17-0007, Design Dental Treatment & Recovery Rooms at NH100

CONTRACT N40085-17-B-0007

NAVFAC SPECIFICATION NO. 05-17-0007

17-0007 DESIGN DENTAL TREATMENT & RECOVERY ROOM, NH100

AT THE

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

JACKSONVILLE, NORTH CAROLINA

DESIGN BY:

The Walker Group Architecture, Inc.
New Bern, North Carolina

A/E Contract: N40085-08-D-8416

SPECIFICATION PREPARED BY:

The Walker Group Architecture, Inc.

Date: JULY 27, 2017

SPECIFICATION APPROVED BY:

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

C. M. Hodrick, Commander, CEC, U.S. Navy
for Commander, Naval Facilities Engineering

05-17-0007

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PART 1   GENERAL

1.1  WORK COVERED BY CONTRACT DOCUMENTS

1.1.1  Project Description

The work includes demolition and renovation of limited interior space on the second floor of NH100 in the Dental Treatment area. The work includes demolition of interior wall partitions, electrical systems, doors and frames, ceilings and interior finishes. Renovation includes new wall partitions, ceilings, electrical, mechanical, & plumbing systems, as well as hospital gasses. In addition renovation includes new doors and floor and room finishes.

1.1.2  Location

The work shall be located at the Marine Corps Base Camp Lejeune, Hospital Building NH100, North Carolina, 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.
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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.

1.4 PRE-CONSTRUCTION RISK ASSESSMENT ICRA/PCRA
EC.02.06.05, LS.01.02.01

PRE-CONSTRUCTION RISK ASSESSMENT ICRA/PCRA
EC.02.06.05, LS.01.02.01

- All construction projects must adhere to the following:
  - Negative pressure exhaust will be in place, unused doors sealed with duct tape, air supply/exhaust vents are to be sealed off
  - "Sticky" dust mats & carpeting remnants will be installed at all construction entrances & exits to reduce dust
  - Contractors thoroughly sweep/clean construction & entrances/exits areas daily or more often if needed
  - Construction area is broom-cleaned at end of the day; no trash is left on site (to prevent vermin)
  - Project manager to check site daily and log in project folder
  - Appropriate safety and project signage will be posted
  - All doors into area are smoke tight, self closing and self locking
  - Temporary partitions will be in place from floor to ceiling deck above. Temporary partitions separating construction from occupied areas will be smoke tight, all penetrations will be maintained in a smoke tight condition by the use of approved/rated materials (separate "Above Ceiling Permit" may be required)
  - Firefighting equipment will be in place and accessible
  - Ceiling tiles are replaced as soon as possible
  - All power equipment is UL listed, outlets are GFCI, equipment is properly grounded, extension cords and wiring is protected, open conductors are secured at 10 foot intervals, and temporary lighting, heating or electrical devices are in accordance with the NEC
  - Flammable and combustible liquids/gases/solids shall be used / stored properly
  - No smoking policy will be enforced
  - Smoke detectors will be covered to prevent dust contamination - covers to be removed at end of each workday
  - Trailers, sheds, and dumpsters will be no closer than 10 feet from...
Gang boxes and tool carts will be secured at all times whenever accessible.

Hard hats will be required for this project when appropriate.

Upon completion:
- Wipe work surfaces with disinfectant
- Wet mop entire area
- Remove isolation of HVAC system in areas where work is being performed
- Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.

PART 2  PRODUCTS

Not used.

PART 3  EXECUTION

Not used.

-- End of Section --
PART 1   GENERAL

1.1   SPECIAL SCHEDULING REQUIREMENTS

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

b. The Naval Hospital will remain in operation during the entire construction period. The Contractor shall conduct his operations so as to cause the least possible interference with normal operations of the activity.

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

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

1.2   CONTRACTOR ACCESS AND USE OF PREMISES

1.2.1   Station Regulations

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

1.2.2   Working Hours

Regular working hours shall consist of an eight and one-half hour period established by the Contracting Officer, Monday through Friday, excluding Government holidays. All work schedules are to be coordinated with the Contracting Officer. All construction phasing work schedules shall also be coordinated with the Contracting Officer prior to start of construction.

1.2.3   Work Outside Regular Hours

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

The Contractor shall be working in an existing building which is occupied. Do not enter the buildings without prior approval of the Contracting Officer.

New construction as well as renovation projects within the hospital/clinics increase the amount of dust and dirt in the hospital. Bacterial and fungal microorganisms normally present in dust can contaminate air-handling systems, putting patients at risk for infections such as Aspergillus pneumonia.

Policy: Consultation with the Infection Control Department will be conducted during the planning phase of any hospital construction/renovation. An Infection Control Risk Assessment (ICRA) will be performed by IC and the facilities department to identify the class of the construction project based on potential risks and the methods needed to contain the risk according to type of construction, place of construction, and risk group involved. ICRA's will be issued for all Class II, III and IV construction.

A. The following projects require barrier structures:

1. Demolition of walls, wallboard, plaster, ceramic tiles, ceiling tiles, and ceilings.
2. Removal of flooring, carpeting, windows, doors and casework.
3. Working with sinks and plumbing that could aerosolize water in high risk areas.
4. Exposure of ceiling spaces for demolition, installation or rerouting of utility services.
5. Crawling into ceiling spaces for inspections that may dislodge dust.
6. Repairing water damage.

B. The following general procedures should apply during any hospital construction/renovation activities. Refer to site/job specific ICRA for detailed containment methods.

1. Isolate the construction area from patient-care areas and routes accessed by patients, staff, and visitors using appropriate hard or plastic barriers.
2. Remove air from the construction site using negative pressure measures by venting it directly to the outside. When outside venting isn't possible, high-efficiency particulate air (HEPA) filters must be used on the air before returning it to the ventilation system. Seal off and block return air vents.

C. Implement dust control measures on all surfaces. Use tacky mats on the outside of all areas. Replace ceiling tiles immediately if unattended. Seal all windows and doors with tape as needed.

D. Relocate patients as needed away from construction areas. Coordinate with the Contracting Officer and Hospital staff.

1. Minimally impact patients and staff. Materials, tools, and equipment should be covered by plastic during transport into and out of the hospital or clinic away from patients and staff on construction-designated elevators. Designate elevators, entrances and exit areas for construction use during selected hours.
2. Educate and monitor worker compliance (including subcontractors)
with the use of protective coveralls, booties and gowns, as well as appropriate exit procedures. Workers should not be out in the patient/staff areas without protective apparel.

3. Remove construction waste products from the site by covering and transporting them via the construction elevator or through an outside chute. Waste is not to be transported through patient/staff areas without the approval of the project manager and the affected department director.

E. Ensure daily thorough cleaning of construction areas using wet wiping procedures, vacuuming under negative pressure of with HEPA filters, tacky mats and coverage of tools each workday and at the end of the project.

1. Use Active Surveillance methods during construction projects to ensure patients are not acquiring airborne infections.

Required "NHCL ICRA Construction Maintenance Permit # FY10 - 5" included at the end of this section.

Relocate movable furniture Contractor's working area as required to perform the work, protect the furniture, and replace the furniture in its original location upon completion of the work. Leave attached equipment in place, and protect it against damage, or temporarily disconnect, relocate, protect, and reinstall it at the completion of the work.

1.2.5 Utility Cutovers and Interruptions (ALL CUTOVERS AND INTERRUPTIONS SHALL BE APPROVED BY THE CONTRACTING OFFICER)

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

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

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, and medical gas systems 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.
### NHCL ICRA CONSTRUCTION MAINTENANCE PERMIT #FY10-5

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<th>Location Of Construction</th>
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| Contractor Performing Work | |
|----------------------------||

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<th>Telephone:</th>
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<tr>
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<th>NO</th>
<th>INFECTION CONTROL RISK GROUP</th>
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<td></td>
<td></td>
<td>GROUP 1: Lowest Risk</td>
</tr>
<tr>
<td>TYPE B: Any work that generates dust or requires demolition or removal of any fixed building components or assemblies</td>
<td></td>
<td></td>
<td>GROUP 2: Medium Risk</td>
</tr>
<tr>
<td>TYPE C: Major demolition and construction projects</td>
<td></td>
<td></td>
<td>GROUP 3: Medium/High Risk</td>
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<table>
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<tr>
<td>CLASS I</td>
<td>1. Execute work by methods to minimize raising dust from construction operations.</td>
<td>3. When changing stained/soiled ceiling tiles, access the stained/soiled tile via an adjacent tile and spray the inside surface with a hospital-approved disinfectant prior to removal. This will minimize any dust and environmental contamination.</td>
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<td>CLASS II</td>
<td>1. Provide active means to prevent air-born dust from dispersing into atmosphere, i.e. control cube.</td>
<td>5. Wipe surfaces with disinfectant</td>
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<td>CLASS III</td>
<td>1. Isolate HVAC system in area where work is being done to prevent contamination of the duct system.</td>
<td>4. Place dust mat at entrance and exit of work area.</td>
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<td>CLASS IV</td>
<td>1. All guidelines for Class III projects.</td>
<td>4. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.</td>
<td></td>
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</table>

Additional Requirements:
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)


1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00, "Submital 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
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 --
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
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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:


1.4.3.4 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 driver’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 Contractor 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 Space Temperature Control, HVAC TAB, and Apparatus Inspection

All contract requirements shall be accomplished directly by a first tier subcontractor. No work required shall be accomplished by a second tier subcontractor.

1.4.9.2 Telecommunication and High Voltage Work

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

1.5 DISCLOSURE OF INFORMATION

Contactor shall comply as follows:

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

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

   (2) The information is otherwise in the 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.
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 --
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 --
PART 1   GENERAL

1.1     SUBMITTALS

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

SD-01 Preconstruction Submittals

   Construction schedule
   Equipment delivery schedule

1.2     CONSTRUCTION SCHEDULE

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

1.3     EQUIPMENT DELIVERY SCHEDULE

1.3.1     Initial Schedule

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

   a. Description.
   b. Date of the purchase order.
   c. Promised shipping date.
   d. Name of the manufacturer or supplier.
   e. Date delivery is expected.
   f. Date the material or equipment is required, according to the current construction schedule.

1.4     NETWORK ANALYSIS SYSTEM (NAS)

The Contractor shall use the critical path method (CPM) to schedule and control construction activities. The Network shall have a minimum of 10
activities and a maximum of 75 activities. The schedule shall identify as a minimum:

- a. Construction time for all major systems and components;
- b. Major submittals and submittal processing time; and
- c. 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 Government's 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 --
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
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.
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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. 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.

1.4.6 Submittals reserved for Marine Corps North Carolina IPT approval

a. Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM: All submittals. Provide an information copy of all submittals to Base Telephone through the Contracting Officer. Base Telephone will coordinate their review and approval through the Marine Corps North Carolina IPT.
b. Section 33 82 00 TELECOMMUNICATIONS OUTSIDE PLANT (OSP): All submittals. Provide an information copy of all submittals to Base Telephone through the Contracting Officer. Base Telephone will coordinate their review and approval through the Marine Corps North Carolina IPT.

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.
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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 W 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 N40085-14-B-0124, 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
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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 # 17-0007, Design Dental Treatment and Recovery Rooms at NH100."

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:

The Walker Group Architecture, Inc.
409 Broad Street
New Bern, NC 28560

1.8.1.1 Administrative Submittals

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

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

1.8.1.3 TAB Submittals

Submit to ROICC/OICC for all projects.

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

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

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --
PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

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

ASME INTERNATIONAL (ASME)

ASME B30.8 (2000) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2002) Potable Fire Extinguishers
NFPA 51B (2003) Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70 (2017) National Electrical Code

U. S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2008; Change 1-2010; Change 3-2010; Errata 1-2010) Safety and Health Requirements Manual
U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

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 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:

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 capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.

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 certification, extensive knowledge, training and experience in the field of fall protection who is capable of performing design, analysis, and evaluation of fall protection systems and equipment.

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

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

   (2) Days away from work;

   (3) Restricted work;

   (4) Transfer to another job;

   (5) Medical treatment beyond first aid;

   (6) Loss of consciousness; or

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

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

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

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

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

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

1.5 REGULATORY REQUIREMENTS

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

1.6 DRUG PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employee uses illegal drugs or consumes alcohol during work hours. Ensure there are no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine, or saliva specimens and test the injured and involved employees for the influence of drugs and alcohol. A copy of the test shall be made available to the Contracting Officer upon request.

1.7 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.7.1 Personnel Qualifications

Work performed under this contract shall meet Level 2.

1.7.1.1 Site Safety and Health Officer (SSHO)

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

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

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

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

Level 4:
A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency: Excavation; Scaffolding; Fall protection; Hazardous energy; Confined space; Health hazard recognition, evaluation and control of chemical, physical and biological agents; Personal protective equipment and clothing to include selection, use and maintenance.

Level 5:
An Associate Safety Professional (ASP), Certified Safety Trained Supervisor (STS) and/or Construction Health & Safety Technician (CHST).
A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency: Excavation; Scaffolding; Fall protection; Hazardous energy; Confined space; Health hazard recognition, evaluation and control of chemical, physical and biological agents; Personal protective equipment and clothing to include selection, use and maintenance.

Level 6:  A Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH).
A minimum of 10 years safety work of a progressive nature with at least 5 years of experience on similar projects.
30-hour OSHA construction safety class or equivalent within the last 5 years.
An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency: Excavation; Scaffolding; Fall protection; Hazardous energy; Confined space; Health hazard recognition, evaluation and control of chemical, physical and biological agents; Personal protective equipment and clothing to include selection, use and maintenance.

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

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

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

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

1.7.1.4 Competent Person for Confined Space Entry

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

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

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

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

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

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

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

g. Maintain records required.

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

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

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

a. Capable by education, specialized training and/or experience of anticipating, recognizing, and evaluating employee exposure to hazardous chemical, physical and biological agents in accordance with USACE EM 385-1-1, Section 6.
b. Capable of specifying necessary controls and protective actions to ensure worker health.

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 Induction

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 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.

h. Hot work permit.

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

j. Safety and Health Warning Posters.

1.10 SITE SAFETY REFERENCE MATERIALS

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

1.11 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.
1.12 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 the FIRE DIVISION for "HOT WORK" within or around flammable materials (such as fuel systems, welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, vaults, etc.) that have the potential for flammable or explosive atmospheres.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

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

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

PART 3   EXECUTION

3.1  CONSTRUCTION AND/OR OTHER WORK

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

3.1.1  Hazardous Material Use

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

3.1.2  Hazardous Material Exclusions

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

3.1.3  Unforeseen Hazardous Material

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

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting with the Contracting Officer to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 FALL HAZARD PROTECTION AND PREVENTION

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

3.3.1 Training

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

3.3.2 Fall Protection Equipment

The Contractor shall enforce use of the fall protection equipment designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is on a surface 1.8 m (6 feet) or more above lower levels. Fall protection systems such as guardrails, personnel fall arrest systems, safety nets, etc., are required when working within 1.8m (6 feet) of any leading edge. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, paragraphs 05.I. and 05.J. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems may be required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with 29 CFR 1926.500, Subpart M and USACE EM 385-1-1.

3.3.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ANSI Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for
attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 1.8 m (6 feet). The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.3.3 Fall Protection for Roofing Work

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

a. Low Sloped Roofs:

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

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

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

3.3.4 Safety Nets

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

3.3.5 Existing Anchorage

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

3.3.6 Horizontal Lifelines

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

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

3.3.8 Rescue and Evacuation Procedures

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

3.4 PERSONAL PROTECTIVE EQUIPMENT

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

- a. Hard Hats
- b. Safety Glasses
- c. High-Visibility Shirt or Vest
- d. Safety-Toed Shoes or Boots

3.5 SCAFFOLDING

Employees shall be provided with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access to scaffold platforms greater than 6 m (20 feet) in height shall be accessed by use of a scaffold stair system. Vertical ladders commonly provided by scaffold system manufacturers shall not be used for accessing scaffold platforms greater than 6 m (20 feet) in height. The use of an adequate gate is required. Contractor shall ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Special care shall be given to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of
the scaffold base. Work platforms shall be placed on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (PP&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/Hazard 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 electrical distribution system. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first tier subcontractor. This work shall not be performed by a second tier subcontractor.

a. Submit name and qualifications of organization. Organization shall have been regularly 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 and 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 an 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 personal 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 --
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](http://www.concrete.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](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 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 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 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 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
17-0007, Design Dental Treatment & Recovery Rooms at NH100

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

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

ARCNET TRADE ASSOCIATION (ATA)
E-M-mail:  info@arcnet.com
Internet:  http://www.arcnet.com/index.htm</URL

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

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

CAST IRON SOIL PIPE INSTITUTE (CISPI)
5959 Shallowford Road, Suite 419
Chattanooga, TN  37421
Ph:   423-892-0137
Fax:  423-892-0817
Internet:  http://www.cispi.org

COMPRESSED GAS ASSOCIATION (CGA)
4221 Walney Road, 5th Floor
CONSUMER ELECTRONICS ASSOCIATION (CEA)  
1919 South Eads St.  
Arlington, VA 22202  
Ph: 866-858-1555 or 703-907-7600  
Fax: 703-907-7675  
E-mail: cea@CE.org  
Internet: http://www.CE.org

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

GYPSUM ASSOCIATION (GA)  
6525 Belcrest Road, Suite 480  
Hyattsville, MD 20782  
Ph: 301-277-8696  
Fax: 301-277-8747  
E-mail: info@gypsum.org  
Internet: http://www.gypsum.org

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

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)
400 Commonwealth Drive
Warrendale, PA 15096-0001
Ph: 724-776-4970
Fax: 724-776-0790
E-mail: customerservice@sae.org
Internet: http://www.sae.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

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
17-0007, Design Dental Treatment & Recovery Rooms at NH100

Ph:  202-289-7800
Fax:  202-289-1092
Internet:  http://www.wbdg.org/references/docs.refs.php

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. 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
PART 2   PRODUCTS

Not used

PART 3   EXECUTION

Not used

-- End of Section --
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 3740 (1999c) Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction


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 working 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 performed;

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

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

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

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

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Organization, a QC Plan, attending a QC Plan meeting, attending a Coordination and Mutual Understanding Meeting, conducting QC meetings, performing three phases of control, performing submittal review, ensuring testing is performed, and preparing QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program shall cover construction operations on-site and off-site and shall be keyed to the proposed construction sequence.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

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

1.5.1.2 Qualifications

An individual with a minimum of five years experience as a foreman, superintendent, inspector, QC Manager, project manager, or construction manager on similar size construction contracts which included the major trades that are part of this Contract.

Provide a separate QC Specialist at the work site for each of the areas of responsibilities for the following:
Electrical and Telecommunication Systems QC Specialists.

Provide ICC IBC Special Inspection Certification from the following specialist:

Telecommunications Systems Installation Specialist, (10) years minimum experience in Telecommunication Systems Installation.

Area of responsibility:

Telecommunication Systems, all Division 27, Division 28, and Division 33 Outside Plant work.

Frequency of specialists is full time during systems installation and testing. QC Specialists are required to attend the Coordination and Mutual Understanding Meeting, QC meetings and be physically present at the construction site to perform the three phases of control and prepare documentation for each definable feature of work in their area of responsibility.

1.5.1.3 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager shall have completed the course entitled "Construction Quality Management for Contractors." This course is periodically offered by the Navy and the Corps of Engineers. However, it is sponsored by both the AGC and the ABC of Charlotte, North Carolina. Call one of the following to sign up for the next available class:

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

The Associated General Contractors (AGC), Virginia Chapter
in Cooperation with the Army Corps of Engineers, Norfolk District, and the Naval Facilities Engineering Command, Atlantic Division.
(Offered at rotating locations in Norfolk, Williamsburg, and Richmond)
Contact: AGC of Virginia
8631 Maylan Drive, Parham Park
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Carolinias Associated General Contractors (CACG)
Contact: CACG
1100 Euclid Avenue
Charlotte, NC 28203
Phone: 704-372-1450 (ext. 5248)

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

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

1.6 QC PLAN

1.6.1 Requirements

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

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

I. QC ORGANIZATION
II. NAMES AND QUALIFICATIONS
III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
IV. OUTSIDE ORGANIZATIONS
V. APPOINTMENT LETTERS
VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
VII. TESTING LABORATORY INFORMATION
VIII. TESTING PLAN AND LOG
IX. PROCEDURES TO COMPLETE REWORK ITEMS
X. DOCUMENTATION PROCEDURES
XI. LIST OF DEFINABLE FEATURES
XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL
XIII. PERSONNEL MATRIX
XIV. PROCEDURES FOR COMPLETION INSPECTION

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

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

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

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

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

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

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

i. A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.

