 11.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable regulations and requirements regarding potential stormwater contamination, which include but may not be limited to:

- **Clean Water Act of 1972.** Establishes the basic structure for regulating discharges of pollutants into the waters of the United States. The CWA establishes that no oil or hazardous substances should be discharged into or upon the navigable waters of the United States or adjoining shorelines, which may affect natural resources under the management of the United States through the following goals: (1) eliminate the introduction of pollutants into waters of the United States, and (2) develop water quality, which protects and propagates fish, shellfish, and wildlife and provides for recreation in and on the water.

- **40 CFR 122, National Pollutant Discharge Elimination System.** Requires industrial, construction, and municipal stormwater permits for the discharge of pollutants from any point source into waters of the United States.

- **15A NCAC Chapter 4.** Requires all persons conducting a land-disturbing activity to take all reasonable measures to protect all public and private property from damage caused by the release of sediments from the activity. The primary tool used to accomplish the objective is the development of an Erosion and Sedimentation Control Plan.
    - Identify critical areas
    - Limit exposure areas
    - Limit time of exposure
    - Control surface water

- Control sedimentation
- Manage stormwater runoff

More information can be found at:

http://reports.oah.state.nc.us/ncac.asp?folderName=\Title%2015A%20-%20Environmental%20Quality\Chapter%2004%20-%20Sedimentation%20Control

- **15A NCAC 02H.1000 Stormwater Management.** The State Stormwater Management Program requires all persons conducting LDAs that (1) require a Coastal Area Management Act (CAMA) Major Development Permit or an Erosion and Sedimentation Control Plan, and (2) are located within coastal counties or drain to specific classifications of water bodies, to protect surface waters and highly productive aquatic resources from the adverse impacts of uncontrolled high-density development or the potential failure of stormwater control measures. To receive permit approval, projects must limit the density of development, reduce the use of conventional collection systems in favor of vegetative systems, and incorporate post-construction, structural BMPs.

## 11.3. PRIOR TO SITE WORK

Contractors are required to address the following in the below section prior to beginning site work.

### 11.3.1. Construction Notifications

Any project involving LDAs aboard the installation must be reviewed by the installation's NEPA Review Board prior to the onset of work so that potential impacts of the project and associated mitigation measures (if necessary) can be determined. Documentation of this review should have been provided to the ROICC or Contract Representative and may include mandatory conditions affecting the construction/implementation of the project. Consult the ROICC or Contract Representative to obtain or review any NEPA documentation associated with the project in the contract.

**Any project involving LDAs aboard the installation must be reviewed by the installation's NEPA Review Board prior to the onset of work.**

### 11.3.2. Familiarity with the Stormwater Phase I Industrial Permit

Discharges of industrial stormwater have the potential to contain contaminants from industrial activity. Because of this, MCB Camp Lejeune holds a Stormwater Phase I industrial permit. This type of discharge is defined and regulated in 40 CFR 122, the EPA final rule regarding NPDES stormwater permitting.

**Contractors are responsible for preparing project-specific permit applications and related plans and for coordinating the permit review schedule with the ROICC or Contract Representative.**

Daily industrial operations discharging stormwater aboard MCB Camp Lejeune and MCAS New River are covered under an individual NPDES permit. In accordance with the permit, the installation maintains an industrial SWPPP that identifies potential sources of pollution that may affect the water quality of stormwater discharges associated with an industrial activity. Refer to Section 11.4 for more information on contractor responsibilities associated with this permit.

### 11.3.3. Familiarity with the Stormwater Phase II Municipal Permit

Discharges of municipal stormwater have the potential to contain contaminants from municipal activity. Because of this, MCB Camp Lejeune holds a Stormwater Phase II municipal permit. This type of discharge is defined and regulated in 40 CFR 122, the EPA final rule regarding NPDES stormwater permitting.

Daily municipal operations discharging stormwater aboard MCB Camp Lejeune and MCAS New River are covered under an NPDES permit. In accordance with the permit, the installation maintains a municipal Stormwater Plan to address the six MCMs of the permit, as well as other requirements. Refer to Section 11.4 for more information on contractor responsibilities associated with this permit.

### 11.3.4. Project-Specific Construction Permits

Contractors are responsible for preparing all project-specific stormwater permit applications and related plans and for coordinating the permit review schedule with the ROICC or

Contract Representative. MCB Camp Lejeune is the responsible party for all project-specific stormwater permits located outside of Public-Private Venture (PPV) housing. All permit-required plans and applications must be submitted to the appropriate MCB Camp Lejeune organization to go through internal approval prior to submission to the appropriate State agency. The permit review schedule should allow adequate time for internal review prior to State submission deadlines. Adequate review time fluctuates and is based on the type of permit application. Stormwater compliance should be coordinated with the appropriate PPV partner for housing-related projects outside the jurisdiction of MCB Camp Lejeune.