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

k. Documentation procedures, including proposed report formats.

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

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

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

1.6.2 Preliminary Work Authorized Prior to Approval

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

1.6.3 Approval

Approval of the QC plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC plan and operations as necessary to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify his/her submitted qualifications.

1.6.4 Notification of Changes

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

1.7 QC PLAN MEETING

Prior to submission of the QC plan, meet with the Contracting Officer to discuss the QC plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding of the QC plan requirements prior to plan development and submission.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

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

1.9 QC MEETINGS

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

a. Review the minutes of the previous meeting;

b. Review the schedule and the status of work:
   - Work or testing accomplished since last meeting
   - Rework items identified since last meeting
   - Rework items completed since last meeting;

c. Review the status of submittals:
   - Submittals reviewed and approved since last meeting
   - Submittals required in the near future;

d. Review the work to be accomplished in the next 2 weeks and documentation required. Schedule the three phases of control and testing:
   - Establish completion dates for rework items
   - Preparatory phases required
   - Initial phases required
   - Follow-up phases required
   - Testing required
   - Status of off-site work or testing
   - Documentation required;

e. Resolve QC and production problems; and

f. Address items that may require revising the QC plan:
   - Changes in QC organization personnel
   - Changes in procedures.

1.9.1 THREE PHASES OF CONTROL

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

1.9.2 Preparatory Phase

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

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

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

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

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

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

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

h. Discuss construction methods

1.9.3 Initial Phase

Notify the Contracting Officer at least 48 hours in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the QC Specialists, the superintendent, and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

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

d. Ensure that testing is performed by an approved laboratory.
1.9.4 Follow-Up Phase

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

a. Ensure the work is in compliance with Contract requirements;
b. Maintain the quality of workmanship required;
c. Ensure that testing is performed by an approved laboratory; and
d. Ensure that rework items are being corrected.

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

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

1.10 SUBMITTAL REVIEW

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

1.11 TESTING

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

1.11.1 Testing Laboratory Requirements

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

a. Sampling and testing shall be under the technical direction of a Registered Professional Engineer (P.E) with at least 5 years of experience in construction material testing.
b. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.
c. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.
d. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.
e. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A 880. Laboratories shall meet the requirements of ASTM E 329.
f. Laboratories engaged in nondestructive testing (NDT) shall meet the requirements of ASTM E 543.
g. Laboratories engaged in hazardous materials testing shall meet the requirements of OSHA and EPA.

1.11.2 Accredited Laboratories

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

1.11.3 Inspection of Testing Laboratories

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

1.11.4 Capability Check

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

1.11.5 Test Results

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

1.12 QC CERTIFICATIONS

1.12.1 Contractor Quality Control Report Certification

Each Contractor Quality Control Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report".
1.12.2 Invoice Certification

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

1.12.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract".

1.13 DOCUMENTATION

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

1.13.1 Contractor Production Report

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

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

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

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

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

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

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

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

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

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

g. A list of equipment/material received each day that is
h. A list of construction and plant equipment on the work site including the number of hours used, idle and down for repair.

i. Include a "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site.

1.13.2 Contractor Quality Control Report

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

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

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

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

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

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

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

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

i. Contractor Quality Control Report certification.

1.13.3 Testing Plan and Log

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

1.13.4 Rework Items List

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

1.13.5 As-Built Drawings

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

1.13.6 Report Forms

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

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

b. Testing Plan and Log

c. Rework Items List

PART 2 PRODUCTS

Not used.
PART 3   EXECUTION

    Not used.

END OF SECTION
PART 1   GENERAL

1.1   TEMPORARY UTILITIES

1.1.1   Availability of Utility Services

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

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

1.1.2   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.

1.1.3   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.

1.1.4   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.

1.1.4.1 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.

1.1.4.2 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.

1.2 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.
1.2.1 Building and Site Storm Protection

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

1.2.1.1 Hurricane Conditions of Readiness

Unless directed otherwise, comply with:

a. Condition FIVE: Normal weather conditions are expected for the foreseeable future. No action is required.

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

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

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

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

1.3 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.

1.4 TEMPORARY BUILDINGS

Locate these where indicated.

1.4.1 Maintenance of Temporary Facilities

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

1.4.2 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

PART 3 EXECUTION

Not used.
PART 1   GENERAL

1.1 REFERENCES

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

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-S-16165 (Rev E) Shielding Harnesses, Shielding Items and Shielding Enclosures for Use in the Reduction of Interference from Engine Electrical Systems

MIL-STD-461 (Rev E) Control of Electromagnetic Interference Emissions and Susceptibility

MIL-STD-462 (Rev D; Notice 4) Electromagnetic Interference Characteristics

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

40 CFR 261 Identification and Listing of Hazardous Waste

40 CFR 262 Generators of Hazardous Waste

40 CFR 263 Transporters of Hazardous Waste

40 CFR 300 National Oil and Hazardous Substances Pollution Contingency Plan

49 CFR 171 General Information, Regulations, and Definitions

49 CFR 172 Hazardous Materials Tables and Hazardous Materials Communications Regulations

49 CFR 178 Shipping Container Specification

1.2 Contractor Liabilities for Environmental Protection

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

1.3.1  Sediment

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

1.3.2  Solid Waste

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

1.3.3  Sanitary Wastes

Wastes characterized as domestic sanitary sewage.

1.3.4  Rubbish

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

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

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

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

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

1.3.5  Debris

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

1.3.6  Chemical Wastes

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

1.3.7  Garbage

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

1.3.8  Hazardous Waste

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

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

1.3.10 Landscape Features

Trees, plants, shrubs, and ground cover.

1.3.11 Lead Acid Battery Electrolyte

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

1.3.12 Oily Waste

Petroleum products and bituminous materials.

1.3.13 Class I Ozone Depleting Substance (ODS)

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

1.4 SUBMITTALS

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

SD-11 Closeout Submittals

Solid waste disposal permit
Disposal permit for hazardous waste
Environmental training documentation
Permit to transport hazardous waste
Hazardous waste certification

1.4.1 Solid Waste Disposal Permit

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

1.4.2 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 ENVIRONMENTAL PROTECTION REGULATORY REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined in this Section. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including but not limited to water, air, solid waste, and noise pollution.

1.6 ADMINISTRATIVE REQUIREMENTS

1.6.1 Licenses and Permits

Obtain licenses and permits pursuant to "FAR 52.236-7, Permits and Responsibilities" except for those permits which will be obtained by the Contracting Officer.

For permits obtained by the Contracting Officer, whether or not required by the permit, perform inspections of the work in progress, and submit certifications to the applicable regulatory agency, via the Contracting Officer, that the work conforms to the contract and permit requirements. The inspections and certifications shall be provided through the services of a Professional Engineer, registered in the State where the work is being performed. As a part of the quality control plan, which is required to be submitted for approval by the quality control section, provide a subitem containing the name, P.E. registration number, address, and telephone number of the professional engineer(s) who will be performing the inspections and certifications for each permit listed above.

1.7 GENERAL ENVIRONMENTAL MANAGEMENT SYSTEM AND ENVIRONMENTAL AWARENESS

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

1.8 CAMP LEJEUNE SANITARY LANDFILL INFORMATION SHEET

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

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 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...
3.2 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during designated times.

3.3 RESTRICTIONS ON EQUIPMENT

3.3.1 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-16165 for internal combustion engines and MIL-STD-461 for other devices capable of producing radiated or conducted interference.

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

3.3.2 Radio Transmitter Restrictions

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

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up and separate solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean.

3.4.1 Disposal of Metal Paint Cans

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

3.4.2 Disposal of Rubbish and Debris

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

Metals shall be taken to the DRMO disposal area at Lot 203, as specified.
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>INFORMATION FOR DEPOSIT IN THE LANDFILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recyclable Cardboard</td>
<td>Breakdown corrugated cardboard boxes and deliver to the Base Recycling Center located at Building 982. If base personnel rejects the cardboard, take cardboard for off-base disposal.</td>
</tr>
<tr>
<td>Recyclable Wood Pallets</td>
<td>Deliver usable pallets to the Base Recycling Center located at Building 982. If base personnel rejects the pellets, take pallets for off-base disposal.</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>Organic matter will not be accepted at the landfill.</td>
</tr>
<tr>
<td>Metals</td>
<td>Metals will not be accepted at the landfill. Remove metals from each and every category before delivery to landfill. (Example: Remove hardware from doors and windows.)</td>
</tr>
<tr>
<td></td>
<td>Dispose of metal construction debris at Defense Reutilization Maintenance Office (DRMO).</td>
</tr>
<tr>
<td></td>
<td>Aluminum, brass, copper, lead, other metal, electrical wiring, cable (cut in 3 foot or less sections)</td>
</tr>
<tr>
<td>Treated &amp; Untreated Wood/Lumber</td>
<td>Treated &amp; untreated wood/lumber will not be accepted at the landfill.</td>
</tr>
<tr>
<td>Concrete</td>
<td>Concrete will not be accepted at the landfill.</td>
</tr>
<tr>
<td>Construction Material</td>
<td>Construction material should be managed and placed in a designated area. Area shall be kept clean of debris and all material removed at the end of the project.</td>
</tr>
<tr>
<td>Solid Waste</td>
<td>Separate each category of solid waste to enhance recycling.</td>
</tr>
<tr>
<td>Hazardous Material</td>
<td>This project involves demolition, renovation/repair and/or construction activities; therefore, hazardous material (such as paints, solvents, thinners, adhesives, etc) may be used during the execution of this project. The contractor</td>
</tr>
<tr>
<td>CATEGORY</td>
<td>INFORMATION FOR DEPOSIT IN THE LANDFILL</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------</td>
</tr>
</tbody>
</table>

will be required to appropriately manage the hazardous material and provide secondary containment.

**Solid Waste Report**

All solid waste generated and recycled will be weighed. Contractor will report the amount of solid waste disposed and recycled at the end of the project to EMD's Solid Waste Manager or the Pollution Prevention Manager via the OICC.

Tonnage information for all materials delivered to the Base Landfill is available at the Landfill Office. Submit a written request to the Landfill Manager, specifying the desired information.

**Recycling of Construction Debris**

Recyclable material (ex. Scrap metal/aluminum/brass/copper/lead, and other metal) may be recycled through Defense Utilization Maintenance Office (DRMO) using a 1348-1a with the following information (Proceeds for the sale of recyclable material are to go to the Qualified Recycling financial account - 17F3875 27RM 00767001 0 000027 3c 000000 06700198004). For additional information contact the Base Recycling Coordinator 910-451-4214.

**Electrical Equipment**

Before demolition or removal of electrical equipment from the Base - Contractor shall contact Base High Voltage Shop Supervisor at (910) 451-2790, to allow for first right of refusal of electrical equipment such as: ATS, transformers, and generators. Electrical equipment will not be accepted at landfill.
3.4.3 Disposal Off-Base

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

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

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

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTE

3.5.1 Hazardous Waste Generation

Handle generated hazardous waste in accordance with 40 CFR 262.

3.5.2 Hazardous Waste Storage

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

3.5.3 Spills of Oil and Hazardous Materials

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

3.5.4 Lead-Acid Batteries

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

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

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

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

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

3.5.6 Petroleum Products

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

3.6 DUST CONTROL

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

3.7 QUARANTINE FOR IMPORTED FIRE ANT (4/82)

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

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

   (1) Bulk soil

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

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

b. Authorization for movement of equipment outside the imported fire and regulated area shall be obtained from USDA, Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine
(PPQ), Box 28, Goldsboro, North Carolina, 27533-0028, Attn: Mr. William Scroggins or Mr. Frank Best, telephone (919) 735-1941. If Mr. Scroggins or Mr. Best are not available, contact Mr. Jim Kelley at (910) 815-4667, the supervisor's office in Wilmington. Requests for inspection shall be made sufficiently in advance of the date of movement to permit arrangements for the services of authorized inspectors. The equipment shall be prepared and assembled so that it may be readily inspected. Soil on or attached to equipment, supplies, and materials shall be removed by washing with water or such other means as necessary to accomplish complete removal. Resulting spoil shall be wasted as necessary and as directed.
ANNUAL REPORT OF PRODUCTS CONTAINING RECOVERED MATERIALS

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

Contract Number: __________________ Fiscal Year: _____________

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

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

APPENDIX A
<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Corrugated &amp; Fiberboard Boxes</td>
<td>Corrugated boxes refer to... &quot;boxes made of corrugated paperboard, which, in turn, is made from a fluted corrugating medium pasted to two flat sheets of paperboard (linerboard).&quot; Fiber or fiberboard boxes refer to... &quot;boxes made from containerboard, either solid fiber or corrugated paperboard (general term); or boxes made from solid paperboard of the same material throughout.&quot;</td>
</tr>
<tr>
<td>12. Folding Boxes and Cartons</td>
<td>This item refers to... &quot;a paperboard suitable for the manufacture of folding cartons.&quot;</td>
</tr>
<tr>
<td>13. Stationery, Office Papers, Envelopes, and Manifold Business Forms</td>
<td>This item is considered self-explanatory, however, if questions arise refer to 40 CFR 250.4 for definitions of any of these items.</td>
</tr>
<tr>
<td>14. Toilet Tissue, Paper Towels, Facial Tissue, Paper Napkins, Doilies, and Industrial Wipes</td>
<td>This item is considered self-explanatory, however, if questions arise refer to 40 CFR 250.4 for definitions of any of these items.</td>
</tr>
<tr>
<td>15. Brown Papers, and Coarse Papers</td>
<td>Brown papers refer to... &quot;papers usually made from unbleached kraft pulp and used for bags, sacks, wrapping paper, and so forth.&quot; Coarse papers refer to... &quot;papers used for industrial purposes, as distinguished from those used for cultural or sanitary purposes.&quot;</td>
</tr>
<tr>
<td>16. Other</td>
<td>Any other type of paper not included in any of the above categories.</td>
</tr>
</tbody>
</table>
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
   Maximo requirements
   Complete Submittal Package 2 CD/DVD's
   Equipment/product warranty tag

1.2  PROJECT RECORD DOCUMENTS

As-Built Drawings will be submitted as specified in 1.2.1 along with GIS Deliverables which will be created and submitted as specified in Section 01 78 30, DIGITAL DATA DELIVERABLES (GIS).

1.2.1  As-Built Drawings

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

1.2.2  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:
1.3 MAXIMO REQUIREMENTS

Submit maximo requirements.

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 shall be fully completed, including all testing, prior to contract completion date. In addition, all contract requirements shall be fully completed, including testing and inspection, prior to contract completion date, except as noted otherwise.

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 # 17-0007, Design Dental Treatment and Recovery Rooms at NH100."

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 --
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)


1.2   SUBMISSION OF OPERATION AND MAINTENANCE DATA

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

1.2.1   Package Quality

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

1.2.2   Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 3.

1.2.3   Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.
1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

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

1.3.1.1 Safety Precautions

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

1.3.1.2 Operator Prestart

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

1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures

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

1.3.1.4 Normal Operations

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

1.3.1.5 Emergency Operations

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

1.3.1.6 Operator Service Requirements

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

1.3.1.7 Environmental Conditions

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

1.3.2 Preventive Maintenance

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

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

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

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

c. A Lubrication Schedule showing service interval frequency.

1.3.2.2 Preventive Maintenance Plan and Schedule

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

1.3.2.3 Cleaning Recommendations

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

1.3.3 Corrective Maintenance (Repair)

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

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

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

1.3.3.2 Wiring Diagrams and Control Diagrams

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

1.3.3.3 Maintenance and Repair Procedures

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

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

1.3.3.5 Spare Parts and Supply Lists

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

1.3.4 Corrective Maintenance Work-Hours

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

1.3.5 Appendices

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

1.3.5.1 Product Submittal Data

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

1.3.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.3.5.3 O&M Submittal Data

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

1.3.5.4 Parts Identification

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

1.3.5.5 Warranty Information

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

1.3.5.6 Personnel Training Requirements

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

1.3.5.7 Testing Equipment and Special Tool Information

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

1.3.5.8 Testing and Performance Data

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

1.3.5.9 Contractor Information

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

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

Include Data Package 5 and the following for control systems:

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

b. Full as-built sequence of operations.

c. Copies of all checkout tests and calibrations performed by the Contractor (not Cx tests).

1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:
1.5.1 Data Package 1
   a. Safety precautions
   b. Cleaning recommendations
   c. Maintenance and repair procedures
   d. Warranty information
   e. Contractor information
   f. Spare parts and supply list

1.5.2 Data Package 2
   a. Safety precautions
   b. Normal operations
   c. Environmental conditions
   d. Lubrication data
   e. Preventive maintenance plan and schedule
   f. Cleaning recommendations
   g. Maintenance and repair procedures
   h. Removal and replacement instructions
   i. Spare parts and supply list
   j. Parts identification
   k. Warranty information
   l. Contractor information

1.5.3 Data Package 3
   a. Safety precautions
   b. Operator prestart
   c. Startup, shutdown, and post-shutdown procedures
   d. Normal operations
   e. Emergency operations
   f. Environmental conditions
   g. Lubrication data
   h. Preventive maintenance plan and schedule
   i. Cleaning recommendations
j. Troubleshooting guides and diagnostic techniques
k. Wiring diagrams and control diagrams
l. Maintenance and repair procedures
m. Removal and replacement instructions
n. Spare parts and supply list
o. Product submittal data
p. O&M submittal data
q. Parts identification
r. Warranty information
s. Testing equipment and special tool information
t. Testing and performance data
u. Contractor information

1.5.4 Data Package 4
a. Safety precautions
b. Operator prestart
c. Startup, shutdown, and post-shutdown procedures
d. Normal operations
e. Emergency operations
f. Operator service requirements
g. Environmental conditions
h. Lubrication data
i. Preventive maintenance plan and schedule
j. Cleaning recommendations
k. Troubleshooting guides and diagnostic techniques
l. Wiring diagrams and control diagrams
m. Maintenance and repair procedures
n. Removal and replacement instructions
o. Spare parts and supply list
p. Corrective maintenance man-hours
g. Product submittal data
r. O&M submittal data
s. Parts identification
t. Warranty information
u. Personnel training requirements
v. Testing equipment and special tool information
w. Testing and performance data
x. Contractor information

1.5.5 Data Package 5
a. Safety precautions
b. Operator prestart
c. Start-up, shutdown, and post-shutdown procedures
d. Normal operations
e. Environmental conditions
f. Preventive maintenance plan and schedule
g. Troubleshooting guides and diagnostic techniques
h. Wiring and control diagrams
i. Maintenance and repair procedures
j. Removal and replacement instructions
k. Spare parts and supply list
l. Product submittal data
m. Manufacturer's instructions
n. O&M submittal data
o. Parts identification
p. Testing equipment and special tool information
q. Warranty information
r. Testing and performance data
s. Contractor information

PART 2 PRODUCTS

Not Used
PART 3 EXECUTION

Not Used

-- End of Section --
PART 1   GENERAL

1.1   OBJECTIVE

The primary objective of this section is to provide detailed specifications for the collection and creation of Geographic Information System (GIS) data to ensure that all GIS data delivered is compatible and will add value to MCB Camp Lejeune's Installation Geospatial Information and Services (IGI&S) repository MCAS Cherry Point's Installation Geospatial Information and Services (IGI&S) repository.

1.1.1   Point of Contact for MCB Camp Lejeune

The Point of Contact (POC) for assistance in preparation of GIS deliverables is:

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

1.1.2   Point of Contact for MCAS Cherry Point

The Point of Contact (POC) for assistance in preparation of GIS deliverables is:

  MCAS Cherry Point Facilities Systems Service Office  
  GIS Section  
  chpt.facssoomb@usmc.mil

1.2   SUBMITTALS

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

  SD-11 Closeout Submittals  
  GIS Data Deliverables
1.3 COLLECTION AND CREATION OF GEOSPATIAL DATA

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

1.3.1 Technical Approach Plan

The Technical Approach Plan will contain the following:

- a. How features will be collected utilizing Global Positioning System (GPS) technology
- b. Which features, as specified in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES", will be located, GPS and created
- c. Source of attribute data
- d. Steps taken to create personal Geodatabase
- e. What GIS data will be delivered

1.3.2 Geospatial Data Collection

All questions regarding the Specification For Digital Data - GIS Deliverables shall be directed to MCB Camp Lejeune I&E, PWD GIS Section, MCAS Cherry Point I&E, PWD GIS Section, via the Government Project Manager. Specific Tasks are as follows:

- a. Contractor is responsible for the collection and creation of geospatial data for newly constructed or replaced utilities and infrastructure features that fall within the realm of this specification.
- b. Utilize GPS technology to locate and create GIS data and deliver only features that are relevant to this contract as specified in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES".
- c. Follow instructions in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES" which defines the following:
  1. GIS feature requirements.
  2. The manner in which the data will be collected in GPS.
  3. The manner in which GIS data will be created.
  4. Required Attribute data.
  5. Other instructions pertaining to GIS data.

1.3.3 Data Collection requirements

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

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

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

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

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

1. North American Datum (NAD) 1983 / UTM Zone 18N.

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

Sub-Foot requirements

1. All points shall be within + 12 inches

2. 95% accuracy rate for all points.

Survey Grade requirements

1. All points shall be within + 1 centimeter

2. 98% accuracy rate for all points

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

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

1.3.4 Geospatial Data Standards

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

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

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

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

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

1.3.5 Government Provided Geospatial Data

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

a. Request only GIS data that is pertinent to the contract. b. Request shall include the following information:

1. Contract Number and Title.

2. Contractor's Name, Address, Phone Number, Email and Point of Contact.

3. Summary of Project.


5. Expected Delivery date and features.

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

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

1.3.7 Collection of Geospatial data

a. 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.

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

c. Other infrastructure data, as identified in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES" shall be collected utilizing Sub-Foot GPS data collection methods.

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

1.3.8 Creation of Geospatial Data

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

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

Geodatabase Spatial Reference Properties shall include the following:


1.3.9 Data Format and Structure

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

a. Geospatial database table structure. b. Domain(s) configuration.

1. SDSFIE domains have been modified by MCB Camp Lejeune MCAS Cherry Point for operational purposes, it is the contractor's responsibility to request and utilize associated domain structure to ensure deliverable will load into the geodatabase.

c. Required attribute data as specified in paragraph "ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES" shall be obtained via contract specifications, plans and on as-built drawings.

1. Actual field data always supersedes drawings.

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

d. The GIS Data Deliverable does not replace the requirements for as-built drawings and or files for this contract.

1.3.10 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:


b. Polygons must not have slivers.

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

1. Features will be snapped to the appropriate item.

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

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

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

5. Polylines will be connected by nodes, i.e., fittings, valves, street connections and other natural occurring items within the data.

6. Demolished Lines are to be delivered in a feature data set, which appropriately reflects the utility.

1.3.11 Creation of Geographic Data Documentation (METADATA)

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

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

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

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

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

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

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

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

f. Definition of all codes used in the data fields.

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

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

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

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

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

b. Any offsets.

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

d. Source that was utilized for all required attributes.

e. Miscellaneous information that the contractor deems significant.

f. A Technical Point of Contact.

g. GPS data controller files.

1.3.13 GIS Submittals GIS Data Deliverables

Submit GIS data deliverables for review and approval by the MCB Camp Lejeune, MCAS Cherry Point Public Works GIS section.

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

1. Microsoft Office 2003 or higher upon verification.


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

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

d. Map submittals shall accompany each geospatial deliverable.

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

2. Data should be labeled and attributed per specification.

1.3.14 Ownership

All digital files, final hard-copy products, GPS raw data, source data acquired for this project, and related materials, including that furnished by the Government, shall become the property of MCB Camp Lejeune MCAS Cherry Point and will not be issued, distributed, or published by the Contractor.
1.3.15 Geographic Data Review

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

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

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

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

1.4 ATTRIBUTE DATA COLLECTION AND GPS REQUIREMENTS FOR SPECIFIC FEATURES

1.4.1 Infrastructure

GPS and collect attribute data as specified in the Collection and Creation of Geospatial data section for each feature listed with Sub-foot GPS accuracy and enter attribute data in compliance with the IGI&S database.

1.4.1.1 Structures:  CLJN.structure_existing_area  CPT.structure_existing_area

GPS Structure and collect the following attributes:

a. Subtype ID  
b. Building ID (building number)  
c. Structure Status  
d. Number of Levels  
e. Structure Use 2: Populate "Residential" if structure is a residential unit  
f. Building No (building number)  
g. Facility No (building number)  
h. Material  
i. Drawing Number  
j. Contract Number  
k. Date Acquired  
l. Data Source

1.4.1.2 Floor Outline:  CLJN.building.floor_outline (Polyline)  
CPT.building.floor_outline (Polyline)

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

Create feature and update the following attributes:

a. Building ID: (building number) 
b. Floor Name  
c. Drawing Number  
d. Contract Number:
e. Data Source

1.4.1.3 Slabs: CLJN.slab_area CPT.slab_area

GPS and collect the following attributes:

a. Structure ID: (Facility Number, if applicable)
b. Feature Description
c. Structure Material
d. Structure Condition
e. Built Date
f. Drawing Number
g. Contract Number
h. Data Source

1.4.2 Transportation

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

1.4.2.1 Road Centerline: CLJN.road_centerline CPT.road_centerline

GPS and collect the following attributes:

a. Category
b. Road Name
c. Paved: Paved/Unpaved
d. Date Acquired
e. Surface Type
f. Drawing Number
g. Contract Number
h. Data Source
i. Use

1.4.2.2 Road Area: CLJN.road_area CPT.road_area

GPS and collect the following attributes:

a. Road Segment
b. Paved
c. Divided: Yes/No
d. Number of Lanes
e. Date Acquired
f. Surface Type
g. Drawing Number
h. Contract Number
i. Data Source
j. Road Name

1.4.2.3 Curb line: CLJN.curb_line CPT.curb_line

GPS and collect the following attributes:

a. Curb Material
b. Description
c. Drawing Number
d. Contract Number
e. Data Source
1.4.2.4 Driveways:  CLJN.vehicle_driveway_area CPT.vehicle_driveway_area

GPS and collect the following attributes:

a. Paved or Unpaved  
b. Surface Material  
c. Date Acquired  
d. Drawing Number  
e. Contract Number  
f. Data Source  

1.4.2.5 Parking Lots:  CLJN.vehicle_parking_area CPT.vehicle_parking_area

GPS and collect the following attributes:

a. Parking ID: Building that is associated with this feature  
b. Paved Description  
c. Total Spaces  
d. Lighting  
e. Drawing Number  
f. Contract Number  
g. Data Source  
h. Surface Type  
i. Park Use  
j. Feature Name  
k. Striping  

1.4.2.6 Bridge:  CLJN.road_bridge_area CPT.road_bridge_area

GPS and collect the following attributes:

a. Bridge ID: Facility Number  
b. Number of Lanes  
c. Bridge Material Type  
d. Bridge Type  
e. Capacity  
f. Drawing Number  
g. Contract Number  
h. Data Source  

1.4.2.7 Pedestrian Sidewalks:  CLJN pedestrian_sidewalk_area  
CPT pedestrian_sidewalk_area

GPS and collect the following attributes:

a. Material  
b. Use  
c. Status  
d. Drawing Number  
e. Contract Number  
f. Data Source  
g. Date Acquired  

1.4.3 Improvement General

Attribute data requirements for Improvement General: The following attributes shall be collected for each infrastructure data class: Collect GPS data for all features listed with Sub-Foot accuracy.
1.4.3.1 Fence: CLJN.fence_line CPT.fence_line

GPS and collect the following attributes:

a. Material: Chain Link, Wood, etc.
b. Drawing Number
c. Contract Number
d. Data Source
e. RECLIN ID: Facility Number
f. Date Acquired

1.4.3.2 Gates: CLJN.gate_line CPT.gate_line

GPS and collect the following attributes:

a. Material
b. Feature Height
c. Drawing Number
d. Contract Number
e. Data Source
f. Gate ID: Facility ID
g. Date Acquired

1.4.3.3 Walls: CLJN.wall_line CPT.wall_line

GPS and collect the following attributes:

a. Material
b. Feature Height
c. Drawing Number
d. Contract Number
e. Data Source
f. Facility ID:
g. Date Acquired

1.4.3.4 Recreation Trails: CLJN.recreation_trail_centerline CPT.recreation_trail_centerline

GPS and collect the following attributes:

a. Subtype
b. Trail Description
c. Paved
d. Date Acquired
e. Drawing Number
f. Contract Number
g. Data Source
h. Trail ID
i. Trail Name

1.4.3.5 Miscellaneous Recreation Area
Playground: CLJN.playground_area CPT.playground_area

GPS and collect the following attributes:

a. Playground ID: Facility Number
b. Feature Description:
17-0007, Design Dental Treatment & Recovery Rooms at NH100

c. Drawing Number
d. Contract Number
e. Data Source

1.4.3.6 Swimming Pool: CLJN.swimming_pool_area CPT.swimming_pool_area

GPS and collect the following attributes:

a. Swimming Pool ID
b. Feature Description
c. Drawing Number
d. Contract Number
e. Data Source

1.4.3.7 Athletic Court: CLJN.athletic_court_area CPT.athletic_court_area

GPS and collect the following attributes:

a. Court ID
b. Court Type
c. Court Name
d. Date Acquired
e. Drawing Number
f. Contract Number
g. Data Source
h. Court Desc

1.4.3.8 Athletic Field: CLJN.athletic_field_area CPT.athletic_field_area

GPS Structures and collect the following attributes:

a. Field ID: Facility Number
b. Field Description
c. Date Acquired
d. Field Type
e. Contract Number
f. Drawing Number
g. Data Source
h. Field Name

1.4.4 Environmental Storage Tanks

Attribute data requirements for Environmental Storage Tanks: The following attributes shall be collected for each infrastructure data class: Collect GPS data for all features listed with Survey Grade accuracy.

1.4.4.1 Underground Storage Tanks: CLJN.underground_storage_tank_point CPT.underground_storage_tank_point

GPS and collect the following attributes:

a. ENVUST ID for Under Ground Storage Tank
b. Hazsite ID
c. EH Tank: Fuel Type
d. Facility Number
e. X Coordinates
f. Y Coordinates
g. Installation Date
17-0007, Design Dental Treatment & Recovery Rooms at NH100

h. Drawing Number
i. Contract Number
j. Data Source
k. Product D
l. Narrative
m. Serial Number
n. Tank Sys D
o. Status
p. Regulated
q. Volume
r. Volume U D

1.4.4.2 Aboveground Storage Tanks: CLJN.aboveground_storage_tank_site
CPT.aboveground_storage_tank_site

GPS and collect the following attributes:

a. ENVAST ID for Above Ground Storage Tank
b. Hazsite ID
c. EH Tank
d. Facility Number
e. X Coordinates
f. Y Coordinates
g. Installation Date
h. Drawing Number
i. Contract Number
j. Data Source
k. Product D
l. Narrative
m. Serial Number
n. Tank Sys D
o. Status
p. Regulated
q. Volume
r. Volume U D

1.4.5 Other Features

Other Infrastructure Features:

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

a. Subtype ID
b. Facility ID
c. Installation Date
d. Type/Description
e. Material
f. Drawing Number
g. Contract Number
h. Data Source
i. Date Acquired

1.4.6 Utilities

Locate underground utilities, GPS and collect attribute data as specified in the Collection and Creation of Geospatial data section for each feature.
listed with survey grade accuracy and enter attribute data in compliance with the IGI&S database.

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

1.4.7 Electrical Distribution

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

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

1.4.7.1 Demolished Electrical Lines: CLJN.demolished_cable_line
CPT.demolished_cable_line

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

a. Date
b. Drawing Number
c. Contract Number
d. Data Source

1.4.7.2 Electrical Lines: CLJN.electrical_cable_line
CPT.electrical_cable_line

Locate all Electrical Line data and collect the following attributes:

a. Subtype Identifier
b. Disposition
c. Subtype
d. Date Acquired
e. Conduit Size
f. Number of Phases
g. Insulation Material
h. Voltage
i. Size of Units
j. Substation ID
k. Circuit ID
l. Contract Number
m. Drawing Number
n. Data Source

1.4.7.3 Electrical Meter: CLJN.electrical_meter_point
CPT.electrical_meter_point

Locate, GPS and collect the following attributes:

a. Meter ID
b. Voltage
   c. KW Rate
   d. Number of Phases
   e. Model Number
   f. Date Acquired
   g. Facility ID
   h. Substation ID
   i. Circuit ID
   j. X Coordinates
   k. Y Coordinates
   l. Contract Number
   m. Drawing Number
   n. Data Source

1.4.7.4 Electrical Transformer:  CLJN.elect_transformr_bank_point
   CPT.elect_transformr_bank_point

   Locate, GPS and collect the following attributes:
       a. Subtype
       b. Date Installed
       c. Primary Voltage
       d. Secondary Voltage
       e. Number of Transformers
       f. Total KVA
       g. Substation ID
       h. Circuit ID
       i. KVA Information
       j. X Coordinates
       k. Y Coordinates
       l. Contract Number
       m. Drawing Number
       n. Data Source

1.4.7.5 Electrical Poles:   CLJN.utility_pole_tower_point
   CPT.utility_pole_tower_point

   Locate, GPS and collect the following attributes:
       a. Pole No
       b. Date Acquired
       c. Condition
       d. Type
       e. Material
       f. Pole Height
       g. Units of Measure
       h. Circuit ID
       i. X Coordinates
       j. Y Coordinates
       k. Contract Number
       l. Drawing Number
       m. Data Source

1.4.7.6 Exterior Lighting:  CLJN.exterior_lighting_point
   CPT.exterior_lighting_point

   Locate, GPS and collect the following attributes:
       a. Light Type
b. X Coordinates
c. Y Coordinates
d. Sensor
e. Watts
f. Voltage
g. Circuit ID
h. Contract Number
i. Drawing Number
j. Date Acquired
k. Data Source

1.4.7.7 Electrical Switch:  CLJN.electrical_switch_point
CPT.electrical_switch_point

Locate, GPS and collect the following attributes:

a. Subtype ID
b. Switch ID
c. Disposition
d. Installation Type
e. Switch Status
f. Voltage
g. Circuit ID
h. X Coordinates
i. Y Coordinates
j. Contract Number
k. Drawing Number
l. Data Source

1.4.7.8 Electrical Regulator:  CLJN.electrical_regulator_point
CPT.electrical_regulator_point

Locate, GPS and collect the following attributes:

a. Electrical Regulator ID
b. Disposition
c. Regulator Type
d. Regulator Use
e. Primary Volts
f. Secondary Volts
g. Number of Taps
h. KV Rate
i. Fuse Type
j. Manufacturer
k. Model Number
l. Circuit ID
m. X Coordinates
n. Y Coordinates
o. Contract Number
p. Drawing Number
q. Data Source

1.4.7.9 Electrical Manholes:  CLJN.electrical_junction_point
CPT.electrical_junction_point

Locate, GPS and collect the following attributes:

a. Subtype ID
b. Type
c. Number of Cables
d. Rim Elevation
e. Units of Elevation
f. Diameter
g. Diameter Units
h. X Coordinates
i. Y Coordinates
j. Substation ID
k. Contract Number
l. Drawing Number
m. Data Source

1.4.7.10 Electrical Generators:  CLJN.electrical_generator_point
CPT.electrical_generator_point

Locate, GPS and collect the following attributes:

a. Generator ID
b. Disposition
c. KVA
d. KW Rate
e. Voltage
f. Fuel Type
g. Manufacturer
h. Model
i. Serial Number
j. Circuit ID
k. X Coordinates
l. Y Coordinates
m. Facility ID
n. Contract Number
o. Drawing Number
p. Data Source

1.4.7.11 Substation:  CLJN.electrical_substation_point
CPT.electrical_substation_point

Locate, GPS and collect the following attributes:

a. Disposition
b. Capacity Rate
c. Capacity Measure
d. Voltage In
e. Voltage Out
f. Voltage
g. Number of transformer
h. Number of Spares
i. Number of Circuits
j. X Coordinates
k. Y Coordinates
l. Contract Number
m. Drawing Number
n. Data Source
o. Date Acquired

1.4.8 Heating and Cooling Systems

The following attributes shall be collected for each utility data class:
Collect GPS data for all features listed with survey grade accuracy.
1.4.8.1 Boiler:  CLJN.heat_cool_boiler_site CPT.heat_cool_boiler_site - If Required

Locate, GPS and collect the following attributes:

a. Date Acquired  
b. Disposition  
c. Type  
d. Capacity Heat  
e. Capacity Units  
f. Building ID: Facility Number where Boiler Resides  
g. X Coordinates  
h. Y Coordinates  
i. Contract Number  
j. Drawing Number  
k. Data Source

1.4.8.2 Fitting:  CLJN.heat_cool_fitting_point CPT.heat_cool_fitting_point

Georeference fitting data and collect the following attributes:

a. Subtype ID  
b. Date Acquired  
c. Material  
d. Size  
e. Units  
f. Line Diameter  
g. Diameter in Units  
h. X Coordinates  
i. Y Coordinates  
j. Contract Number  
k. Drawing Number  
l. Data Source

1.4.8.3 Valves:  CLJN.heat_cool_valve_point CPT.heat_cool_valve_point

Locate, GPS and collect the following attributes:

a. Date Acquired  
b. Size  
c. Size Units  
d. Elevation  
e. Elevation Units  
f. Project ID  
g. X Coordinates  
h. Y Coordinates  
i. Contract Number  
j. Drawing Number  
k. Data Source

1.4.8.4 Manholes:  CLJN.heat_cool_junction_point CPT.heat_cool_junction_point

Locate, GPS and collect the following attributes:

a. Subtype ID  
b. Number of Valves  
c. Number of Pipes
d. Width  
e. Length  
f. Diameter  
g. Units for Measurements  
h. Rim Elevations  
i. Ground Elevation  
j. Contract Number  
k. Drawing Number  
l. X Coordinates  
m. Y Coordinates  
n. Data Source

1.4.8.5 Chiller and Steam Line:  CLJN.heat_cool_line CPT.heat_cool_line

Locate, GPS and collect the following attributes:

a. Subtype ID: Condensate, Steam, Chiller  
b. Date Acquired  
c. Disposition  
d. Use: Underground, Overhead, Abandoned  
e. Material  
f. Size  
g. Length  
h. Size Units  
i. Ground Elevation  
j. Invert Elevation  
k. Units for Elevation  
l. Taped: Yes/No  
m. Building ID: If service line indicate Building  
n. Insulation Material  
o. Size of Insulation  
p. Size Units  
q. Contract Number  
r. Drawing Number  
s. Data Source

1.4.8.6 Demolished Steam Line:  CLJN.demolished_heat_cool_line CPT.demolished_heat_cool_line

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

a. Date  
b. Drawing Number  
c. Contract Number  
d. Data Source

1.4.9 Storm Sewer

1.4.9.1 Storm Sewer Lines:  CLJN.storm_sewer_line CPT.storm_sewer_line

Locate, GPS and collect the following attributes:

a. Date Acquired  
b. Use  
c. Type  
d. Material  
e. Size  
f. Diameter Units
g. Elevation
h. Elevation Units
i. Contract Number
j. Drawing Number
k. Data Source

1.4.9.2 Storm Sewer Drainage Line: CLJN.storm_sewer_open_drainage_line
CPT.storm_sewer_open_drainage_line

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Disposition
c. Contract Number
d. Drawing Number
e. Data Source

1.4.9.3 Manhole: CLJN.storm_sewer_junction_point
CPT.storm_sewer_junction_point

Locate, GPS and collect the following attributes:

a. Subtype
b. X Coordinates
c. Y Coordinates
d. Contract Number
e. Drawing Number
f. Data Source

1.4.9.4 Inlet: CLJN.storm_sewer_inlet_point CPT.storm_sewer_inlet_point

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

a. Subtype
b. Date Acquired
c. X Coordinates
d. Y Coordinates
e. Contract Number
f. Drawing Number
g. Data Source

1.4.9.5 Outfall: CLJN.storm_sewer_outfall_point
CPT.storm_sewer_outfall_point

Locate, GPS and collect the following attributes:

a. Subtype Domain
b. Date Acquired
c. Basin ID: Contractor shall utilize existing data and coordinate Basin_ID with data manager.
d. User Flag
e. X Coordinates
f. Y Coordinates
g. Contract Number
h. Drawing Number
i. Data Source
1.4.9.6 Ponds, Basins, & Treatment Measures:  
CLJN.storm_sewer_reservoir_areas CPT.storm_sewer_reservoir_areas  