**All permit-required plans and applications must go through internal approval before being submitted to the appropriate State agency.**

Permit coverage is required under the North Carolina General Permit No. NCG010000 (General Permit) for construction activities that disturb 1 acre or more of land. Three copies of a proposed Erosion and Sedimentation Control Plan must be prepared and submitted to the NCDEQ Sedimentation Control Commission (or to an approved local program) at least 30 days prior to beginning construction activity to obtain coverage under the General Permit. A copy of the plan will be kept on file at the job site at all times while the site is active. **Coverage under the permit becomes effective when a plan approval is issued. No LDAs may take place prior to receiving the plan approval.** The

approved plan is considered a requirement or condition of the General Permit; deviation from the approved plan will constitute a violation of the terms and conditions of the permit unless prior approval for the deviations has been obtained.

A State Stormwater Management Permit, issued in accordance with 15A NCAC 02H.1000, is required for all development activities that require a CAMA Major Development Permit or an Erosion and Sedimentation Control Plan and that meet any of the following criteria:

- Development within the 20 coastal counties
- Development within 1 mile of and draining to any waters classified as High Quality Water (HQW) and rated "excellent" based on biological and physical/ chemical characteristics through the NCDWR monitoring or special studies, primary nursery areas designated by the Marine Fisheries Commission, and other functional nursery areas designated by the Marine Fisheries Commission
- Development that drains to an Outstanding Resource Water, which is a subset of HQW that is intended to protect unique and special waters having excellent water quality and being of exceptional ecological or recreational significance to the State or Nation

**A State Stormwater Management Permit is required for all activities that will disturb 1 acre or more of land.**

Because the installation is in a coastal county, any project that disturbs greater than 1 acre of land (requiring coverage under the General Permit for construction activity) will also require a State Stormwater Management Permit. A State Stormwater Management Permit application must be submitted and filed with the NCDEQ, Division of Water Quality, after the construction plans and specifications are complete and before construction activities begin. Additional information is available on the NCDEQ website:

http://deq.nc.gov/about/divisions/energy-mineral-land-resources/stormwater

State Stormwater Management Permits typically specify design standards for conveyance systems and structural BMPs, a schedule of compliance, and general conditions to which the permittee must adhere.

## 11.4. RESPONSIBILITIES DURING SITE WORK

The contractor is responsible for maintaining the quality of the stormwater runoff and preventing pollution of stormwater at the construction/job site. The job site may be inspected by installation environmental personnel to ensure compliance with the contractor's construction and/or the installation's industrial SWPPP, municipal stormwater plan, and applicable permits. The following requirements apply to all projects at the installation that have the potential to impact water quality:

- Any changes to the project area that do not comply with the approved Erosion and Sedimentation Control Plan, alter the approved post-construction stormwater conveyance system, or could otherwise significantly change the nature or increase the quantity of pollutants discharged should be immediately communicated to the ROICC or Contract Representative.
- All permitted erosion and sedimentation control projects will be inspected by the contractor at least once every 7 calendar days (unless discharges to a 303(d)-listed water body are occurring) and within 24 hours after any storm event greater than 0.5 inch of rain per 24-hour period, as required by the North Carolina General Permit No. NCG010000. Inspection results shall be maintained by the designated contractor throughout the duration of an active construction project.
- Equipment used during the project activities must be operated and maintained in such a manner as to prevent the potential or actual pollution of the surface or ground waters of the State.
- No POL products (e.g. fuels, lubricants, hydraulic fluids), coolants (e.g., antifreeze), or any other substance shall be discharged onto the ground, into surface waters, or down storm drains (to include leaking vehicles, heavy equipment, pumps, and/or structurally deficient containers of hazardous materials).

- Spent fluids shall be disposed of in a manner so as not to enter surface or ground waters of the State, or storm drains. Disposal of spent fluids is outlined in Section 7.0.
- Implement spill prevention measures, clean up all spills immediately, and follow the spill reporting requirements presented in Section 5.0. Any spilled fluids shall be cleaned up to the extent practicable and disposed of in a manner so as not to allow their entry into the water (surface or ground) of the State. Refer to Section 5.0 for emergency and spill response procedures.
- Herbicide, pesticide, and fertilizer use shall be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act and shall be used in accordance with label restrictions. Refer to Section 7.0 for additional information on Hazardous Material/Hazardous Waste Management.
- Particular care must be used when storing materials outside. Materials and equipment stored outside that could potentially affect the quality of stormwater runoff include, but are not limited to, garbage dumpsters, vehicles, miscellaneous metals, chemical storage, fuels storage, wood products, and empty storage drums. These materials should be stored under cover whenever practicable. Contact the ROICC or Contract Representative with any questions about whether an outdoor storage practice is acceptable.

- Use good housekeeping practices to maintain clean and orderly work areas, paying particular attention to those areas that may contribute pollutants to stormwater. For industrial activities, refer to the link below for more information on best management practices to prevent stormwater pollution. EPA Industrial Fact Sheet Series for Activities Covered by EPA's multi-sector general stormwater permit: http://www.epa.gov/npdes

PAGE INTENTIONALLY BLANK

# 12.0 SOLID WASTE, RECYCLING, AND POLLUTION PREVENTION (P2)

**Contractors should minimize the amount of solid waste requiring disposal in a landfill.**

The installation has a proactive P2 and recycling program, and contractors should minimize the amount of solid waste requiring disposal in a landfill. This section addresses solid waste, including both municipal solid waste (MSW) and construction and demolition (C&D) waste. HM and HW are discussed in Section 7.0 of this guide. Contractors are required to comply with all Federal, State, and local laws and regulations for proper disposal and recycling of all solid wastes.

## 12.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with solid waste, recycling, and pollution prevention. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

### 12.1.1. Key Definitions

- **Construction and Demolition Debris.** Inert materials generated during the construction, renovation, and demolition of buildings, roads, and bridges. C&D waste often contains bulky, heavy materials such as concrete, lumber (from buildings), asphalt (from roads and roofing shingles), gypsum (the main component of drywall), and glass (from windows).
- **Green Procurement (GP).** The purchase of products and services that are environmentally preferable, when compared with competing products that serve the same purpose, in accordance with federally mandated "green" procurement preference programs. GP is intended to have a lesser or reduced negative effect on human health and the environment, and to permit fulfilling the social, economic, and other requirements of present and future generations.
- **Pollution Prevention.** Reducing the amount of pollution entering waste streams or otherwise released to the environment through source reduction and process efficiencies.
- **Recycling.** Activities that may include collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use as raw materials in the manufacturing of new products. Recycling also includes using, reusing, or reclaiming materials, as well as processes

that regenerate a material or recover a usable product from it.

- **Municipal Solid Waste.** Any solid materials discarded, including garbage, construction debris, commercial refuse, non-hazardous materials, non-recyclable wood, or other non-recyclable material per BO 11350.1, Refuse Disposal Procedures.

### 12.1.2. Key Concepts

- **Pollution Prevention/Green Procurement.** Installation contractors are strongly encouraged to use P2 and GP practices.
- **Qualified Recycling Program (QRP).** An organized operation that diverts or recovers scrap or waste streams and that identifies, segregates, and maintains the integrity of the recyclable materials in order to maintain or enhance the marketability of the materials.
- **Recycling.** Recycling is required on the installation. The MCB Camp Lejeune Landfill (Base Landfill) Recycling Center accepts specified recyclables according to the schedule in Table 12-1. Call (910) 451-4214 prior to a bulk turn-in.
- **Solid Waste.** Solid waste is disposed of in accordance with contract specifications (off the installation or at the Base Landfill). Data related to disposal off the installation (to include C&D waste) must be provided to the ROICC or Contract Representative on a monthly basis.

- **Source Reduction.** Any practice that reduces the amount of any HM, pollutant, or contaminant entering any waste stream or released into the environment prior to recycling, treatment, and disposal that could reduce the hazard to public health and the environment. Source reduction may include equipment or technology modification; process or procedure modification; reformulation or redesign of products; substitution of raw materials; and improvements in housekeeping, maintenance, training, or inventory control.

### 12.1.3. Environmental Management System

Contractor practices associated with solid waste, recycling, and P2 include the following:

- Battery management
- Building operation/maintenance/repair
- Composting
- Construction/demolition/renovation
- Equipment operation/maintenance/disposal
- Grease traps
- HW disposal offsite transport
- Land clearing
- Livestock operations
- Metal working
- Packaging/unpackaging

- Paint removal
- Painting
- Parts replacement
- Polishing
- Range residue clearance
- Recreational facilities operation
- Road construction maintenance
- Rock crushing operations
- Solid waste collection/transportation
- Storage tank management
- Urban wildlife management
- Vehicle maintenance

The potential impacts of these activities on the environment include soil degradation, surface water quality degradation, depletion of landfill space, and depletion of nonrenewable resources.

## 12.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable regulations and requirements regarding solid waste disposal, recycling, and P2, which include but may not be limited to the following:

- **BO 5090.17, Solid Waste Reduction – Qualified Recycling Program.** Provides guidance for solid

waste reduction, P2, and management of recyclable materials.

- **BO 11350.2D, Refuse Disposal Procedures.** Establishes procedures for the separation, collection, and disposal of refuse and the disposal of waste wood products.
- **DoD Instruction 4715.4, Pollution Prevention.** Establishes the DoD requirement for installation QRPs and calls for GP.
- **EO 13423, Strengthening Federal Environmental, Energy and Transportation Management.** Integrates prior practices, strategies, and requirements to further enhance the environmental and energy performance and compliance requirements. The EO sets goals in several environmental areas, including recycling.
- **EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance.** Expands on the environmental performance requirements for Federal agencies, to include setting goals for solid waste diversion.
- **Pollution Prevention Act of 1990 (42 USC 13101 et seq.).** Establishes the national policy that "pollution should be prevented or reduced at the source whenever feasible," and establishes the following hierarchy: source reduction, recycling, treatment, and disposal.
- **Resource Conservation and Recovery Act of 1976.** Governs the disposal of solid waste and establishes

Federal waste disposal standards and requirements for State and regional authorities. The objectives of Subtitle D are to assist in developing and encouraging methods for the disposal of solid waste that are environmentally sound and that maximize the utilization of valuable resources recoverable from solid waste.