Locate, GPS and collect the following attributes:

a. Date Acquired  
b. Project ID  
c. Permit ID: SW8 XXXXXX  
d. Size  
e. Facility ID  
f. Installation ID  
g. Drawing Number  
h. Data Source  

1.4.10 Wastewater Collection  

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

1.4.10.1 Wastewater Lines:  CLJN.wastewater_line CPT.wastewater_line  

Locate, GPS and collect the following attributes:

a. Pipe ID: By Manhole Number  
b. Date Acquired  
c. Use  
d. Material  
e. Size of Diameter  
f. Units  
g. Invert Elevation 1  
h. Invert Elevation 2  
i. Elevation Units  
j. Slope  
k. Slope Units  
l. Building ID: If building/facility service line indicate  
Building number that the line services  
m. Contract Number  
n. Drawing Number  
o. Data Source  
p. Subtype  

1.4.10.2 Demolished Lines:  CLJN.demolished_wastewater_line  
CPT.demolished_wastewater_line  

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

a. Date  
b. Drawing Number  
c. Contract Number  
d. Data Source  

1.4.10.3 Fitting:  CLJN.wastewater_fitting_point  
CPT.wastewater_fitting_point  

Georeference Fitting data and collect the following attributes:

a. Subtype ID  
b. Date Acquired
1.4.10.4 Valves: CLJN.wastewater_valve_point CPT.wastewater_valve_point

Locate, GPS and collect the following attributes:

a. Valves ID: Manhole Number associated with valve
b. Date Acquired
c. Valve Style/Group
d. Valve Use
e. Size in Diameter
f. Valve Elevation
g. Units of Elevation
h. X Coordinates
i. Y Coordinates
j. Manhole ID
k. Contract Number
l. Drawing Number
m. Data Source

1.4.10.5 Manholes: CLJN.wastewater_junction_point CPT.wastewater_junction_point

Locate, GPS and collect the following attributes:

a. Subtype ID: Manhole
b. Manhole ID: Each section of the base has a unique numbering system for manholes; please see Public Work, GIS office for details.
c. Use
d. Type
e. Material
f. Number of Pipes in manhole
g. Rim Elevation
h. Invert Elevation
i. Elevation Units
j. Manhole Diameter
k. Diameter Units
l. X Coordinates
m. Y Coordinates
n. Date Acquired
o. Contract Number
p. Drawing Number
q. Data Source

1.4.10.6 Vent: CLJN.wastewater_vent_point CPT.wastewater_vent_point

Locate, GPS and collect the following attributes:

a. Date Acquired
17-0007, Design Dental Treatment & Recovery Rooms at NH100

b. Valve Style/Type
c. Use
d. Size in Diameter
e. Units in Diameters
f. X Coordinates
g. Y Coordinates
h. Subtype ID
i. Containment Type
j. Contract Number
k. Drawing Number
l. Data Source

1.4.10.7 Pump Stations: CLJN.wastewater_pump_point
CPT.wastewater_pump_point

Locate, GPS and collect the following attributes:

a. Pump Station ID: Facility Number
b. Date Acquired
c. Use
d. Type
e. Cooling Method
f. Rated Outflow Volume
g. Flow Unit Measure Code
h. X Coordinates
i. Y Coordinates
j. Number of Pumps
k. Contract Number
l. Drawing Number
m. Data Source

1.4.10.8 Oil Water Separators: CLJN.wstewat_oil_wat_separatr_point
CPT.wstewat_oil_wat_separatr_point

Locate, GPS and collect the following attributes:

a. Oil Water Separator ID: Facility Number
b. Date Acquired
c. Type
d. Separator Process
e. Separator Volume
f. Volume Units of Measure
g. Grit Chamber
h. Flow Capacity
i. Flow Units
j. X Coordinates
k. Y Coordinates
l. Contract Number
m. Drawing Number
n. Data Source

1.4.10.9 Grease Trap: CLJN.wastewater_grease_trap_point
CPT.wastewater_grease_trap_point

Locate, GPS and collect the following attributes:

a. Trap Identification: Nearest Facility use Number
b. Type of Trap
c. Material
1.4.10.10 Septic Tank:  CLJN.wastewater_septic_tank_point
CPT.wastewater_septic_tank_point

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Disposition
c. Tank capacity
d. Contract Number
e. Drawing Number
f. Data Source

1.4.11 Water Distribution

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

1.4.11.1 Water Lines:  CLJN.water_line CPT.water_line

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Use of Line
c. Disposition
d. Material
e. Size
f. Size Units
g. Pipe Length
h. Unit for Length Dimension
i. Taped
j. Source
k. All Invert Elevation information
l. Units of Measures
m. Contract Number
n. Drawing Number
o. Data Source
p. Subtype

1.4.11.2 Demolished Line:  CLJN.demolished_water_line
CPT.demolished_water_line

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

a. Date
b. Drawing Number
c. Contract Number
d. Data Source

1.4.11.3 Water Meter: CLJN.water_meter_point CPT.water_meter_point

Locate, GPS and collect the following attributes:

a. Meter ID
b. Date Acquired
c. Type
d. Installation Type
e. Building ID: Facility Number - If attached to Building
f. X Coordinates
g. Y Coordinates
h. Contract Number
i. Drawing Number
j. Data Source

1.4.11.4 Water Tank: CLJN.water_tank_point CPT.water_tank_point

Locate, GPS and collect the following attributes:

a. Tank ID: Facility Number
b. Date Acquired
c. Disposition
d. Tank Use
e. Tank Status
f. Tank Width
g. Tank Length
h. Tank Diameter
i. Ground Elevation
j. Tank Volume
k. Unit of measure in Gallons
l. Top Elevation
m. Overflow Elevation
n. Pressure High
o. Pressure Low
p. X Coordinates
q. Y Coordinates
r. Contract Number
s. Drawing Number
t. Data Source

1.4.11.5 Water Valve: CLJN.water_valve_point CPT.water_valve_point

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Disposition
c. Use: Valve
d. Valve Status
e. Size
f. Size Units
g. Valve Elevation
h. Ground Elevation
i. Size Unit
j. Manhole ID
k. X Coordinates
l. Y Coordinates
1.4.11.6 Water Fitting: CLJN.water_fitting_point CPT.water_fitting_point

Georeference and collect the following attributes:

a. Date Acquired
b. Disposition
c. Type
d. Material
e. Size
f. Size Units
g. Contract Number
h. Drawing Number
i. Data Source

1.4.11.7 Water Well: CLJN.potable_water_well_point CPT.potable_water_well_point

Locate, GPS and collect the following attributes:

a. Well ID: Facility Number
b. Use: Potable, Non-Potable
c. Well Status
d. Station ID: Building Number
e. Date Acquired
f. X Coordinates
g. Y Coordinates
h. Tank ID: Water Tank Facility Number for which well feeds
i. Contract Number
j. Drawing Number
k. Data Source

1.4.11.8 Water Manhole: CLJN.water_junction_point CPT.water_junction_point

Locate, GPS and collect the following attributes:

a. Subtype
b. Use
c. Type
d. Material
e. Number Valves
f. Number Pipes
g. Installation Date
h. Size Diameter
i. Unit Diameter
j. X Coordinates
k. Y Coordinates
l. Contract Number
m. Drawing Number
n. Data Source

1.4.11.9 Fire Hydrant: CLJN.water_fire_connection_point CPT.water_fire_connection_point

Locate, GPS and collect the following attributes:
a. Hydrant ID: TBD by Fire Department
b. Date Acquired
c. Disposition
d. Valve Connector Type
e. Valve Size
f. Inlet Diameter
g. Units of measure
h. X Coordinates
i. Y Coordinates
j. Contract Number
k. Drawing Number
l. Data Source

1.4.11.10 NON Potable Water Well: CLJN.non-potable_water_well_point
CPT.non-potable_water_well_point

Locate, GPS and collect the following attributes:

a. Well ID: Facility Number
b. Use
c. Well Status
d. Station ID: Building Number
e. Date Acquired
f. X Coordinates
g. Y Coordinates
h. Tank ID: Water Tank Facility Number
i. Contract Number
j. Drawing Number
k. Data Source

1.4.11.11 Other Utility Features

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

Geospatial data delivery does not replace as-built requirements. All newly constructed features require GIS deliverables.

a. Facility ID
b. Installation Date
c. Type/Description
d. Material
e. Size
f. Drawing Number
g. Contract Number
h. Data Source

1.4.12 Alternative Energy

1.4.12.1 Geothermal Wells CLJN.geothermal wells CPT.geothermal wells

Locate, GPS and collect the following attributes:

a. Bldg_ID
b. X Coordinates
c. Y Coordinates
d. Well_ID
e. Depth
17-0007, Design Dental Treatment & Recovery Rooms at NH100

f. Units
g. Status
h. Bentonite
i. Casing
j. Construction
k. Installation Contract #
l. Contract Number
m. Drawing Number
n. Data Source

1.4.12.2 Water Wells associated with Geothermal Pumping System   CLJN.water wells associated with geothermal pumping system CPT.water wells associated with geothermal pumping system

Locate, GPS and collect the following attributes:

a. Well ID: Facility Number
b. Use:
c. Well Status
d. Station ID: Building Number
e. Date Acquired:
f. X Coordinates
g. Y Coordinates
h. Tank ID: Water Tank Facility Number
i. Contract Number
j. Drawing Number
k. Data Source:

1.4.12.3 Water Lines associated with Geothermal Pumping System (Hybrid Geothermal Loop)   CLJN.water lines associated with geothermal pumping system CPT.water lines associated with geothermal pumping system

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Use of Line
c. Disposition
d. Material
e. Size
f. Size Units
g. Pipe Length
h. Unit for Length Dimension
i. Taped
j. Source
k. All Invert Elevation Information
l. Units of Measures
m. Contract Number
n. Drawing Number
o. Data Source
p. Subtype

1.4.12.4 Water Valve associated with Geothermal Pumping System   CLJN.water valve associated with geothermal pumping system CPT.water valve associated with geothermal pumping system

Locate, GPS and collect the following attributes:

a. Date Acquired:
b. Disposition
c. Use: Valve
d. Valve Status
e. Size
f. Size Units
g. Valve Elevation
h. Ground Elevation
i. Size Unit
j. Manhole ID
k. X Coordinates
l. Y Coordinates
m. Contract Number
n. Drawing Number
o. Data Source
p. Subtype

1.4.12.5 Water Fitting associated with Geothermal Pumping System CLJN.water fitting associated with geothermal pumping system CPT.water fitting associated with geothermal pumping system

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Disposition
c. Type
d. Material
e. Size
f. Size Units
g. Contract Number
h. Drawing Number
i. Data Source

1.4.13 Natural Gas Line

Locate, GPS and collect the following attributes:

a. Date Acquired
b. Disposition
c. Material
d. Size
e. Size Units
f. Pipe Length
g. Taped
h. Source
i. All Invert Elevation Information
j. Units of Measures
k. Contract Number
l. Drawing Number
m. Data Source
n. Subtype

1.4.13.1 Natural Gas Valve

Locate, GPS and collect the following attributes:

a. Date Acquired:
b. Use:
c. Size
d. Size Units
e. Valve Elevation
f. Ground Elevation
g. Size Unit
h. X Coordinates
i. Y Coordinates
j. Contract Number Drawing Number
k. Data Source
l. Subtype

1.4.12 Non-Compliance

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

Geospatial data delivery does not replace as-built requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --
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 A10.6 (1990; R 1998) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2008; Change 1-2010; Change 3-2010; Errata 1-2010) Safety and Health Requirements Manual

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

40 CFR 61-SUBPART M National Emission Standard for Asbestos

1.2   GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the station daily; 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. Materials that cannot be removed daily shall be stored 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. **Contractor shall coordinate work schedule phasing with Government.**

1.3   SUBMITTALS

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

SD-07 Certificates

Demolition plan

Proposed demolition and removal procedures for approval before work is started.

SD-11 Closeout Submittals

Receipts
Receipts or bills of laden, as specified.

1.4   REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ANSI A10.6.

1.4.1   Notifications

1.4.1.1   General Requirements

Furnish timely notification of demolition and renovation projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61-SUBPART M. Notify the State's environmental protection agency and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M.

1.4.2   Receipts

Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped to the Defense Depot, Richmond, Virginia.

1.5   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.

1.6   PROTECTION

1.6.1   Traffic Control Signs

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

1.6.2   Existing Work

Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing work 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, the location and extent of cracks and other damage and description of surface conditions that exist prior to before starting work.

1.6.3   Items to Remain in Place

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

1.6.4 Existing Construction

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.

1.6.5 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.6.6 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition 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.

1.6.7 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, 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, or demolition work performed under this contract.

1.6.8 Protection of Personnel

Before, during and after the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition 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.
1.7 BURNING

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

1.8 RELOCATIONS

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

1.9 REQUIRED DATA

The Demolition plan shall include procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Provide procedures for safe conduct of the work in accordance with EM 385-1-1.

1.10 ENVIRONMENTAL PROTECTION

Comply with the Environmental Protection Agency requirements specified.

1.11 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.12 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the following schedule: Coordinate with Contracting Officer.

PART 2 PRODUCTS

2.1 FILL MATERIAL

Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition of structures.

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 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 uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer.

3.1.2 Paving and Slabs

Remove concrete slabs as indicated. Provide neat sawcuts at limits of pavement removal as indicated.

3.1.3 Concrete

Saw concrete along straight lines. 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.

3.1.4 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. 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.

3.1.5 Mechanical Equipment and Fixtures

Disconnect mechanical hardware at the nearest connection to existing services to remain, unless otherwise noted. Mechanical equipment and fixtures must be disconnected at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated storage area as directed by the Contracting Officer. Do not remove equipment until approved.

3.1.5.1 Piping

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve.
shall be attached to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Wrap sprinkler heads individually in plastic bags before boxing. Classify piping not designated for salvage, or not reusable, as scrap metal.

3.1.5.2 Ducts
Classify removed duct work as scrap metal.

3.2 DISPOSITION OF MATERIAL

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

3.2.2 Reuse of Materials and Equipment
Remove and store materials and equipment indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.2.3 Salvaged Materials and Equipment
Remove materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site, as directed within 10 miles of the work site.

   a. Salvage items and material to the maximum extent possible.

   b. Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

   c. Salvaged items to remain the property of the Government shall be removed in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents.

3.3 CLEANUP
Debris and rubbish shall be removed from basement and similar excavations.
Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.4 DISPOSAL OF REMOVED MATERIALS

3.4.1 Sub Title

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations.

3.4.2 Burning on Government Property

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

3.4.3 Removal from Government Property

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

3.5 REUSE OF SALVAGED ITEMS

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

-- End of Section --
SECTION 03 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 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 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

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 3,000 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 318/318E. 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
Joint 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 109, 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.
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)


AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)


APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA F405L    (1999) Performance Rated Panels

ASME INTERNATIONAL (ASME)

ASME B18.2.1  (1996; Addenda A 1999; Errata 2003; R 2005) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2  (1987; R 2005) 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
17-0007, Design Dental Treatment & Recovery Rooms at NH100

ASTM INTERNATIONAL (ASTM)

ASTM A 307  (2007b) Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength


ASTM C 79/C 79M  (2004a) Treated Core and Nontreated Core Gypsum Sheathing Board


FM GLOBAL (FM)

FM DS 1-49  (2000) Perimeter Flashing

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)


NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)


REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)

RIS Grade Use  (1998) Redwood Lumber Grades and Uses

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)


SOUTHERN PINE INSPECTION BUREAU (SPIB)

Pine Lumber

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923  (Rev A; Notice 1) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)

CID A-A-1924  (Rev A; Notice 1) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors)

CID A-A-1925  (Rev A; Notice 1) Shield Expansion (Nail Anchors)

FS FF-B-588  (Rev E) Bolt, Toggle; and Expansion Sleeve, Screw

FS FF-T-1813  (Basic) Tack

FS UU-B-790  (Rev A) Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)


WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)


1.2 SUBMITTALS

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

SD-02 Shop Drawings

Nailers and Nailing Strips

SD-03 Product Data

Oriented Strand Board

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.
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. 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 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.

1.5 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 boards - 19 percent maximum

   b. Timbers 5 inches and thicker - 25 percent maximum

1.7 QUALITY ASSURANCE

1.7.1 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   LUMBER

2.1.1   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.

<table>
<thead>
<tr>
<th>Grading Rules</th>
<th>Species</th>
<th>Framing</th>
<th>Board Lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWPA G-5</td>
<td>Aspen</td>
<td>All Species:</td>
<td>All Species:</td>
</tr>
<tr>
<td>standard grading rules</td>
<td>Douglas Fir-Larch</td>
<td>Standard Light Framing or No.</td>
<td>No. 3 Common</td>
</tr>
<tr>
<td></td>
<td>Douglas Fir South</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engelmann Spruce</td>
<td>3 Structural Light Framing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Lodgepole Pine</td>
<td>(Stud Grade for 2x4 nominal size, 10 feet and shorter)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engleman Spruce</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mountain Hemlock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPIB 1003</td>
<td>Douglas Fir-Larch</td>
<td>All Species:</td>
<td>All Species:</td>
</tr>
<tr>
<td>standard grading rules</td>
<td>Hem-Fir</td>
<td>Standard Light Framing or No.</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td>Mountain Hemlock</td>
<td>3 Structural</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sitka Spruce</td>
<td>Light Framing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Western Cedars</td>
<td>(Stud Grade for 2x4 nominal size, 10 feet and shorter)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Western Hemlock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCMA Spec</td>
<td>Southern Pine</td>
<td>Standard Light Framing or No.</td>
<td>No. 2 Boards</td>
</tr>
<tr>
<td>standard</td>
<td></td>
<td>3 Structural</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Framing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Stud Grade for 2x4 nominal size, 10 feet and shorter)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cypress</td>
<td>No. 2 Common</td>
<td>No. 2 Common</td>
</tr>
</tbody>
</table>
### Table of Grades for Framing and Board Lumber

<table>
<thead>
<tr>
<th>Grading Rules specifications</th>
<th>Species</th>
<th>Framing</th>
<th>Board Lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>NELMA Grading Rules standard grading rules</td>
<td>Balsam Fir</td>
<td>All Species:</td>
<td>All Species:</td>
</tr>
<tr>
<td></td>
<td>Eastern Hemlock</td>
<td>Standard Light</td>
<td>No. 3 Common</td>
</tr>
<tr>
<td></td>
<td>-Tamarack</td>
<td>Framing or No. 3 Structural</td>
<td>except Standard for</td>
</tr>
<tr>
<td></td>
<td>Eastern Spruce</td>
<td>Light Framing</td>
<td>Eastern White</td>
</tr>
<tr>
<td></td>
<td>Eastern White Pine</td>
<td>(Stud Grade for 2x4 nominal size, 10 feet and</td>
<td>Northern Pine</td>
</tr>
<tr>
<td></td>
<td>Northern Pine</td>
<td>shorter)</td>
<td>Pine</td>
</tr>
<tr>
<td></td>
<td>Northern Pine</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cedar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIS Grade Use standard specifications</td>
<td>Redwood</td>
<td>All Species:</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard Light</td>
<td>Heart</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Framing or No. 3 Structural</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Framing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Stud Grade for 2x4 nominal size, 10 feet and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>shorter)</td>
<td></td>
</tr>
<tr>
<td>NHLA Rules rules for the measurement and inspection of hardwood and cypress lumber</td>
<td>Cypress</td>
<td>No. 2 Dimension</td>
<td>No. 2 Common</td>
</tr>
</tbody>
</table>

2.2 **PLYWOOD, STRUCTURAL-USE, AND ORIENTED STRAND BOARD (OSB) PANELS**

**APA PS 1, APA PS 2, APA E445S, and APA F405L** respectively.

2.2.1 **Subflooring**

2.2.1.1 **Plywood**

C-D Grade, Exposure 1 durability classification, Span rating of 24/16 or greater.

2.3 **OTHER MATERIALS**

2.3.1 **Gypsum Wall Sheathing**

ASTM C 79/C 79M, 5/8 inch thick; 4 feet wide with square edge for supports 16 inches o.c. with or without corner bracing of framing; 2 feet wide with V-tongue and groove (T&G) edge for supports 16 inches o.c. with corner bracing of framing.
2.3.2 Building Paper

FS UU-B-790, Type I, Grade D, Style 1.