- **Solid Waste Disposal Act (SWDA) of 1965.** Requires Federal facilities to comply with all Federal, State, interstate, and local requirements concerning the disposal and management of solid wastes, including permitting, licensing, and reporting requirements. The SWDA encourages the reuse of waste through recycling and requires the procurement of products that contain recycled materials.

## 12.3. SOLID WASTE REQUIREMENTS

Contractors must follow all Federal, State, and local requirements regarding the collection, storage, and disposal of solid waste. Contact the ROICC or Contract Representative for additional information regarding solid waste requirements.

At a minimum, the following actions are required for all contractors:

1. Prior to performing work that will or may generate solid waste at the installation, all contractors must provide their ROICC or Contract Representative with a copy of their Solid Waste Disposal Permit

unless the use of the Base Landfill is authorized for disposal. If the Base Landfill is authorized, the contractor must contact the Base Landfill Operations Clerk to ensure the contract is registered in the Landfill Tracking System. Recycling should be coordinated with the ROICC or Contract Representative and the Landfill Manager.

2. Provide the weight of ALL waste, both MSW and C&D, that is either disposed of or recycled, to the ROICC or Contract Representative, with a copy to the Landfill Manager. This requirement does not apply if the landfill/recycling facility picks up or accepts materials directly from the contractor. If contractors transport waste offsite for disposal, it is mandatory that they track the material weight and provide that information to their ROICC or Contract Representative for input into the annual Pollution Prevention Annual Data Summary.

In addition, contractors producing solid waste on the installation are required to take these steps:

- Pick up solid waste, separate it according to material type, and place it in covered containers of the correct type that are regularly emptied for recycling or landfilling.
- Verify that the solid waste contains no HM or HW.
- Prevent contamination of the site and the surrounding areas when handling and disposing of waste.

- Leave the project site clean upon completion of a project.

### 12.3.1. MCB Camp Lejeune Landfill Acceptable Waste Streams

To dispose of waste at the Base Landfill, contractors must be authorized with a valid construction pass and placard representing the related contract. Contractors must also contact the Landfill Operator prior to unloading refuse. Contact the ROICC or Contract Representative with any questions regarding use of the landfill or to coordinate disposal.

The Base Landfill accepts certain types of solid waste under the conditions specified in Table 12-1. Base Landfill hours of operation are 0730 to 1530, Monday through Friday, but ACM waste must be delivered between 0700 and 1000, Monday through Thursday. Each material must be separated into different loads.

PAGE INTENTIONALLY BLANK

***Table 12-1. Base Landfill Requirements***

| **No Personal Property/ Off-Base Trash Accepted** |
|---|
| **Landfill Operating Hours** |
| 0700-1500 Monday – Thursday<br>0700-1400 Friday |
| **Wood Products** |
| The following products may be mixed together and delivered to the landfill:<br>• Scrap lumber (unpainted)<br>• Embark boxes (broken down)<br>• Pallets (broken/untreated)<br>The following products must be separated and delivered to the landfill:<br>• Trees (cut to 10 feet or less and free of soil)<br>• Leaves and scrubs<br>Serviceable pallets |
| **Lead Based Painted Wood Products** |
| • Delivered before 1400 Monday – Thursday<br>• Not accepted on Friday<br>• Cut in less than 8-foot lengths<br>Wrapped in 6-millimeter plastic bags/sealed |
| **Asbestos (all types)** |
| • Appointment needed (910-451-5011 / 2946)<br>• Delivered by 1000 (Mon – Thurs.)<br>• Not accepted on Friday<br>• Double wrapped in 6-millimeter plastic bags |

| |
|---|
| • Sealed with duct tape<br>Labeled and manifested prior to delivery |
| **Organic Products** |
| • Leaves, pine straw, grass, and shrub clippings<br>• No bags or containers allowed<br>• No twigs or limbs over 2 inches in diameter<br>• Less than 6-foot lengths |
| **Concrete** |
| • Delivered separately from other items<br>• Wire and rebar must be cut off flush with exposed surfaces<br>• Concrete and culverts<br>• Bricks and blocks<br>• Mortar products |
| **Soil** |
| Non-contaminated soil accepted |
| **Recyclable Products**<br>(Must be separated and dropped off at a designated recycling drop-off point or at a Recycling Center) |
| • Wood pallets (delivered separately)<br>• White paper (mixed flat or shredded)<br>• Newspaper<br>• Magazines<br>• Military publications (binders removed)<br>• Phone books<br>• Plastic and glass (containers or bottles)<br>• Toner cartridges<br>• Cardboard (delivered separately if in bulk) |

| |
|---|
| • Vinyl siding (delivered separately, in less than 6-foot lengths)<br>• Asphalt shingles (delivered separately)<br>Scrap metals |
| **Other Related Information** |
| **Asphalt may** be accepted in small quantities, as needed, at the discretion of the Landfill Manager (large quantities of asphalt must be taken off the installation). |
| **All furniture** must be accompanied by a DD Form 1348, with a classification of rejected by the Base Property Office **AND** downgraded to scrap by Defense Logistics Agency Disposition Services (DLADS). |
| **All other Base or USMC property** must be accompanied by a DD Form 1348 and downgraded to scrap by DLADS. |
| Scrap materials related to **ordinance, ammunition or dangerous items**, including containers, tubes, and packing, must also be accompanied by Ammunition, Explosives, and Other Dangerous Articles (AEDA) certifications and copies of the certifier and verifier's appointment letters. |
| **Phone Numbers:** (area code 910)<br>• Landfill Manager 451-4998<br>• Recycling Manager 451-4214<br>• Landfill Fax 451-9935<br><br>• Landfill Clerk 451-2946<br>• EMD 451-5837<br>• EOD 451-0558 |

| *Unacceptable Items* |
| --- |
| • Hazardous Waste<br>• Liquid Waste<br>• Useable Appliances<br>• Paint and Paint Cans<br>• Appliances<br>• Electronics<br>• Computer Equipment<br>• Batteries<br>• Wire (Communication/Barbed/ Concertina)<br>• Oyster Shells<br>• Contaminated Soil<br>• Tires<br>• 55-Gallon Drums<br>• Oil Filters<br>• Petroleum Containers<br>• Regulated Medical Waste<br>• PCBs or PCB containers<br>• Demilitarized Waste<br>• Construction and Demolition Debris (unless specified in the contract) |

## 12.4. RECYCLING REQUIREMENTS

The installation's QRP is managed by the EMD in collaboration with the Public Works Division. Reducing solid waste saves money and helps protect the environment by conserving natural resources. Additionally, USMC facilities are mandated to recycle, and the installation must meet solid waste diversion goals specified in EO 13514, the

DoD Strategic Sustainability Performance Plan, and the EMS.

### 12.4.1. Recycling Center

The MCB Camp Lejeune Recycling Center, Building 982, is co-located with the Base Landfill on Piney Green Road. Normal working hours are Monday through Thursday, 0700–1500, and Friday, 0700-1400. All materials should be brought to the Recycling Center. Have the ROICC or Contract Representative contact the Recycling Center at (910) 451-4214 for additional details. Call Recycling Coordinator at (910) 451-4214 for specific types and categories of materials accepted.

The following types and categories of materials are accepted for recycling but must be delivered to the Recycling Center on Piney Green Road:

- Scrap metal
- Steel (high temperature, corrosion resistant)
- Brass (includes spent/fired munitions, but excludes brass casings above .50 caliber; please call the Recycling Coordinator at (901) 451-4214 for details and documentation requirements)
- Copper and copper wire
- Aluminum (plate, sheet, scrap) and aluminum cans
- Paper (white, news, magazine)
- Cardboard

- Glass bottles (no window, windshields, or drinking glass)
- Plastic bottles
- Toner cartridges

Special arrangements may be made for other materials (C&D waste) or larger volumes of commonly recycled materials from events such as C&D. Regulations set forth in BO 11350.1 must be followed.

### 12.4.2. Other Recyclables

- **Asphalt Pavement.** Asphalt must be removed and delivered to an asphalt recycling facility. Contractors must provide a record of the total tons of asphalt recycled and the corporate name and location of the recycling facility to their ROICC or Contract Representative, with a copy to the Landfill Manager.
- **Empty Metal Paint Cans.** Take empty metal paint cans to Building S-962 for recycling. Turn in all HM cans or HM containers that are generated from MCB Camp Lejeune or MEF contracts to Building S-962 on Michael Road on the scheduled contractor turn-in day. Have the ROICC or Contract Representative contact EMD for more information. Any waste generated from this process must be managed appropriately.
- **Other Metals.** Take other metals to the DLADS disposal area in Lot 201, following the guidelines of BO 5090.17.

- **Red Rag Recycling.** Contractors should seek a red rag program to supply and launder shop rags. This service supplies clean rags and picks them up after use. The rags are laundered offsite and returned.
- **Universal Waste.** See Section 7.0 of this guide for management procedures.
- **Unused Hazardous Materials.** Turn in these materials to the HM Free Issue Point, Building 977 on Michael Road. Have the ROICC or Contract Representative contact the Free Issue Point at (910) 451-1482.
- **White Rag Recycling.** White rags are used in painting (these have no dye and thus do not interfere with these types of operations) and may be laundered offsite in a program analogous to the red rag recycling service.