2.3.3 Miscellaneous Wood Members

2.3.3.1 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:

<table>
<thead>
<tr>
<th>Member</th>
<th>Size (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging</td>
<td>1 x 3 or 1 x 4 for use between members</td>
</tr>
<tr>
<td></td>
<td>2 x 12 and smaller; 2 x 4 for use between members larger than 2 x 12.</td>
</tr>
<tr>
<td>Corner bracing</td>
<td>1 x 4.</td>
</tr>
<tr>
<td>Furring</td>
<td>1 x 2</td>
</tr>
<tr>
<td>Grounds</td>
<td>Plaster thickness by 1-1/2.</td>
</tr>
<tr>
<td>Nailing strips</td>
<td>1 x 3 or 1 x 4 when used as shingle base or interior finish, otherwise</td>
</tr>
<tr>
<td></td>
<td>2 inch stock.</td>
</tr>
</tbody>
</table>

2.4 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.

2.4.1 Bolts, Nuts, Studs, and Rivets

ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M, ASME B18.2.2, and ASTM A 687.

2.4.2 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

2.4.3 Expansion Shields


2.4.4 Lag Screws and Lag Bolts

ASME B18.2.1.
2.4.5 Toggle Bolts  
FS FF-B-598.

2.4.6 Wood Screws  
ASME B18.6.1.

2.4.7 Nails

ASTM F 547, size and type best suited for purpose. 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.

2.4.8 Wire Nails  
ASTM F 1667.

2.4.9 Tacks  
FS FF-T-1813.

2.4.10 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.

2.4.11 Door Buck Anchors

Metal anchors, 1/8 by 1 1/4 inch steel, 12 inches long, with ends bent 2 inches, except as indicated otherwise. 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.

2.4.12 Metal Bridging

Where not indicated or specified otherwise, No. 16 U.S. Standard gage, cadmium-plated or zinc-coated.

2.4.13 Toothed Rings and Shear Plates  
AF&PA T101.

2.4.14 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.

2.4.15 Panel Edge Clips

Extruded aluminum or galvanized steel, H-shaped clips to prevent differential deflection of roof sheathing.

2.5 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 125 g 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 670 g 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.

3.1.1 Wood Sheathing

Sheathing end joints shall be made over framing members and so alternated that there will be at least two boards between joints on the same support. Each board shall bear on at least three supports.

3.1.2 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.

3.1.3 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.

3.2 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 DS 1-49.

3.2.2 Temporary Centering, Bracing, and Shoring

Provide for the support and protection of masonry work. Forms and centering for cast-in-place concrete work are specified in Section 03 30 50 CAST-IN-PLACE CONCRETE.

-- End of Section --
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 E2174 (2010a; E 2011) Standard Practice for On-Site Inspection of Installed Fire Stops


FM GLOBAL (FM)


FM AS 4991 (2001) Approval of Firestop Contractors

UNDERWRITERS LABORATORIES (UL)

UL 1479 (2003; Reprint Oct 2012) Fire Tests of Through-Penetration Firestops
1.2 SYSTEM DESCRIPTION

(Fire rated wall partitions are not required for this renovation. If new or existing penetrations of an existing fire wall partition are encountered, follow guidelines in this section)

1.2.1 General

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.

1.2.2 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.

1.3 SUBMITTALS

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

| SD-02 Shop Drawings |
| Firestopping Materials |
| SD-07 Certificates |
Firestopping Materials.

Installer Qualifications

Inspection

1.4 QUALITY ASSURANCE

1.4.1 Installer

Engage an experienced Installer who is:

a. FM Research approved in accordance with FM AS 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. 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 written certification of training, and retain proof of certification for duration of firestop installation.

1.5 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. Remove damaged or deteriorated materials from the site.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Provide firestopping materials, supplied from a single domestic manufacturer, consisting of commercially manufactured, asbestos-free, nontoxic, water-based, noncombustible products FM APP GUIDE approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

2.1.1 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.

2.1.2 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. Firestop material must be free from Ethylene Glycol, PCB, MEK, or other types of hazardous chemicals.
2.1.3 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.

2.1.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph SYSTEM DESCRIPTION, shall provide "F", "T" and "L" fire resistance ratings in accordance with ASTM E814 or UL 1479. Fire resistance ratings shall be as follows:

a. Penetrations of Fire Resistance Rated Walls and Partitions: F Rating = (1) hour or Rating of wall or partition being penetrated.

2.1.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph SYSTEM DESCRIPTION, and gaps such as those between floor slabs or roof decks 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 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.

2.1.4 Material Performance

All firestop materials are subject to these minimum standards of performance.

a. Firestop material shall be capable of installation at temperatures of 35 to 120 degrees F.

b. Material must be able to be frozen, thawed and still maintain manufacturer approval for installation.

c. Firestop material must convey a manufacturer's written warranty guaranteeing the performance of the material for the sustainable lifetime of the structure.

d. Material must maintain a shelf life of no less than two years from date of manufacturing.

e. Acceptable firestop cast-in-place devices are factory assembled intumescent lined round or oval plastic cylinders capable of protecting plastic, metallic, cable, and blank openings through the cast-in-place device equal to the fire-resistance rating of the floor.
PART 3   EXECUTION

3.1   PREPARATION

Areas to receive firestopping shall 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 shall 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 shall be capable of supporting the same load as the floor is designed to support or shall 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 03 00 BASIC MECHANICAL MATERIALS AND METHODS. 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. 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.

3.3 INSPECTION

3.3.1 General Requirements

For Navy projects, install one of each type of penetration and have it inspected and accepted by the Facilities Division, Naval Facilities Engineering Command, Fire Protection Engineer prior to the installation of the remainder of the penetrations. For all projects, the remainder of the firestopped areas shall not be covered or enclosed until inspection is complete and approved. The manufacturer's representative shall 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.

3.3.2 Inspection Standards

Inspect all firestopping in accordance to ASTM standards for firestop inspection, and document inspection results to be submitted to GC, Architect and Owner.

a. ASTM E2393

b. ASTM E2174

-- End of Section --
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 734 (2006) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering

ASTM C 834 (2005) Latex Sealants

ASTM C 919 (2008) Use of Sealants in Acoustical Applications


ASTM D 217 (2002; R 2008) Cone Penetration of Lubricating Grease


1.2   SUBMITTALS

Submit the following 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). Provide a copy of the Material Safety Data Sheet for each solvent, primer or sealant material.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to
Apply sealant when the ambient temperature is between 40 and 90 degrees F.

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. Label elastomeric sealant containers 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.

Guarantee sealant joint against failure of sealant and against water penetration through each sealed joint for five years.

Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>As selected</td>
</tr>
<tr>
<td>b. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.</td>
<td>Match adjacent</td>
</tr>
<tr>
<td>c. Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.</td>
<td>Match adjacent</td>
</tr>
</tbody>
</table>
d. Joints between edge members for acoustical tile and adjoining vertical surfaces.

LOCATION                          COLOR

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 occurring where substrates change.

h. Behind escutcheon plates at valve pipe penetrations and showerheads in showers.

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. Provide location(s) and color(s) of sealant as follows:

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.

b. Joints between new and existing exterior masonry walls.

c. Masonry joints where shelf angles occur.

d. Expansion and control joints.

e. Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.

f. Voids where items pass through exterior walls.

g. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.

h. Metal-to-metal joints where sealant is indicated or specified.
i. Joints between ends of gravel stops, fascias, copings, and adjacent walls.

2.1.3 Floor Joint Sealant

**ASTM C 920**, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Seats of metal thresholds for exterior doors.</td>
<td>As selected</td>
</tr>
<tr>
<td>b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.</td>
<td>As selected</td>
</tr>
</tbody>
</table>

2.1.4 Acoustical Sealant

Rubber or polymer-based acoustical sealant conforming to **ASTM C 919** must have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with **ASTM E84**. Acoustical sealant must have a consistency of 250 to 310 when tested in accordance with **ASTM D 217**, and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in **ASTM C 734**, and must be non-staining.

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. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Make backstop material compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.5 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean surfaces from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean
cloths. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer 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, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity.

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:

<table>
<thead>
<tr>
<th>JOINT WIDTH</th>
<th>JOINT DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>Maximum</td>
</tr>
</tbody>
</table>

For metal, glass, or other nonporous surfaces:

- 1/4 inch (minimum) over 1/4 inch
  - 1/4 inch
  - 1/4 inch

For wood, concrete, masonry, stone:

- 1/4 inch (minimum) Over 1/4 inch to 1/2 inch
  - 1/4 inch
  - Equal to width

- Over 1/2 inch to 2 inch
  - 1/2 inch
  - 5/8 inch
  - (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 is not required on metal surfaces.

3.3.2 Masking Tape

Place masking tape on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Remove masking tape within 10 minutes after joint has been filled and tooled.

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 printed 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. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer 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 --
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 DAF45 (2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 800 (2010) Voluntary Specifications and Test Methods for Sealants


ASTM INTERNATIONAL (ASTM)


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

Aluminum sliding glass doors

Submit drawings for aluminum sliding glass doors and accessories that indicate elevations of each door type, full size sections, thickness, nominal gages of metal, fastenings, proposed method of installation and anchoring, the size and spacing and method of glazing, details of operating hardware, method and material for weatherstripping, type of finish, and screen details.

SD-03 Product Data

Aluminum sliding glass doors
Hardware

Glazing

Finish

Describe each type of aluminum sliding glass door, hardware, fastener, accessory, screen, and finish. Include descriptive literature, detailed specifications, and performance test data.

SD-04 Samples

Finish

Submit color chart of factory color coatings when factory-finished color coating is to be provided.

1.3 TEMPORARY PROTECTIVE COVERING

Prior to shipment from the factory, finished surfaces of aluminum sliding glass doors shall receive a protective covering of waterproof tape, strippable plastic, or cardboard to protect against discoloration and surface damage that may occur during transportation, storage, and construction activities. Also, no coatings or lacquers shall be applied to surfaces to which caulking and glazing compounds must adhere. Covering shall be readily removable after installation.

1.4 DELIVERY AND STORAGE

Inspect aluminum sliding glass doors, hardware and accessories, for damage and unload and store doors upright on platforms in accessible spaces with a minimum of handling. The storage spaces shall be dry, adequately ventilated, free from heavy dust and not subject to combustion products, sources of water or other conditions that could damage the door. Storage spaces shall have easy access for inspection and handling of doors.

PART 2 PRODUCTS

2.1 ALUMINUM SLIDING GLASS DOORS

Design and construct with sliding panels and fixed panels in the sizes and arrangements indicated and conforming to AAMA/WDMA/CSA 101/I.S.2/A440 for Type 72" x 84". Sliding door glazing shall be set in aluminum frames and roller assemblies of sufficient strength to withstand lateral live stresses and static load or weight requirements.

2.1.1 Hardware

Sliding door panel shall have a manually operated adjustable latch operable by latch handle or slide bar from both sides. Provide pulls for both inside and outside of sliding panel and the sliding screen panel. Exposed hardware is to be aluminum or stainless steel, color finished to match door color finish.

2.1.2 Glazing

Factory glazed sliding glass doors, including fixed panel, with single glazed glass conforming to ASTM C1048, Kind FT, Condition A, Type I, Class 1, not less than 1/4 inch thick. Glazing material must be certified as
meeting CPSC **16 CFR 1201**, Category II. Set glazing unit in polyvinyl-chloride or synthetic rubber glazing channels. Channels shall be reusable when replacing glass and have mitered or continuous corners. Channels exposed to view shall blend in color with the aluminum frame finish.

### 2.1.3 Finish

Before fabrication, clean sliding glass door units and give a AA-M-10-C22-A31 clear (natural) anodized finish in accordance with the requirements of the AA DAF45. The finish thickness shall be A41, 0.4 mil or greater.

### 2.2 CAULKING AND SEALING

As specified under Section **07 92 00** JOINT SEALANTS.

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Doors, Frames, and Accessories

Install doors, frames, framing members, hardware, and accessories in accordance with approved shop drawings and the requirements specified herein. Set frames securely anchored in place to straight, plumb, square, level condition without distortion and in alignment. Install door panels to retain proper weathering contact with frames. Caulk metal-to-metal joints between frame members and remove excess material. Caulking around perimeter of door frame and wall openings to provide weathertight installation shall be accomplished in accordance with AAMA 800 and manufacturer's recommendations. Finished work shall be rigid, neat in appearance, and free from defects. Upon completion, adjust sliding doors to operate properly. Thoroughly clean aluminum frames and glass in accordance with manufacturer's recommendation. Doors damaged prior to completion and acceptance shall be restored to original manufactured condition or replaced with new doors as directed.

#### 3.1.2 Protection of Aluminum from Dissimilar Materials

##### 3.1.2.1 Aluminum to Dissimilar Metals

Prevent aluminum surfaces from contacting dissimilar metals other than stainless steel, zinc, or white bronze by one or a combination of the following:

- a. Paint dissimilar metal with one coat of heavy-bodied bituminous paint.
- b. Apply caulking between aluminum and dissimilar metal.
- c. Paint dissimilar metal with primer, followed by one coat of aluminum paint or other suitable lead-free coating.
- d. Use nonabsorptive tape or gasket in permanently dry locations.

##### 3.1.2.2 Drainage from Dissimilar Metals

Paint dissimilar metals located in areas where their drainage washes over aluminum to prevent the staining of aluminum.
3.1.2.3 Aluminum to Masonry and Concrete

Prevent aluminum surfaces from coming into contact with mortar, concrete, or other masonry materials by applying one coat of heavy-bodied bituminous paint to the aluminum surfaces.

3.1.2.4 Aluminum to Wood

Prevent aluminum surfaces from coming into contact with wood, treated wood, or similarly absorptive materials by one or a combination of the following methods:

a. Paint aluminum surfaces with two coats of aluminum paint or one coat of heavy-bodied bituminous paint.

b. Paint the wood, treated wood, or other absorptive surfaces with two coats of aluminum paint and seal contiguous joints with caulking compound.

-- End of Section --
17-0007, Design Dental Treatment & Recovery Rooms at NH100

SECTION 09 22 00

SUPPORTS FOR PLASTER AND GYPSUM BOARD

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)


ASTM C 645 (2009a) Nonstructural Steel Framing Members

ASTM C 754 (2009a) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

ASTM C 841 (2003; R 2008e1) Installation of Interior Lathing and Furring


NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM ML/SFA 920 (1991) Metal Lathing and Furring

UNDERWRITERS LABORATORIES (UL)


1.2 SUBMITTALS

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

SD-02 Shop Drawings

Metal support systems

Submit for the erection of metal framing. Indicate materials, sizes, thicknesses, and fastenings.
1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site and store in ventilated dry locations. Storage area shall permit easy access for inspection and handling. If materials are stored outdoors, stack materials off the ground, supported on a level platform, and fully protected from the weather. Handle materials carefully to prevent damage. Remove damaged items and provide new items.

PART 2 PRODUCTS

2.1 MATERIALS

Provide steel materials for metal support systems with galvanized coating ASTM A653/A653M, G-60; aluminum coating ASTM A463/A463M, T1-25; or a 55-percent aluminum-zinc coating.

2.1.1 Materials for Attachment of Lath

2.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C 841, and ASTM C 847.

2.1.1.2 Non-loadbearing Wall Framing

NAAMM ML/SFA 920.

2.1.2 Materials for Attachment of Gypsum Wallboard

2.1.2.1 Suspended and Furred Ceiling Systems

ASTM C 645.

2.1.2.2 Nonload-Bearing Wall Framing and Furring

ASTM C 645, but not thinner than 0.0179 inch thickness, with 0.0329 inch minimum thickness supporting wall hung items such as cabinetwork, equipment and fixtures.

2.1.2.3 Furring Structural Steel Columns

ASTM C 645. Steel (furring) clips and support angles listed in UL Fire Resistance may be provided in lieu of steel studs for erection of gypsum wallboard around structural steel columns.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Systems for Attachment of Lath

3.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C 841, except as indicated otherwise.

3.1.1.2 Non-loadbearing Wall Framing

NAAMM ML/SFA 920, except provide framing members 16 inches o.c. unless indicated otherwise.
3.1.2 Systems for Attachment of Gypsum Wallboard

3.1.2.1 Suspended and Furred Ceiling Systems

ASTM C 754, except provide framing members 16 inches o.c. unless indicated otherwise.

3.1.2.2 Non-loadbearing Wall Framing and Furring

ASTM C 754, except as indicated otherwise.

3.2 ERECTION TOLERANCES

Provide framing members which will be covered by finish materials such as wallboard, plaster, or ceramic tile set in a mortar setting bed, within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/4 inch in 8 feet from a straight line;

c. Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/4 inch in 8 feet from a true plane.

Provide framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/8 inch in 8 feet from a straight line;

c. Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/8 inch in 8 feet from a true plane.

-- End of Section --
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 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 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 630/C 630M  (2003e1) Water-Resistant Gypsum Backing 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

1.2 SUBMITTALS

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

SD-03 Product Data

Water-Resistant Gypsum Backing Board

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

SD-10 Operation and Maintenance Data

SD-11 Closeout Submittals

Gypsum Board

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. 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.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.6 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 5 years of documented successful experience.

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.

2.1.1 Gypsum Board

ASTM C 36/C 36M and ASTM C 1396/C 1396M.

2.1.2 Water-Resistant Gypsum Backing Board

ASTM C 1178/C 1178M

2.1.2.1 Regular

48 inch wide, 5/8 inch thick, square edges.

2.1.3 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.

2.1.3.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.3.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.3.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.3.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.
2.1.3.5 Joint Tape

Use cross-laminated or tapered edge tape recommended by the manufacturer.

2.1.4 Fasteners

2.1.4.1 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 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.

2.1.6 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 be bonded together with an adhesive, except where prohibited by fire rating(s). 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.
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 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C 840, System XIII or GA 216.

3.3 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 water resistant gypsum backing board, ASTM C 630/C 630M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive a heavy-grade wall covering or heave textured finish before painting to Level 3 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings to Level 4 in accordance with GA 214. Finish all 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.

3.3.1 Uniform Surface

Wherever gypsum board is to receive eggshell, semigloss or gloss 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.

3.4 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.

3.5 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

-- End of Section --
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 C423 (2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method


ASTM C834 (2014) Latex Sealants

ASTM E1414/E1414M (2011a; E 2014) Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

ASTM E1477 (1998a; R 2013) Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
1.2 SYSTEM DESCRIPTION

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. The unit size, texture, finish, and color must be as specified. The location and extent of acoustical treatment shall be as shown on the approved detail drawings. Submit drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan. Coordinate with paragraph RECLAMATION PROCEDURES for reclamation of mineral fiber acoustical ceiling panels to be removed from the job site.

1.2.1 Ceiling Attenuation Class and Test

Provide a ceiling system with an attenuation class (CAC) of 40 for when determined in accordance with ASTM E1414/E1414M. Provide fixture attenuators over light fixtures and other ceiling penetrations, and provide acoustical blanket insulation adjacent to partitions, as required to achieve the specified CAC. Provide test ceiling continuous at the partition and assembled in the suspension system in the same manner that the ceiling will be installed on the project.

1.2.2 Ceiling Sound Absorption

Determine the Noise Reduction Coefficient (NRC) in accordance with ASTM C423 Test Method.

1.2.3 Light Reflectance

Determine light reflectance factor in accordance with ASTM E1477 Test Method.

1.2.4 Other Submittals Requirements

The following shall be submitted:

a. Manufacturer's data indicating percentage of recycle material in acoustic ceiling tiles to verify affirmative procurement compliance.

b. Total weight and volume quantities of acoustic ceiling tiles with recycle material.

c. Manufacturer's catalog showing UL classification of fire-rated ceilings.
giving materials, construction details, types of floor and roof constructions to be protected, and UL design number and fire protection time rating for each required floor or roof construction and acoustic ceiling assembly.

d. Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified sound transmission requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resistance may be submitted in lieu of test reports.

e. Certificate attesting that the mineral based acoustical units furnished for the project contain recycled material and showing an estimated percent of such material.

1.3 SUBMITTALS

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

SD-02 Shop Drawings
   Approved Detail Drawings

SD-03 Product Data

SD-04 Samples
   Acoustical Units
   Acoustic Ceiling Tiles

SD-06 Test Reports
   Ceiling Attenuation Class and Test

SD-07 Certificates
   Acoustical Units
   Acoustic Ceiling Tiles

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent for 24
hours before, during, and 24 hours after installation of acoustical units.

1.6 SCHEDULING

Complete and dry interior finish work such as plastering, concrete and terrazzo work before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period. Include an agreement to repair or replace acoustical panels that fail within the warranty period in the standard performance guarantee or warranty. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Furnish spare tiles, from the same lot as those installed, of each color at the rate of 50 tiles for each 1000 tiles installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

2.1.1 Affirmative Procurement

Mineral Wool, Cellulose, and Laminated Paperboard used in acoustic ceiling tiles are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (http://www.epa.gov/cpg/). EPA's recommended Recovered Materials Content Levels for Mineral Wool, Cellulose, Structural Fiberboard and Laminated Paperboard are:

<table>
<thead>
<tr>
<th>Product</th>
<th>Material</th>
<th>Percent of Post Consumer Materials</th>
<th>Percent of Total Recovered Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laminate Paperboard</td>
<td>Post Consumer Paper</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Rock Wool</td>
<td>Slag</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Cellulose</td>
<td>Post Consumer Paper</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>

a. The recommended recovered materials content levels are based on the weight (not volume) of materials in the insulating core only.

b. Submit recycled material content data for acoustic ceiling tiles indicating compliance with affirmative procurement.

c. Submit total weight and volume quantities of acoustic ceiling tiles with recycle material.
2.1.2 Humidity Resistant Composition Units

2.1.2.1 Type

Non-asbestos mineral or glass fibers bonded with ceramic, moisture resistant thermo-setting resin, or other moisture resistant material and having a factory applied white paint finish. Provide panels that do not sag or warp under conditions of heat, high humidity or chemical fumes.

2.1.2.2 Flame Spread

Class: A, 25 or less

2.1.2.3 Pattern

D

2.1.2.4 Minimum NRC

Minimum .60 when tested on Mounting Type E-400 of ASTM E795.

2.1.2.5 Minimum Light Reflectance Coefficient

LR-1, 0.75 or greater

2.1.2.6 Nominal Size

24 x 24 inch

2.1.2.7 Edge Detail

Square

2.2 SUSPENSION SYSTEM

Provide exposed-grid suspension system conforming to ASTM C635/C635M for intermediate-duty systems. Provide surfaces exposed to view of aluminum or steel with a factory-applied white baked-enamel finish. Provide wall molding having a flange of not less than 15/16 inch. Provide standard corners. Suspended ceiling framing system must have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Provide a suspension system with a maximum deflection of 1/360 of the span length. Conform seismic details to the guidance in UFC 3-310-04 and ASTM E580/E580M.

2.3 HANGERS

Provide hangers and attachment capable of supporting a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.3.1 Wires

Conform wires to ASTM A641/A641M, Class 1, 0.11 inch in diameter.

2.3.2 Straps

Provide straps of 1 by 3/16 inch galvanized steel conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.
2.3.3 Rods

Provide 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

2.3.4 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with ASTM A489. Eyebolt size must be a minimum 1/4 inch.

2.4 ADHESIVE

Use adhesive as recommended by tile manufacturer.

2.5 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

2.6 COLORS AND PATTERNS

Use colors and patterns for acoustical units and suspension system components SELECTED FROM MANUFACTURERS LIST OF COLORS.

2.7 ACOUSTICAL SEALANT

Conform acoustical sealant to ASTM C834, nonstaining.

PART 3 EXECUTION

3.1 INSTALLATION

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Rid areas, where acoustical units will be cemented, of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

3.1.1 Suspension System

Install suspension system in accordance with ASTM C636/C636M and as specified herein. Do not suspend hanger wires or other loads from underside of steel decking.
3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than 6 inch from each corner of each fixture.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, offset the resulting horizontal force by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than 3 inch from ends of each length and not more than 16 inch on centers between end fastenings. Provide wall molding springs at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Acoustical Units

Install acoustical units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment. Arrange acoustical units so that units less than one-half width are minimized. Hold units in exposed-grid system in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf or if required for fire resistance rating.

3.1.4 Caulking

Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings.

3.1.5 Adhesive Application

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of tiles. Ensure that contact area of each daub is at least 2 inch diameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

3.2 CEILING ACCESS PANELS

Locate ceiling access panels directly under the items which require access.

3.3 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

3.4 RECLAMATION PROCEDURES

Neatly stack ceiling tile, designated for recycling by the Contracting Officer, on 4 by 4 foot pallets not higher than 4 foot. Panels must be
completely dry. Shrink wrap and symmetrically stack pallets on top of each other without falling over.

-- End of Section --
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 F 1482 (2004) Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring

ASTM F 1869 (2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

ASTM F 2170 (2002) Determining Relative Humidity in Concrete Floor Slabs in situ Probes


ASTM F 1303 (2004; R 2014) Sheet Vinyl Floor Covering with Backing

1.2 FIRE RESISTANCE REQUIREMENTS

Provide a minimum average critical radiant flux of 0.22 watts per square centimeter for flooring in corridors and exits when tested in accordance with ASTM E 648.

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Resilient Flooring and Accessories

Scaled drawings indicating patterns (including location of patterns and colors) and dimensions.
SD-03 Product Data

Resilient Flooring and Accessories

Manufacturer's descriptive data.

Adhesives

Manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics. Provide Material Safety Data Sheets (MSDS) for all primers and adhesives to the Contracting Officer. Highlight VOC emissions.

Sheet Vinyl Flooring

SD-04 Samples

Resilient Flooring and Accessories

Three samples of each indicated color and type of flooring, base, mouldings, and accessories. Provide a minimum 2-1/2 by 4 inch sample.

Moisture, Alkalinity and Bond Tests

SD-08 Manufacturer's Instructions

Surface Preparation

Installation

Manufacturer's printed installation instructions for all flooring materials and accessories, including preparation of substrate, seaming techniques, and recommended adhesives.

SD-10 Operation and Maintenance Data

Resilient Flooring and Accessories

Adhesives

LEED documentation relative to low-emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 DELIVERY AND STORAGE

Deliver materials to the building site in original unopened containers bearing the manufacturer's name, style name, pattern color name and number, production run, project identification, and handling instructions. Store materials in a clean, dry, secure, and well-ventilated area with ambient air temperature maintained above 68 degrees F and below 85 degrees F, stacked according to manufacturer's recommendations. Remove resilient flooring products from packaging to allow ventilation prior to installation. Protect materials from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances. Observe ventilation and safety procedures specified in the MSDS. Do not store rubber surface products with materials that have a high capacity to adsorb volatile
organic compound (VOC) emissions. Do not store exposed rubber surface materials in occupied spaces.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas to receive resilient flooring at a temperature above 68 degrees F and below 85 degrees F for 3 days before application, during application and 2 days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 55 degrees F thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

1.6 SCHEDULING

Schedule resilient flooring application after the completion of other work which would damage the finished surface of the flooring.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

PART 2 PRODUCTS

2.1 SHEET VINYL FLOORING

Conform to ASTM F 1303 for sheet vinyl flooring, Type I, Grade 1, Class A-non-asbestos formulated fibrous backing (minimum wear layer thickness 0.020 inch and minimum overall thickness 0.080 inch) and a minimum 6 feet wide. Extend color and pattern through the total thickness of the material. As required, provide welding rods as recommended by the manufacturer for heat welding of joints.

2.2 INTEGRAL COVE BASE

Extend integral coved base for sheet vinyl flooring up the wall 4 inch. Provide a vinyl, square cap strip and vinyl, rubber, or wood fillet strip with a minimum radius of 3/4 inch for integral coved bases at perimeter and fixed vertical interruptions to flooring. Provide integral cove of the same material as flooring. Provide inside and outside corner protectors of plastic approved by flooring manufacturer.

2.3 MOULDING

Provide tapered mouldings of rubber-colored anodized aluminum and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2.

2.4 ADHESIVES

Provide adhesives for flooring, base and accessories as recommended by the manufacturer and comply with local indoor air quality standards.

2.5 SURFACE PREPARATION MATERIALS

Provide surface preparation materials, such as panel type underlayment,
lining felt, and floor crack fillers as recommended by the flooring manufacturer for the subfloor conditions. Comply with ASTM F 1482 for panel type underlayment products.

2.6 POLISH/FINISH

Furnish polish as recommended by the manufacturer and conform to ASTM D 4078.

2.7 CAULKING AND SEALANTS

Furnish caulking and sealants in accordance with Section 07 92 00 JOINT SEALANTS.

2.8 MANUFACTURER'S COLOR, PATTERN AND TEXTURE

Provide color, pattern and texture for resilient flooring and accessories selected from manufacturer's standard colors. Provide flooring in any one continuous area or replacement of damaged flooring in continuous area from same production run with same shade and pattern.

PART 3 EXECUTION

3.1 EXAMINATION/VERIFICATION OF CONDITIONS

Examine and verify that site conditions are in agreement with the design package. Report all conditions that will prevent a proper installation. Do not take any corrective action without written permission from the Government. Work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

Provide a smooth, true, level plane for surface preparation of the flooring, except where indicated as sloped. Flatten floor to within 3/16 inch in 10 feet. Prepare subfloor in accordance with flooring manufacturer's recommended instructions. Prepare the surfaces of lightweight concrete slabs (as defined by the flooring manufacturer) as recommended by the flooring manufacturer. Comply with ASTM F 710 for concrete subfloor preparation. Floor fills or toppings may be required as recommended by the flooring manufacturer. Install underlayments, when required by the flooring manufacturer, in accordance with manufacturer's recommended printed installation instructions. Comply with ASTM F 1482 for panel type underlayments. Before any work under this section is begun, correct all defects such as rough or scaling concrete, chalk and dust, cracks, low spots, high spots, and uneven surfaces. Repair all damaged portions of concrete slabs as recommended by the flooring manufacturer. Remove from the slabs concrete curing and sealer compounds, other than the type that does not adversely affect adhesion. Remove paint, varnish, oils, release agents, sealers, waxes, and adhesives, as required by the flooring product in accordance with manufacturer's printed installation instructions.

3.3 MOISTURE, ALKALINITY AND BOND TESTS

Determine the suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content and pH level by moisture and alkalinity tests and comply with manufacturer's recommendations. Conduct moisture testing in accordance with ASTM F 1869 or ASTM F 2170, unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by the flooring manufacturer. Determine
the compatibility of the resilient flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations.

3.4  PLACING MOULDING

Provide moulding where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When required, locate moulding under door centerline. Moulding is not required at doorways where thresholds are provided. Anchor aluminum moulding to floor surfaces as recommended by the manufacturer.

3.5  PLACING WALL BASE

Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent resilient flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

3.6  CLEANING

Immediately upon completion of installation of flooring in a room or an area, dry/clean the flooring and adjacent surfaces to remove all surplus adhesive. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions. No sooner than 5 days after installation, wash flooring with a nonalkaline cleaning solution, rinsed thoroughly with clear cold water, and, except for rubber flooring and stair treads, risers and stringers, vinyl and other flooring not requiring polish by manufacturer, given the number of coats of polish in accordance with manufacturer's written instructions. Clean and maintain all other flooring as recommended by the manufacturer.

3.7  PROTECTION

From the time of laying until acceptance, protect flooring from damage as recommended by the flooring manufacturer. Remove and replace flooring which becomes damaged, loose, broken, or curled and wall base which is not tight to wall or securely adhered.

-- End of Section --
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 D4263 (1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method


ASTM F1869 (2011) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

MASTER PAINTERS INSTITUTE (MPI)

MPI 50 (Oct 2009) Interior Latex Primer Sealer

MPI 54 (Oct 2009) Interior Latex, Semi-Gloss, MPI Gloss Level 5

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

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-03 Product Data

Materials

Coating

Manufacturer's Technical Data Sheets

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Applicator's qualifications

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

Materials
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 military installations on a minimum of three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:
   
   Position or responsibility
   
   Employer (if other than the Contractor)
   
   Name of facility owner
   
   Mailing address, telephone number, and telex number (if non-US) of facility owner
   
   Name of individual in facility owner's organization who can be contacted as a reference
   
   Location, size and description of structure
   
   Dates work was carried out
   
   Description of work carried out on structure

1.4 **REGULATORY REQUIREMENTS**

1.4.1 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.4.2 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.4.3 Asbestos Content

Materials shall not contain asbestos.

1.4.4 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.4.5 Silica

Abrasive blast media shall not contain free crystalline silica.
1.4.6 Human Carcinogens

Materials shall not contain ACGIH 0100 confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.5 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.

1.6 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. 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.

1.6.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

1.6.2 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.

1.7 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation.

1.7.1 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 **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 selected.

1.9 **LOCATION AND SURFACE TYPE TO BE PAINTED**

1.9.1 **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.

1.9.1.1 **Exterior Painting**

Includes new surfaces of the building and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

1.9.1.2 **Interior Painting**

Includes new surfaces existing coated surfaces of the building 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 metal deck; and

b. Other contiguous surfaces.

1.9.2 **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.

1.9.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new 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.

1.9.4 Definitions and Abbreviations

1.9.4.1 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.

1.9.4.2 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.

1.9.4.3 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.9.4.4 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.

1.9.4.5 EPP

Environmentally Preferred Products, a standard for determining
environmental preferability in support of Executive Order 13101.

1.9.4.6 EXT

MPI short term designation for an exterior coating system.

1.9.4.7 INT

MPI short term designation for an interior coating system.

1.9.4.8 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.9.4.9 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.

1.9.4.10 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.9.4.11 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:

<table>
<thead>
<tr>
<th>Gloss Level</th>
<th>Description</th>
<th>Units at 60 degrees</th>
<th>Units at 85 degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Matte or Flat</td>
<td>0 to 5</td>
<td>10 max</td>
</tr>
<tr>
<td>G2</td>
<td>Velvet</td>
<td>0 to 10</td>
<td>10 to 35</td>
</tr>
<tr>
<td>G3</td>
<td>Eggshell</td>
<td>10 to 25</td>
<td>10 to 35</td>
</tr>
<tr>
<td>G4</td>
<td>Satin</td>
<td>20 to 35</td>
<td>35 min</td>
</tr>
<tr>
<td>G5</td>
<td>Semi-Gloss</td>
<td>35 to 70</td>
<td></td>
</tr>
<tr>
<td>G6</td>
<td>Gloss</td>
<td>70 to 85</td>
<td></td>
</tr>
<tr>
<td>G7</td>
<td>High Gloss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Gloss is tested in accordance with ASTM D523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.9.4.12 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.

1.9.4.13 Paint

See Coating definition.
1.9.4.14 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.9.4.15 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 shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.

f. Blisterring, 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.

3.3 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,, or SSPC SP 10/NACE No. 2. Brush-off blast remaining surface in accordance with SSPC 7/NACE No.4; 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.

3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC 7/NACE No.4, SSPC SP 6/NACE No.3, and SSPC SP 10/NACE No. 2. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12/NACE No.5. As a visual reference, cleaned surfaces shall be
similar to photographs in SSPC VIS 4/NACE VIS 7.

3.3.3 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.

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.

3.4 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 cup household 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, existing coated, 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.

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 F1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.5 APPLICATION

3.5.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended
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.

3.5.2 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 quantity recommended by paint manufacturer of suitable thinner per . 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.

3.5.3 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.

3.5.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 9: 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.

3.6 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.

3.7 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.8 COATING SYSTEMS FOR WOOD AND PLYWOOD

a. Apply coatings of Tables in Division 6 for Exterior and Interior.

b. Apply two coats of specified primer to treat and prime wood and plywood surfaces which will be inaccessible after erection.

3.9 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.

3.10 PAINT TABLES

3.10.1 INTERIOR PAINT TABLES

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

A. New and Existing Wallboard:

1. MPI INT 9.2A-G5 (Semigloss) / Existing; RIN 9.2A-G5 (Semigloss)
   Primer:             Intermediate:       Topcoat:
   MPI 50             MPI 54             MPI 54
   System DFT:        4 mils

-- End of Section --
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 NATIONAL STANDARDS INSTITUTE (ANSI)**


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

36 CFR 1191 Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

1.2 SUBMITTALS

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

- SD-02 Shop Drawings
  - Detail Drawings
- SD-03 Product Data
  - Installation
  - Warranty
- SD-04 Samples
  - Interior Signage
- SD-10 Operation and Maintenance Data
  - Approved Manufacturer's Instructions
  - Protection and Cleaning

1.3 QUALITY ASSURANCE

1.3.1 Samples

Submit *interior signage* samples of each of the following sign types showing
The samples may be installed in the work, provided each sample is identified and location recorded.

1.3.2 **Detail Drawings**

Submit detail drawings showing elevations of each type of sign, dimensions, details and methods of mounting or anchoring, mounting height, shape and thickness of materials, and details of construction. Include a schedule showing the location, each sign type, and message.

1.4 **DELIVERY, STORAGE, AND HANDLING**

Materials shall be packaged to prevent damage and deterioration during shipment, handling, storage and installation. Product shall be delivered to the jobsite in manufacturer's original packaging and stored in a clean, dry area in accordance with manufacturer's instructions.

1.5 **WARRANTY**

Warrant the interior signage for a period of 2 years against defective workmanship and material. Warranties shall be signed by the authorized representative of the manufacturer. Submit warranty accompanied by the document authenticating the signer as an authorized representative of the guarantor. Guarantee that the signage products and the installation are free from any defects in material and workmanship from the date of delivery.

PART 2   PRODUCTS

2.1 **STANDARD PRODUCTS**

Signs, plaques, directories, and dimensional letters shall be the standard product of a manufacturer regularly engaged in the manufacture of such products that essentially duplicate signs that have been in satisfactory use at least 2 years prior to bid opening. Obtain signage from a single manufacturer with edges and corners of finished letterforms and graphics true and clean.

2.2 **ROOM IDENTIFICATION/DIRECTIONAL SIGNAGE SYSTEM**

2.2.1 Standard Room Signs

Signs shall consist of acrylic plastic **0.080 inch** thickness minimum conforming to **ANSI Z97.1** and shall match existing signage in Dental Wing:

a. Units shall be frameless. Corners of signs shall be squared.

2.2.2 Changeable Message Strip Signs

Changeable message strip signs shall be of same construction as standard room signs to include a clear sleeve that will accept a paper or plastic insert identifying changeable text. The insert shall be prepared die-cut vinyl letters applied to **0.015 inch** rigid vinyl film. Provide paper and software for creating text and symbols for computers identified by owner for Owner production of paper inserts after project completion. Furnish one suction device to assist in removing face sheet. Sliding inserts or slide knobs that slide horizontally exposing different graphic information shall be provided as identified in the signage placement schedule.
2.2.3 Type of Mounting For Signs

Surface mounted signs shall be mounted with \textit{1/16 inch} thick closed cell vinyl foam with adhesive backing. Adhesive shall be transparent, long aging, high tech formulation on two sides of the vinyl foam. Fabricated from materials that are not corrosive to sign material and mounting surface.

2.2.4 Graphics

Signage graphics for modular signs shall conform to the following:

2.2.4.1 Surface Applied Photopolymer

Integral graphics and Braille achieved by photomechanical stratification processes. Photopolymer used for ADA compliant graphics shall be of the type that has a minimum durometer reading of 90. Tactile graphics shall be raised \textit{1/32 inch} from the first surface of plaque by photomechanical stratification process.

PART 3 EXECUTION

3.1 INSTALLATION

Signs shall be installed plumb and true and in accordance with \textit{approved manufacturer's instructions} at locations shown on the schedule below. Submit six copies of operating instructions outlining the step-by-step procedures required for system operation. The instructions shall include simplified diagrams for the system as installed, the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers: the words \textit{OPERATING AND MAINTENANCE INSTRUCTIONS}, name and location of the facility, name of the Contractor, and contract number. Mounting height and mounting location shall conform to \textit{36 CFR 1191}. Required blocking shall be installed. Signs on doors or other surfaces shall not be installed until finishes on such surfaces have been installed. Signs installed on glass surfaces shall be installed with matching blank back-up plates in accordance with manufacturer's instructions.

<table>
<thead>
<tr>
<th>Door/Room Number</th>
<th>Sign Type</th>
<th>Text</th>
<th>Insert(s)</th>
<th>Symbol/Remarks</th>
</tr>
</thead>
</table>

SIGNAGE PLACEMENT SCHEDULE
SIGNAGE PLACEMENT SCHEDULE

| Dental Recovery Dental Treatment | Room Identification | W252 W247A | - | Verify Room Numbers with Contracting Officer prior to ordering signs |

3.1.1 Anchorage

Anchorage shall be in accordance with approved manufacturer's instructions.

a. Signs mounted to painted gypsum board surfaces shall be removable for painting maintenance.

c. Install signs mounted on metal surfaces with magnetic tape.