## 12.5. POLLUTION PREVENTION AND GREEN PROCURMENT

MCB Camp Lejeune is subject to GP requirements. GP implements environmentally protective principles in the procurement arena and includes preferential use of the following:

- Products made from recovered materials
- Biobased products
- Water- and energy-efficient products
- Alternatives to ozone-depleting substances

- Non-toxic and less-toxic products
- Electronics that meet Electronic Product Environmental Assessment Tool standards
- Products that do not contain toxic chemicals, hazardous substances, or other pollutants targeted for reduction and elimination by the DoD
- Products with alternative fuel use/increased fuel efficiency
- Environmentally preferable purchasing practices

Contractors are encouraged to employ GP practices whenever feasible.

# 13.0 POTENTIAL DISCOVERY OF UNDOCUMENTED CONTAMINATED SITES

MCB Camp Lejeune was placed on the EPA National Priorities List, effective November 4, 1989. To ensure the protection of human health and the environment, a proactive Installation Restoration Program has been established to assess and remediate various sites on the installation. Numerous investigations have been performed to ensure that all of the installation's contaminated sites have been found, but additional contaminated areas may still exist. It is the contractor's responsibility to notify the ROICC or Contract Representative of any unforeseen site conditions while on the installation. It is recommended that any contractors performing intrusive activities on the installation be properly trained in accordance with the OSHA standards in 29 CFR 1910.120(e). If intrusive activities are planned for known contaminated areas, all required environmental training should be completed *prior* to working at MCB Camp Lejeune. Copies of training records should be available upon request by Federal or State regulators.

**Contact the ROICC or Contract Representative with questions or concerns about the information in this section.**

## 13.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with unforeseen site conditions. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

### 13.1.1. Key Definitions

- **Free Product.** A discharged HM/HW, POL, or environmental pollutant that is present in the environment as a floating or sinking non-aqueous phase liquid that exists in its free state (i.e., exceeds the solubility limit of liquids or saturation limit of soil/solids).
- **National Priorities List.** List of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants.
- **Petroleum, Oil, and Lubricants.** A broad term that includes all petroleum and associated products or oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, vegetable oil, animal oil, sludge, oil refuse, and oil mixed with wastes.
- **Unforeseen Site Condition.** A potentially hazardous or unanticipated site condition encountered on a job site.

- **Munitions and Explosives of Concern.** Military munitions that may pose explosives safety risks, including MEC, UXO, DMM, and munitions constituents present in a high enough concentration to present an explosives hazard.

### 13.1.2. Key Concepts

- **Notification.** Contractors must notify the ROICC or Contract Representative, in writing, of any unforeseen site conditions prior to disturbing them.
- **Response.** Contractors must stop working and evacuate work areas if unforeseen site contaminants, HM, or MEC/DMM/UXO are suspected to be present.

### 13.1.3. Environmental Management System

Unforeseen site conditions are potentially applicable to all EMS practices conducted aboard MCB Camp Lejeune.

## 13.2. OVERVIEW OF REQUIREMENTS

Contractors operating aboard the installation must be aware of and adhere to all applicable regulations and requirements regarding unforeseen site conditions, which include but may not be limited to the following:

- **CERCLA of 1980 and Superfund Amendments & Reauthorization Act (SARA) of 1986.** Establishes the Nation's HW site cleanup program.

- **Occupational Safety and Health Standards, 29 CFR 1910.** Federal standards that govern occupational health and safety to ensure the protection of employees from recognized hazards, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. The standards include provisions for many facets of employee safety and health, including, but not limited to, employee training, personal protective equipment, HM communication, medical surveillance, and emergency planning.

## 13.3. UNFORESEEN SITE CONDITION PROCEDURES

Contractors must promptly, before the conditions are disturbed, give a written notice to the ROICC or Contract Representative of (1) any subsurface or latent physical conditions at the site that differ materially from those indicated in the contract, or (2) any unknown physical conditions at the site, of an unusual nature, that differ materially from those ordinarily encountered.

The ROICC or Contract Representative will investigate the site conditions promptly after receiving the notice.

The most common unforeseen conditions at MCB Camp Lejeune typically relate to POL contamination and MEC/DMM/UXO. Procedures for these scenarios are provided in the following sections.

### 13.3.1. Petroleum, Oil, and Lubricants

The most frequently encountered condition that requires EMD assistance is the presence of a POL odor while excavating. If an odor or any free product is encountered during construction or excavation activities, take the following actions:

- Stop work.
- Immediately clear the area of all personnel to a safe distance upwind of the suspected area.
- Call the Fire and Emergency Services Division (911) immediately if personnel are affected or injured by the suspected contaminant.
- Call the Fire and Emergency Services Division to properly secure the area.
- Notify the ROICC or Contract Representative so that the EMD Spill Response Team will be contacted to determine the appropriate course of action.