3.1.2 Protection and Cleaning

Protect the work against damage during construction. Hardware and electrical equipment shall be adjusted for proper operation. Glass, frames, and other sign surfaces shall be cleaned at completion of sign installation in accordance with the manufacturer's approved instructions and the requirements of Section 01 78 23 OPERATION AND MAINTENANCE DATA, Package 1. Submit six copies of maintenance instructions listing routine procedures, repairs, and guides.

-- End of Section --
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)


U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-1691  (1994; Rev F) Construction and Material Schedule for Military Medical and Dental Facilities

1.2 SUBMITTALS

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

SD-02 Shop Drawings
Detail Drawings;

SD-03 Product Data
Casework

SD-04 Samples
Casework;
Wall Hung Cabinets;
Floor Mounted Cabinets;
Countertops;
Laminated Plastic Sheets;

SD-08 Manufacturer's Instructions
Installation
1.3 CERTIFICATIONS

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver casework to the jobsite in the original individual containers, complete with screws, keys, and instructions. Mark each container with the manufacturer's name and catalog number. Store casework in an adequately ventilated, dry location that is free of dust, water, or other contaminates and in a manner to permit access for inspection and handling. Handle casework carefully to prevent damage to the surfaces. Replace damaged items that cannot be restored to like-new condition.

PART 2 PRODUCTS

2.1 CASEWORK

Submit for approval Drawings showing layout of casework at 3/4 inch equals one foot scale. Indicate details of construction and rough-in requirements. Indicate whether cabinets are metal or wood, whether countertop is corrosion-resisting steel or plastic laminate, and whether sink is coated with modified epoxy resin or corrosion-resisting steel. All wood products must be formaldehyde free. Verify job condition affecting the work and obtain accurate field measurements for incorporation into drawings. Locate structural members, required utilities and services provided by other sections of this specification. Submit details and information necessary for fabrication and installation, manufacturer's printed data, catalog cuts, and instructions for installation and cleaning. Provide casework as scheduled on the detail drawings. Factory fabricate of manufacturer's standard sizes and finishes and conform to MIL-STD-1691, and the requirements specified below. Supplementary ordering data are as follows:

Basis of Design for the casework is as follows: Base Cab - A-DEC 5531, Upper Cab - A-DEC 5731, and A-DEC 5580.

2.1.1 Dental Casework

Provide dental operator casework of wood core covered with laminated plastic sheets. Pattern, color and finish of decorative laminated plastic for exteriors of casework shall be selected by the Architect from the manufacturer's standard color samples.

2.1.2 Countertops

Provide countertops of plastic laminate covered particleboard. In lieu of individual samples, complete minimum size casework may be submitted as samples. Mock-up units are not acceptable. Samples shall be of sufficient size to show color, pattern, and method of assembly. Some requirements are:

<table>
<thead>
<tr>
<th>Countertop and backsplash</th>
<th>One section, containing both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door and drawer front</td>
<td>One of each, with hardware mounted</td>
</tr>
<tr>
<td>Melamine plastic color samples</td>
<td>approx 2 X 3 inch size</td>
</tr>
<tr>
<td>Stain/color samples</td>
<td>approx 2 by 3 inch size</td>
</tr>
</tbody>
</table>
2.2 PLUMBING FIXTURES

Provide faucet, trap and drain fittings, gas, air and vacuum cocks as required. Provide connection conforming to the requirements specified in Section 22 00 70 PLUMBING, HEALTHCARE FACILITIES.

PART 3 EXECUTION

3.1 INSTALLATION

Install casework in a manner that does not damage the work of other trades. Secure the casework in place in true alignment, level, and plumb. Secure units with screws through backs to cleats that have been anchored to building structure with toggle or expansion bolts.

Do not install building construction materials that show visual evidence of biological growth.

3.1.1 Wall Hung Cabinets

Install wall-hung cabinets to support the weight of the cabinets plus the normally expected weight of the contents of the cabinets. Space fasteners 12 inch on center using at least three bolts in each 3 or 4 foot unit width. Join adjacent cabinets in an assembly together at top and bottom with inconspicuous bolts or clips. Seal joints between the casework and wall surfaces which are not larger than the joints between casework sections with sealant conforming to ASTM C920, Type M, Grade NS, Class 25, Use NT. Close larger joints with filler strips of the same material and finish as adjacent casework. Cut filler strips to the contour of the wall surface and secure to the casework with concealed nails or screws. Use filler strips no wider than 6 inch.

3.1.2 Floor Mounted Cabinets

Set floor-mounted metal cabinets on a common metal base or integral base, in assemblies up to 6 feet in length in rooms having concrete or resilient flooring. Bolt cabinets to bases at cabinet corners. Face metal bases with resilient material to match wall base in space where the cabinets are located. Fasten together adjoining cabinets at top and bottom of front and back with bolts placed inconspicuously inside cabinets. Set metal cabinets in rooms having terrazzo or ceramic-tile floors on concrete or masonry bases with exposed faces finished the same as other bases in the room. Seal flush openings between cabinet and wall surfaces, due to irregularity of surfaces, with Type S or M, Grade NS, Class 12.5, use NT, conforming to ASTM C920. Close exposed-to-view openings larger than joints in tile work with filler or scribing strip of the same material and finish as adjacent casework. Cut filler to contour of wall surface and secure to casework with concealed sheet-metal screws. Use minimum width and number of fillers consistent with need and in no case shall filler exceed 6 inch in width.

3.1.3 Countertops

Height of counter tops as indicated. Where required, toe space at front of cabinets shall be provided by installing front face of cabinets 3 inch in front of face of base. Where toe space is not required, face of base and cabinets shall be flush. Bases must have a height of approximately 4 inch. Install all items as required for proper operation in accordance with the manufacturer's directions.
3.2 INSPECTION AND CLEANING

Inspect placed items for proper location, fastening, connection to utilities, operation, and for damage which may have occurred during installation. Put each item into service to prove proper operation. Correct defects disclosed during inspection. Clean cabinets and countertops in accordance with manufacturer's instructions.

-- End of Section --
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)


NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS (NCRP)

NCRP 145 (2003) Radiation Protection in Dentistry

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

29 CFR 1910.1025 Lead

1.2 SUBMITTALS

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

SD-02 Shop Drawings

X-Ray Shielding;

SD-06 Test Reports

Testing and Certification

Submit four copies of surveyor's report.

SD-07 Certificates

X-Ray Shielding

1.3 QUALIFICATIONS

Work shall be performed by a company which specializes in the type of shielding work required by the Contract documents. Company shall have a minimum of 5 years of documented successful experience.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original containers bearing the name of the
manufacturer and brand name. Store shielding materials off the ground under watertight cover. Handle materials preventing damage to edges, ends or surfaces in conformance with 29 CFR 1910.1025. Remove damaged materials from the premises.

1.5 WARRANTY

Lead sheet shielding materials shall be warranted against sagging and curling for 10 years.

PART 2 PRODUCTS

2.1 SHIELDING SYSTEM

Construct X-ray shielding unimpaired by joints, openings for ducts, pipes, or other openings through shielding, or conduits, service boxes, and other items embedded in the shielding. The shielding shall appear to be continuous. Install lead patches, lead sleeves, and/or mazes as required to provide continuity of the shielding. Minimum lead lap shall be 1 inch. Sleeves shall be not less than 1 inch in length. Thicknesses indicated for shielding are minimum acceptable thickness.

a. Submit shop drawings that indicate thickness of lead at all locations; construction at floor, walls, ceiling, and columns; details of lead laps and lap securing methods; fastenings, profiles, details of items and accessories penetrating the shielding materials; and any special method of construction.

b. Certify the shielding materials supplied comply with specified quality and thicknesses.

2.2 LEAD SHEET

Lead sheet shall conform to ASTM B749, Grade C, thickness as indicated.

2.3 LEAD-LINED GYPSUM WALLBOARD

Lead-lined gypsum wallboard shall be a single thickness of unpierced lead laminated to 5/8 inch thick gypsum board conforming to ASTM C1396/C1396M, Type III, Grade R, Class 1, Form a, Style 1.

2.4 LEAD-HEADED NAILS

Lead-headed nails may be used to accomplish shielding not less than that provided by the barrier. The size, type and design shall be recommended by the manufacturer of material to be installed.

2.5 LEAD TABS OR CLIPS

Lead tabs or clips shall be unpierced sheet lead not less than the thickness of lead in the barrier. Prior to folding, the tabs shall be rectangular in shape and shall be the required size to provide an effective lead lap over an unleadeded nail, screw, or tie wire penetration when folded.

PART 3 EXECUTION

3.1 INSTALLATION

Perform installation of materials and assemblies in accordance with
drawings and approved manufacturer’s recommendations and NCRP 145.

3.1 Workmanship

Install sheet lead free of waves, lumps, and wrinkles and with a minimum of joints. Joints in sheet lead shall provide protection equivalent to the protection provided by the adjacent sheet lead. Joints shall be finished smooth and neat.

3.1.2 Protection

Use lead shields to maintain continuity of protection where unshielded built-in items penetrate lead linings. Where outlet boxes, junction boxes, ducts, conduits, and similar items prevent the use of shields, lead sleeves or lead lining shall be used. Fasteners shall not disrupt the continuity of shielding.

3.2 LEAD-LINED GYPSUM WALLBOARD

Lead-lined gypsum wallboard shall be applied over supports specified in Section 06 10 00 ROUGH CARPENTRY and Section 09 22 00 METAL SUPPORT ASSEMBLIES. Method of predrilling or drilling pilot holes shall not cause deformation of the fastener and shall not cause distortion of wallboard. Wallboard shall be applied vertically, with long edges parallel to supports, and with lead linings placed next to supports. Blocking shall be provided at end joints.

3.2.1 Joints

Sheet-lead strips not less than the lead thickness used for wallboard and not less than 1-1/2 inches wide shall be installed on blocking and supports at all joints.

3.2.2 Corner Joints

Corner joints shall consist of 1-3/4 by 1-3/4 inch lead angle.

3.2.3 Wood Supports

The sheet-lead strips shall be secured to blocking and supports at outer edges with wire nails. Edges of wallboard shall then be butt-jointed and fastened to supports with lead-headed nails at approximately 8 inch on centers at joints and 12 inch on center at intermediate supports with nail heads driven slightly below the surface of wallboard.

3.2.4 Metal Supports

Edges of gypsum wallboard at metal studs shall be fastened with 1 inch long lead-headed screws. Heads shall be covered with 1/2 inch diameter lead disc cemented to wallboard and installed flush with surface of wallboard.

3.2.5 Finish Ply

Gypsum wallboard not scheduled to be plastered shall receive a finish ply of gypsum wallboard bonded to the first ply with laminating adhesive as recommended by the wallboard manufacturer. Nailing the finish ply will not be permitted. A shoring system shall be used to hold finish ply in place during adhesive drying period. Shoring shall be left in place at least 24 hours. Joint and corner treatment shall be as specified in Section 09 29 00.
3.3 TESTING AND CERTIFICATION

Before and after x-ray equipment has been installed and placed in operating condition, the x-ray installation shall be surveyed by a qualified expert as defined in NCRP 145. Survey shall be performed in accordance with NCRP 145. Any part of x-ray shielding work found to be defective shall be corrected or replaced, including all other work affected thereby.

-- End of Section --
17-0007, Design Dental Treatment & Recovery Rooms at NH100

SECTION 21 13 13.00 20

WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION
04/08

PART 1  GENERAL

1.1  REFERENCES

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

ASTM INTERNATIONAL (ASTM)


FM GLOBAL (FM)


NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13  (2016) Standard for the Installation of Sprinkler Systems


UNDERWRITERS LABORATORIES (UL)


1.2  SYSTEM DESCRIPTION

Design and modify existing automatic wet pipe fire extinguishing sprinkler systems for complete fire protection coverage throughout area of work.

1.3  SPRINKLER SYSTEM DESIGN

Except as modified herein, design automatic wet pipe fire extinguishing sprinkler systems in accordance with the required and advisory provisions of NFPA 13, including all recommendations and advisory portions, which shall be considered mandatory; this includes advisory provisions listed in the appendices of such standard(s), as though the word "shall" had been substituted for the word "should" wherever it appears. Design system by hydraulic calculations for uniform distribution of water over the design area. Hydraulic calculations shall assume a 12 psi pressure loss for the backflow preventer assembly. Locate sprinklers in a consistent pattern with ceiling grid, lights, and air supply diffusers. Provide sprinklers and piping system layout. All Devices and equipment for fire protection service shall be UL Fire Prot Dir listed or FM APP GUIDE approved for use in wet pipe sprinkler systems.
1.3.1 Location of Sprinklers

Sprinklers in relation to the ceiling and the spacing of sprinklers shall not exceed that permitted by NFPA 13 for light hazard occupancy. Uniformly space sprinklers on the branch piping. Sprinklers shall provide coverage throughout 100 percent of the building. This includes, but is not limited to, telephone rooms, electrical equipment rooms, boiler rooms, switchgear rooms, transformer rooms, and other electrical and mechanical spaces.

1.3.2 Water Distribution

Distribution shall be uniform throughout the area in which the sprinklers will open. Discharge from individual sprinklers in hydraulically most remote area shall be between 100 percent and 120 percent of the specified density.

1.3.3 Density of Application of Water

Size pipe to provide the specified density when the system is discharging the specified total maximum required flow. Application to horizontal surfaces below the sprinklers shall be 0.1 gpm per sq ft.

1.3.4 Sprinkler Discharge Area

Permissible decreases and required increases from NFPA 13 shall be applied to an initial hydraulically most remote area of 1500 sq ft.

1.3.5 Outside Hose Allowances

Hydraulic calculations shall include a hose allowance of 250 gpm for outside hose streams.

1.3.6 Water Supply

Base hydraulic calculations on operation of existing fire pumps.

1.4 SUBMITTALS

Partial submittals and submittals not fully complying with the requirements and recommended practices of NFPA 13 and this specification section shall be returned disapproved without review. This contract stipulation is non-negotiable.

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

SD-02 Shop Drawings

Shop Drawings

Prepare 24 by 36 inch detail working drawings of sprinklers and piping. Floor plans shall be drawn to a scale not less than 1/8" = 1'-0". Show data essential for proper installation of each system. Show details, plan view, elevations and sections of the systems supply and piping. Show piping schematic of systems supply, devices, valves, pipe and fittings. Show point to point electrical wiring diagrams. Submit drawings signed by a registered fire protection engineer. Provide three copies of the Sprinkler System Shop Drawings, no later than 21 days prior to the start of
sprinkler system installation.

SD-03 Product Data

Pipe
Fittings
Sprinklers
Pipe hangers and supports
Mechanical couplings

Annotate descriptive data to show the specific model, type, and size of each item. Catalog cuts shall also indicate UL Listing/FM Approval and country of manufacture.

SD-05 Design Data

Hydraulic Calculations

Submit computer program generated hydraulic calculations to substantiate compliance with hydraulic design requirements. Calculations shall be performed by computer using software intended specifically for fire protection system design. Submit name of software program used.

SD-06 Test Reports

request to schedule Preliminary Tests

Preliminary Test Report

Provide Three copies of the completed Preliminary Test Report, no later than 7 days after the completion of the Preliminary Tests. The Preliminary Tests Report shall include both the Contractor's Material and Test Certificate for Underground Piping and the Contractor's Material and Test Certificate for Aboveground Piping. All items in the Preliminary Tests Report shall be signed by the Fire Protection Engineer.

request to schedule Final Acceptance Test

Final Acceptance Test Report

Provide Three copies of the completed Final Acceptance Tests Reports, no later than 7 days after the completion of the Final Acceptance Tests. All items in the Final Acceptance Report shall be signed by the Fire Protection Engineer.

SD-07 Certificates

Inspection by Fire Protection Engineer

Concurrent with the Final Acceptance Test Report, certification by the Fire Protection Engineer that the sprinkler system is installed in accordance with the contract requirements, including signed approval of the Preliminary and Final Acceptance Test Reports.

Fire Protection Engineer
The name and documentation of certification of the proposed Fire Protection Engineer, no later than 14 days after the Notice to Proceed and prior to the submittal of the sprinkler system drawings and hydraulic calculations.

**Sprinkler System Installer**

Submit data showing the Sprinkler System Installer has successfully installed systems of the same type and design as specified herein. Data shall include names and locations of at least two installations where the Contractor, or the subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months. Provide NICET certification of the system technician. Contractor shall submit data along with submittal of the Fire Protection Engineer Qualifications.

**SD-10 Operation and Maintenance Data**

**Operating and Maintenance Instructions**

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA as supplemented and modifies by this specification section.

Provide six manuals in accordance with NFPA 13. The manuals shall include the manufacturer's name, model number, parts list, list of parts and tools that should be kept in stock by the owner for routine maintenance including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization (including address and telephone number) for each item of equipment. Each service organization submitted shall be capable of providing 4 hour on-site response to a service call on an emergency basis.

**SD-11 Closeout Submittals**

**As-built drawings**

As-built shop drawings, at no later than 14 days after completion of the Final Tests. The Sprinkler System Drawings shall be updated to reflect as-built conditions after all related work is completed. Provide electronic drawings in dwg or pdf format.

**1.5 QUALIFICATIONS**

**1.5.1 Fire Protection Engineer**

A Fire Protection Engineer is a registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES).

**1.5.2 Sprinkler System Installer**

The Sprinkler System Installer shall be regularly engaged in the installation of the type and complexity of system specified in the Contract.
documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months. Installation drawings, shop drawings and as-built drawings shall be prepared, by or under the supervision of, an system technician who is experienced with the types of works specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with minimum Level III certification in Automatic Sprinkler System program or by a fire protection engineer.

1.6 QUALITY ASSURANCE

1.6.1 Material and Equipment Qualifications

Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.6.2 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.

1.6.3 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.

1.6.4 Field Fabricated Nameplates

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.7 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.

1.8 DELIVERY, STORAGE AND HANDLING

All equipment delivered and placed in storage shall be housed in a manner
to preclude any damage from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, all pipes shall either be capped or plugged until installed.

PART 2 PRODUCTS

2.1 UNDERGROUND PIPING COMPONENTS

2.1.1 Pipe

Pipe shall comply with NFPA 24. Minimum pipe size shall be 6 inches.

2.2 ABOVEGROUND PIPING COMPONENTS

All components of the aboveground piping shall fully comply with the requirements and recommended practices of NFPA 13 and this specification section. Aboveground piping shall be steel.

2.2.1 Steel Pipe

Pipe shall be rigid black steel. Steel piping shall be Schedule 10 or 40 for sizes less than 8 inches. Steel pipe shall be Schedule 40 for sizes less than 3 inches and Schedule 10 for sizes 3 inches or larger. Fittings into which sprinklers, sprinkler riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings, fittings that use steel gripping devices to bite into the pipe and segmented welded fittings shall not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe sizes 1.5 inches and larger. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Steel piping with wall thickness less than Schedule 30 shall not be threaded. Side outlet tees using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal.

2.2.2 Grooved Mechanical Joints and Fittings

Grooved couplings, fittings and grooving tools shall be products of the same manufacturer.

2.2.3 Flexible Sprinkler Hose

The use of flexible sprinkler hose is permissible.

2.2.4 Sprinklers

Provide nominal 0.50 inch or 0.53 inch orifice sprinklers. Sprinklers with internal O-rings shall not be used. Sprinklers shall be used in accordance with their listed coverage limitations. Provide Recessed quick response sprinklers. Sprinklers shall have a polished chrome finish. Temperature classification shall be ordinary. Sprinklers in high heat areas including attic spaces or in close proximity to unit heaters shall have temperature classification in accordance with NFPA 13. Extended coverage sprinklers shall not be used. Deflector shall not be more than 3 inches below suspended ceilings. Ceiling plates shall not be more than 0.5 inch deep. Ceiling cups shall not be permitted.

2.2.5 Pipe Supports

Provide Pipe hangers and supports in accordance with NFPA 13.
2.3 ACCESSORIES

2.3.1 Sprinkler Cabinet

Provide metal cabinet with extra sprinklers and sprinkler wrench adjacent to each alarm valve. The number and types of extra sprinklers shall be as specified in NFPA 13.

2.3.2 Pipe Escutcheon

Provide split hinge metal plates for piping entering walls, floors, 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.