**If there is an odor, stop work and immediately clear the area of all personnel to a safe distance upwind of the suspected area.**

Please note that if contaminated soil is removed during excavation activities, the soil will have to be characterized prior to disposition. While it is staged and awaiting characterization sampling results, contaminated soil is to be placed within a bermed area on an impervious surface or barrier and securely covered with plastic or appropriate

material. Sample results and characterization will determine the ultimate disposition of the soil. In accordance with installation policy, contaminated soil is not permitted to be reintroduced into excavations.

**Recognize**

**Retreat**

**Report**

### 13.3.2. Munitions and Ordnance

MCB Camp Lejeune has been in operation as a military training installation since the early 1940s. As such, munitions or an ordnance item may be encountered during site excavation or construction activities. MEC, DMM, or UXO at MCB Camp Lejeune and its outlying areas typically include flares, mines, grenades, rockets, artillery projectiles, bulk explosives, fuses, or blasting caps. These items may vary in condition from very good/easily recognizable to unrecognizable, fragmented, or corroded scrap metal. MEC, DMM, or UXO may be encountered on the ground surface, partially buried, or completely buried.

Contractors operating aboard the installation should follow the "3R" concept if a possible munitions or ordnance item is discovered: **"Recognize, Retreat, and Report."**

**Recognize**

**Retreat**

**Report**

- **Recognize.** Contractors with the potential to encounter any possible MEC, DMM, or UXO should have a basic knowledge of these items. The item does not have to

be specifically recognized or identified, but it is important for personnel to recognize the potential hazard.

- **Retreat.** If a suspected MEC, DMM, or UXO item is encountered, leave the immediate area and DO NOT DISTURB the item. If possible, note the general size and shape of the item, any markings, and the location.
- **Report.** Report all occurrences to the appropriate authority, including any observations (e.g., size, shape, markings, and location).

**Stop work immediately if a project unearths a hazardous material, such as MEC/DMM/UXO, and report the situation to the ROICC or Contract Representative.**

If a project unearths any potential MEC/DMM/UXO, recognize the potential hazard. Stop work immediately, and have all personnel clear the immediate area. Report the situation and any observations to the ROICC or Contract Representative, who will then report the item to Range Control and Explosive Ordnance Disposal (EOD). The following link is to a 6-minute "UXO Safety" awareness training video that provides additional guidance.

http://www.lejeune.marines.mil/OfficesStaff/ExplosivesSafety/ %20trainingandguides.aspx

For other emergency response procedures, please refer to Section 5.0 of this guide.

PAGE INTENTIONALLY BLANK

# 14.0 PERMITTING

Contractors operating aboard the installation must ensure that all relevant environmental permits are obtained before work commences onsite. Contractors must work with their ROICC or Contract Representative to determine permitting responsibilities prior to beginning work. Contractors must adhere to all permit conditions. Examples of permits related to the environment are provided in Section 14.3.

## 14.1. KEY DEFINITIONS AND CONCEPTS

The following key definitions and concepts are associated with contractor permitting requirements. If you have any questions or concerns about the information in this section, please consult the ROICC or Contract Representative, who will contact the appropriate environmental office if additional clarification is necessary.

**Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.**

### 14.1.1. Key Definitions

- **Major Source.** Any source that emits or has the potential to emit 100 tons per year or more of any criteria air pollutant in accordance with Title V of the CAA.

- **Permit.** A legally enforceable document required by statutory regulation for potential sources of pollution that is required for operations that may have an environmental impact. Permits may be administered at the Federal, State, or local level.
- **Target Housing.** Any housing constructed before 1978, with the exception of housing for the elderly and persons with disabilities (unless a child under the age of 6 lives or is expected to live there) and residential dwellings where the living areas are not separated from the sleeping areas (efficiencies, studio apartments, dormitories, etc.).

### 14.1.2. Key Concepts

- **Permits.** Prior to beginning work aboard the installation, consult applicable permit requirements and ensure that they are met before work begins. Copies of all applicable permits/authorizations should be retained onsite for the life of the project. Additional information on North Carolina permits is found on the following webpage: http://deq.nc.gov/about/divisions/environmental-assistance-customer-service/deacs-permit-guidance/environmental-permit-assistance

Consult the ROICC or Contract Representative for additional information concerning the contract's permit requirements. The contractor is responsible for ensuring that all required permits are acquired prior to any work aboard MCB Camp Lejeune.

### 14.1.3. Environmental Management System

Currently, no practices are associated with permitting under the EMS.

## 14.2. OVERVIEW OF REQUIREMENTS

Please refer to the individual sections of this Guide for applicable permitting regulations and requirements for each environmental media. Many permits have specific timetables for submittal prior to project initiation. Contractors must consult the permit requirements and ensure that all pertaining permits are obtained in the required timeframe.

## 14.3. PROJECT PERMITS AND APPROVALS

**The NCDEQ website (http://deq.nc.gov/) is a useful reference for determining required permits and obtaining necessary forms.**

Prior to work being awarded, EMD's NEPA Section should have performed an environmental review of the installation-associated action proponent to comply with NEPA 1969. The outcome of this review would be either a Decision Memorandum or an Environmental Assessment. Contractors must refer to their contract and the requirements outlined in the NEPA documentation for specific permitting requirements. EMD Program Managers are available for

guidance; however, if the contractor is tasked with preparing permit applications, the contractor is expected to have the capability and expertise required to complete the submittals in accordance with the guidance provided by the regulatory agency that issues the permit. In addition, EMD must be provided with copies of all permits submitted to the NCDEQ. In some cases, EMD must submit the permit application. Please direct questions to the ROICC or Contract Representative.

Some permits that may be required are discussed in applicable sections of this Guide. The following list of permits is not meant to be all-inclusive; please be aware that other permits may also be required. The NCDEQ website (http://deq.nc.gov/) is a useful reference for determining required permits and obtaining necessary forms. In addition, any inspection and/or data collection required by the permits must be retained onsite for review upon request.

### 14.3.1. Stormwater (Section 11.0)

- **NPDES Stormwater Discharge Permit for Construction Activities (also referred to as General Permit No. NCG010000).** Required for all LDAs that exceed 1 acre; also requires an accompanying Erosion and Sedimentation Control Plan.
- **General Permit SWG050000.** Required for residential development activities within the 20 coastal counties (including Onslow County) located within 1/2 mile and draining to class SA waters (waters classified as SA are tidal salt waters that are

used for commercial shellfishing or marketing purposes) that disturb less than 1 acre if adding more than 10,000 square feet of built-upon area that will result in a built-upon area greater than 12 percent of the total project area.

- **High-Density Stormwater Permit.** Required when (1) the LDA exceeds 1 acre and impervious surfaces are greater than or equal to 25 percent of the total project area adjacent to non-SA waters or greater than or equal to 12 percent of the total project area adjacent to SA water; or (2) total development exceeds 10,000 square feet of impervious surface.
- **Low-Density Stormwater Permit.** Required when the LDA exceeds 1 acre and impervious surfaces are less than 25 percent of the total project area when adjacent to non-SA waters or less than 12 percent of the total project area when adjacent to SA waters.

### 14.3.2. Asbestos (Section 8.0)

- **Asbestos Permit Application and Notification for Demolition/Renovation.** DHHS Form 3768, available at the following website (under *Forms & Applications*):

  http://epi.publichealth.nc.gov/asbestos/ahmp.html

### 14.3.3. Lead-Based Paint (Section 9.0)

- **North Carolina Lead-Based Paint Abatement Permit Application.** Any person or firm conducting an abatement of a child-occupied facility or target

housing is required to obtain a Lead Hazard Management Plan Permit. The application is available at the following website: http://epi.publichealth.nc.gov/lead/pdf/LeadAbatePermit08-07.pdf

### 14.3.4. Air Quality (Section 4.0)

- **Construction Permits.** Construction permits are required for all new stationary sources and all existing stationary sources that are added to or are modified with new equipment that may emit air pollutants. Permits may be required for the construction or modification of the following types of emission sources:
  - Boilers
  - Generators
  - Engine test stands
  - Surface coating/painting operations
  - Refrigerant recovery and recycling operations for other ozone-depleting substances, such as industrial chillers, refrigerators, air conditioning compressors, or cleaning agents.
  - Chemical or mechanical paint removal, abrasive blasting, grinding, or other surface preparation activities
  - Fuel storage and fuel dispensing
  - Woodworking shops

- Welding shops
- Bulk chemical or flammables storage
- Open burning
- Fire training
- Rock crushing or other dust-causing activities

- **New Source Review Permit.** A New Source Review permit is a pre-construction permit that authorizes the construction of new major sources of air pollution or major modifications of existing sources.

### 14.3.5. Wetlands (Section 10.6)

- **Section 404 Clean Water Act Permit.** Contractors working aboard the installation will not perform any work in waters of the United States or wetlands (see definition below) without an approved permit (even if the work is temporary). Unavoidable impacts to wetlands or waters of the United States will require coordination and written approval from the USACE for a Section 404 CWA permit (individual or applicable nationwide permit), the NCDWR for a Section 401c Water Quality certification, and the NCDCM for a Federal Consistency Determination. Failure to acquire written authorization for making impacts to wetlands and/or waters of the United States may result in significant project delays or design modifications. See the following website for more information:

  http://www.epa.gov/laws-regulations

### 14.3.6. Drinking Water/Wastewater

- **Approval of Engineering Plans and Specifications for Water Supply Systems.** Applicants must submit engineering plans and specifications at least 30 days prior to the date upon which the Authorization to Construct is desired. Authorization to Construct must be obtained prior to onset of work.
- **Wastewater Extension Permit.** NCDEQ Form FTA 02/03 – Rev. 3 04/05. Applicants submitting Form FTA 02/03 should plan to allow the State approximately 90 days to issue the permit. The Wastewater Extension Permit must be obtained prior to onset of work.