PART 3 EXECUTION

3.1 INSPECTION BY FIRE PROTECTION ENGINEER

The Fire Protection Engineer shall inspect the sprinkler system periodically during the installation to assure the sprinkler system is being provided and installed in accordance with the contract requirements and the approved sprinkler system submittal(s). The Fire Protection Engineer shall attend both the preliminary and final tests, and shall sign the test results. After the preliminary testing has been completed, the Fire Protection Engineer, shall certify in writing the system is ready for the final inspections and tests. This report shall document any discrepancies found and what actions will be taken to correct. Any discrepancy noted during the periodic site visits or the preliminary testing shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.

3.2 ABOVEGROUND PIPING INSTALLATION

The methods of fabrication and installation of the aboveground piping shall fully comply with the requirements and recommended practices of NFPA 13 and this specification section.

3.2.1 Piping in Finished Areas

In areas with suspended or dropped ceilings and in areas with concealed spaces above the ceiling, piping shall be concealed above ceilings. Piping shall be inspected, tested and approved before being concealed. Risers and similar vertical runs of piping in finished areas shall be concealed.

3.2.2 Pendent Sprinklers

Where sprinklers are installed below suspended or dropped ceilings, drop nipples shall be cut such that sprinkler ceiling plates or escutcheons are of a uniform depth throughout the finished space. The outlet of the reducing coupling shall not extend more than 1 inch below the underside of the ceiling. Pendent sprinklers in suspended ceilings shall be a minimum of 6 inches from ceiling grids.

3.2.3 Reducers

Reductions in pipe sizes shall be made with one-piece tapered reducing
3.2.4 Pipe Penetrations

Cutting structural members for passage of pipes or for pipe-hanger fastenings will not be permitted. Pipes that must penetrate concrete or masonry walls or concrete floors shall be core-drilled and provided with pipe sleeves. Each sleeve shall be Schedule 40 galvanized steel, ductile iron or cast iron pipe and shall extend through its respective wall or floor and be cut flush with each wall surface. Sleeves shall provide required clearance between the pipe and the sleeve per NFPA 13. The space between the sleeve and the pipe shall be firmly packed with mineral wool insulation. Where pipes penetrate fire walls, fire partitions, or floors, pipes shall be fire stopped in accordance with Section 07 84 00 FIRESTOPPING. In penetrations that are not fire-rated or not a floor penetration, the space between the sleeve and the pipe shall be sealed at both ends with plastic waterproof cement that will dry to a firm but pliable mass or with a mechanically adjustable segmented elastomer seal.

3.2.5 Identification Signs

Signs shall be affixed to each control valve, inspector test valve, main drain, auxiliary drain, test valve, and similar valves as appropriate or as required by NFPA 13. Valve identification signs shall be minimum 6 inches wide by 2 inches high with enamel baked finish on minimum 18 gauge steel or 0.024 inch aluminum with red letters on a white background or white letters on red background. Hydraulic design data nameplates shall be permanently affixed to each sprinkler riser as specified in NFPA 13.

3.3 PIPE PAINTING AND COLOR CODE MARKING

Paint and color code mark sprinkler piping system as specified in Section 09 90 00 PAINTS AND COATINGS.

3.4 PRELIMINARY TESTS

The system, including the underground water mains, and the aboveground piping and system components, shall be tested to assure that equipment and components function as intended. The underground and aboveground interior piping systems and attached appurtenances subjected to system working pressure shall be tested in accordance with NFPA 13. Submit request to schedule Preliminary Tests, no later than 14 days prior to the proposed start of the tests. Upon completion of specified tests, the Contractor shall submit for approval a Preliminary Test Report.

3.4.1 Aboveground Piping

3.4.1.1 Hydrostatic Testing

Aboveground piping shall be hydrostatically tested in accordance with NFPA 13.

3.5 FINAL ACCEPTANCE TEST

Final Acceptance Test shall begin only when the Preliminary Test Report has been approved. Submit request to schedule Final Acceptance Test, no later than 14 days prior to the proposed start of the tests. Notification shall include a copy of the Contractor's Material & Test Certificates.
An experienced technician regularly employed by the system installer shall be present during the inspection. The Fire Protection Engineer shall attend the final inspections and tests. At this inspection, repeat any or all of the required tests as directed. Correct defects in work provided by the Contractor, and make additional tests until the systems comply with contract requirements. Furnish appliances, equipment, electricity, instruments, connecting devices, and personnel for the tests. The Government will furnish water for the tests. The Mid Atlantic Division, Naval Facilities Engineering Command, Fire Protection Engineer, will witness formal tests and approve systems before they are accepted. The Contractor shall submit the Final Acceptance Test Report and as-built drawings as specified in the Submittals paragraph.

3.6 ON-SITE TRAINING

Submit request to schedule the On-site Training, at least 14 days prior to the start of related training but prior to the final inspections and tests. The sprinkler contractor shall conduct a training course for operating and maintenance personnel as designated by the Contracting Officer. Training shall be provided for a period of 2 hours of normal working time and shall start after the system is functionally complete and after the Final Acceptance Test. The On-Site Training shall cover all of the items contained in the approved Operating and Maintenance Instructions.

-- End of Section --
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 HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)


AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA 10084 (2005) Standard Methods for the Examination of Water and Wastewater
AWWA B300 (2010; Addenda 2011) Hypochlorites
AWWA B301 (2010) Liquid Chlorine
AWWA C651 (2014) Standard for Disinfecting Water Mains
AWWA C652 (2011) Disinfection of Water-Storage Facilities

AMERICAN WELDING SOCIETY (AWS)


ASME INTERNATIONAL (ASME)

ASME A112.36.2M (1991; R 2012) Cleanouts
ASME B1.20.1 (2013) Pipe Threads, General Purpose (Inch)
ASTM INTERNATIONAL (ASTM)


CAST IRON SOIL PIPE INSTITUTE (CISPI)


COPPER DEVELOPMENT ASSOCIATION (CDA)


INTERNATIONAL CODE COUNCIL (ICC)


MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58 (2002) Standard for Pipe Hangers and
17-0007, Design Dental Treatment & Recovery Rooms at NH100

Supports - Materials, Design and Manufacture

MSS SP-69 (2003; R 2004) Standard for Pipe Hangers and Supports - Selection and Application

MSS SP-73 (2003) Brazing Joints for Copper and Copper Alloy Pressure Fittings

MSS SP-80 (2013) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)


NSF INTERNATIONAL (NSF)


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

SD-03 Product Data

Plumbing System

Diagrams, instructions, and other sheets proposed for posting. Manufacturer's recommendations for the installation of bell and spigot and hubless joints for cast iron soil pipe.

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.

1.3 STANDARD PRODUCTS

1.3.1 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.

1.3.1.1 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."

1.3.1.2 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 REGULATORY REQUIREMENTS

Unless otherwise required herein, plumbing work shall be in accordance with ICC NCPC.

1.6 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.

1.7 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 valves. End point devices such as drinking water fountains, lavatory faucets, kitchen and bar faucets, residential ice makers, supply stops and end point control valves used to dispense water for drinking must meet the requirements of NSF 61, Section 9. Hubless cast-iron soil pipe shall not be installed underground, under concrete floor slabs, or in crawl spaces below kitchen floors. Plastic pipe shall not be installed in air plenums.
2.1.1 Pipe Joint Materials

Solder containing lead shall not be used with copper pipe. Cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Institute. Joints and gasket materials shall conform to the following:

a. Solder Material: Solder metal shall conform to ASTM B 32.

b. Solder Flux: Flux shall be liquid form, non-corrosive, and conform to ASTM B 813, Standard Test 1.

c. PTFE Tape: PTFE Tape, for use with Threaded Metal or Plastic Pipe.


e. Flexible Elastomeric Seals: ASTM D 3139, ASTM D 3212 or ASTM F 477.

2.1.2 Miscellaneous Materials

Miscellaneous materials shall conform to the following:

a. Metallic Cleanouts: ASME A112.36.2M.

b. Hypochlorites: AWWA B300.

c. 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 solder-type connections for tubing. Valves shall conform to the following standards:

<table>
<thead>
<tr>
<th>Description</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronze Gate, Globe, Angle, and Check Valves</td>
<td>MSS SP-80</td>
</tr>
</tbody>
</table>

2.4 MISCELLANEOUS PIPING ITEMS

2.4.1 Pipe Sleeves

Provide where piping passes entirely through walls, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, 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.

2.4.2 Sleeves Not in Masonry and Concrete

Provide 26 gage galvanized steel sheet pipe sleeves.

2.4.3 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.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Piping located in air plenums shall conform to NFPA 90A requirements. Piping located in shafts that constitute air ducts or that enclose air ducts shall be noncombustible in accordance with NFPA 90A. The plumbing system shall be installed complete with necessary fixtures, fittings, traps, valves, and accessories. Water and drainage piping shall be extended as indicated. 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 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.
3.1.4 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 floors. 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.

3.1.2 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.

3.1.2.1 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.

3.1.2.2 Unions

Unions shall not be concealed in walls, ceilings, or partitions. Unions shall be used on pipe sizes 2-1/2 inches and smaller.

3.1.2.3 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 compressor and the
3.1.3 Pipe Sleeves and Flashing

Pipe sleeves shall be furnished and set in their proper and permanent location.

3.1.3.1 Sleeve Requirements

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 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. Pipe sleeves in fire-rated walls shall conform to the requirements in Section 07 84 00 FIRESTOPPING.

3.1.3.2 Pipe Penetrations

Provide sealants for all pipe penetrations. All pipe penetrations shall be sealed to prevent infiltration of air, insects, and vermin.

3.1.4 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.

3.1.5 Supports

3.1.5.1 General

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.

3.1.5.2 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 24 may be used only on trapeze hanger systems or on fabricated frames.

d. Type 40 shields shall:

   (1) Be used on insulated pipe less than 4 inches.
e. 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.

f. 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.

3.1.5.3 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.

3.1.6 Pipe Cleanouts

Pipe cleanouts shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required. 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. Heads of fastening screws shall not project above the cover surface. Where cleanouts are provided with adjustable heads, the heads shall be cast iron.

3.2 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.

3.3 ESCUTCHEONS

Escutcheons shall be provided at finished surfaces where bare or insulated piping, exposed to view, passes through walls. 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.

3.4 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 TESTS, FLUSHING AND DISINFECTION

3.5.1 Plumbing System

The following tests shall be performed on the plumbing system in accordance with ICC NCPC, 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. Water Supply Systems Tests. (Pressure tests shall use water - do not use air pressure)

3.5.2 System Flushing

3.5.2.1 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.

3.5.2.2 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.

3.5.3 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. Operation of each fixture and fixture trim.

c. Operation of each valve and faucet.

3.5.4 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 and booster pump, 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.

3.6 TABLES

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>PIPE AND FITTING MATERIALS FOR DRAINAGE, WASTE, AND VENT PIPING SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SERVICE</td>
</tr>
<tr>
<td>Item #</td>
<td>Pipe and Fitting Materials</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Cast iron soil pipe and fittings hubless, CISPI 301 and ASTM A 888.</td>
</tr>
<tr>
<td></td>
<td>Pipe and fittings shall be marked with the CISPI trademark.</td>
</tr>
</tbody>
</table>

SERVICE:

B - Aboveground Soil, Waste, Drain In Buildings
D - Aboveground Vent
### TABLE II
**PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Pipe and Fitting Materials</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seamless copper pipe,</td>
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<tr>
<td></td>
<td>ASTM B 42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Seamless copper water tube,</td>
<td>X**</td>
<td>X**</td>
<td>X**</td>
<td>X***</td>
</tr>
<tr>
<td></td>
<td>ASTM B 88, ASTM B 88M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cast bronze threaded fittings,</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ASME B16.15 for use with Items 2 and 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wrought copper and bronze solder-joint pressure fittings,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>ASME B16.22 for use with Items 2, 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SERVICE**

A - Cold Water Service Aboveground
B - Hot and Cold Water Distribution 180 degrees F Maximum Aboveground

--- End of Section ---
17-0007, Design Dental Treatment & Recovery Rooms at NH100

SECTION 22 00 70
PLUMBING, HEALTHCARE FACILITIES

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)


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


AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE 1001 (2008) Performance Requirements for Atmospheric Type Vacuum Breakers (ANSI approved 2009)


ASSE 1037 (2015) Performance Requirements for Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA 10084 (2005) Standard Methods for the Examination of Water and Wastewater

AWWA B300 (2010; Addenda 2011) Hypochlorites

AWWA B301 (2010) Liquid Chlorine

and Tape - Hot-Applied

AWWA C606  (2015) Grooved and Shouldered Joints
AWWA C651  (2014) Standard for Disinfecting Water Mains
AWWA C652  (2011) Disinfection of Water-Storage Facilities

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8/A5.8M  (2011; Amendment 2012) Specification for Filler Metals for Brazing and Braze Welding

ASME INTERNATIONAL (ASME)

ASME A112.19.3/CSA B45.4  (2008; R 2013) Stainless Steel Plumbing Fixtures
ASME A112.36.2M  (1991; R 2012) Cleanouts
ASME A112.6.1M  (1997; R 2012) Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use
ASME B1.20.1  (2013) Pipe Threads, General Purpose (Inch)
ASME B16.18  (2012) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.21  (2011) Nonmetallic Flat Gaskets for Pipe Flanges
ASME B16.23  (2011) Cast Copper Alloy Solder Joint Drainage Fittings - DWV
ASME B16.29  (2012) Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASME B16.34  (2013) Valves - Flanged, Threaded and Welding End
ASME B31.1  (2016) Power Piping
<table>
<thead>
<tr>
<th>Standard</th>
<th>Title</th>
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<tbody>
<tr>
<td>ASME B40.100</td>
<td>(2013) Pressure Gauges and Gauge Attachments</td>
</tr>
<tr>
<td>ASME BPVC SEC IV</td>
<td>(2010) BPVC Section IV-Rules for Construction of Heating Boilers</td>
</tr>
<tr>
<td>ASME BPVC SEC IX</td>
<td>(2010) BPVC Section IX-Welding and Brazing Qualifications</td>
</tr>
<tr>
<td>ASME CSD-1</td>
<td>(2016) Control and Safety Devices for Automatically Fired Boilers</td>
</tr>
<tr>
<td>ASTM A516/A516M</td>
<td>(2010; R 2015) Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service</td>
</tr>
</tbody>
</table>
Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications


Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ASTM D3311 (2011; R 2016) Drain, Waste, and Vent (DWV) Plastic Fittings Patterns


CAST IRON SOIL PIPE INSTITUTE (CISPI)


COPPER DEVELOPMENT ASSOCIATION (CDA)


INTERNATIONAL CODE COUNCIL (ICC)


MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-110 (2010) Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
17-0007, Design Dental Treatment & Recovery Rooms at NH100

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>MSS SP-67</td>
<td>(2011) Butterfly Valves</td>
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<tr>
<td>MSS SP-70</td>
<td>(2011) Gray Iron Gate Valves, Flanged and Threaded Ends</td>
</tr>
<tr>
<td>MSS SP-71</td>
<td>(2011; Errata 2013) Gray Iron Swing Check Valves, Flanged and Threaded Ends</td>
</tr>
<tr>
<td>MSS SP-72</td>
<td>(2010a) Ball Valves with Flanged or Butt-Welding Ends for General Service</td>
</tr>
<tr>
<td>MSS SP-78</td>
<td>(2011) Cast Iron Plug Valves, Flanged and Threaded Ends</td>
</tr>
<tr>
<td>MSS SP-80</td>
<td>(2013) Bronze Gate, Globe, Angle and Check Valves</td>
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NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

<table>
<thead>
<tr>
<th>Standard</th>
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<tbody>
<tr>
<td>NEMA 250</td>
<td>(2014) Enclosures for Electrical Equipment (1000 Volts Maximum)</td>
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

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<th>Standard</th>
<th>Description</th>
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NSF INTERNATIONAL (NSF)

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<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>NSF/ANSI 61</td>
<td>(2016) Drinking Water System Components - Health Effects</td>
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PLUMBING AND DRAINAGE INSTITUTE (PDI)

<table>
<thead>
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<th>Standard</th>
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SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

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<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>SAE J1508</td>
<td>(2009) Hose Clamp Specifications</td>
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U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>PL 93-523</td>
<td>(1974; A 1999) Safe Drinking Water Act</td>
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>40 CFR 143</td>
<td>National Secondary Drinking Water Regulations</td>
</tr>
</tbody>
</table>
1.2 SYSTEM DESCRIPTION

Provide complete and operable plumbing systems including sanitary and storm drainage, domestic water, plumbing fixtures, valves, pumps, water heaters, supports, and all associated appurtenances.

1.2.1 Performance Requirements

1.2.1.1 Plumbing Fixtures

Water flow and consumption rates shall, at a minimum, comply with requirements in PL 102-486.

1.2.2 Accessibility of Equipment

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, and equipment requiring access, in locations freely accessible through access doors.

1.3 SUBMITTALS

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

SD-02 Shop Drawings
   Plumbing System

SD-03 Product Data
   Pipe and Fittings
   Pipe Hangers, Inserts, and Supports
   Valves
   Plumbing Fixtures
   Cleanouts
   Plumbing System

SD-06 Test Reports
   Tests, Flushing and Disinfection

SD-07 Certificates
   Materials and Equipment
   Welding
   Bolts
1.4 QUALITY ASSURANCE

1.4.1 Qualifications

1.4.1.1 Manufacturer Qualifications

Manufacturers shall be regularly engaging in the manufacturing, supplying, and servicing of specified products and equipment, as well as, providing engineering and/or start-up services as specified. Provide evidence demonstrating compliance for a minimum of 5 years, and on 5 projects of similar complexity.

1.4.1.2 Installer Qualifications

Installer shall be licensed, and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.

Installation of the following items/systems shall be done by authorized representatives of respective manufacturers:

a. Water Pressure Booster Pump System.

b. Copper-silver Ionization System.

1.4.2 Welding

Weld piping in accordance with qualified procedures using performance-qualified welders and welding operators. Submit a list of names and identification symbols of qualified welders and welding operators. Provide documentation that welders, and welding operators are certified in accordance with American Welding Society Standard AWS B2.1/B2.1M. Qualify procedures and welders in accordance with ASME BPVC SEC IX. Welding procedures qualified by others, and welders and welding operators qualified by another employer, may be accepted as permitted by ASME B31.1. Notify the Contracting Officer 24 hours in advance of tests, and perform the tests at the work site if practicable. Welders or welding operators shall apply their assigned symbols near each weld they make as a permanent record.

1.4.3 Regulatory Requirements

1.4.3.1 International Code Council (ICC) Codes

Unless otherwise required herein, perform plumbing work in accordance with the ICC IPC.

a. For ICC Codes, interpret reference to the "code official" to mean the "Contracting Officer." For Government owned property, interpret references to the "owner" to mean the "Contracting Officer." For leased facilities, interpret references to the "owner" to mean the "lessor." Interpret references to the "permit holder" to mean the "Contractor."

b. 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 Resident Engineer 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.

1.4.4 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.

1.4.5 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.

1.5 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 MAINTENANCE

Provide extra materials as follows:

a. Four additional cartridges for each waterless urinal installed along with any tools needed to remove/install the cartridge. Provide an additional quart of biodegradable liquid for each urinal installed.

b. One spare electrode cell for the copper-silver ionization system.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS

Provide materials and equipment which are the 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. Provide standard products that 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.

2.2 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. See also paragraph "Nameplates" in PART 3.

2.3 MATERIALS AND EQUIPMENT

Submit manufacturer’s catalog data with highlighting to show model, size, options, etc., that are intended for consideration. Provide adequate data to demonstrate compliance with contract requirements. Submit certificate stating that the design, fabrication, and installation conform to the code, where equipment is specified to conform to requirements of the ASME Boiler and Pressure Vessel Code.

a. Cast-iron pipe shall contain a minimum of 100 percent recycled content. Hubless cast-iron soil pipe shall not be installed underground, under concrete floor slabs, or in crawl spaces below kitchen floors.

b. 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/ANSI 61, Section 8. End point devices such as water coolers, lavatory faucets, kitchen and bar faucets, ice makers, supply stops and end point control valves used to dispense water for drinking shall meet the requirements of NSF/ANSI 61, Section 9.

2.4 PIPE AND FITTINGS

2.4.1 Domestic Water Piping

Domestic water piping at service entrance (from 1 foot inside building to 5 feet outside): Same as indicated for outside utilities.

a. 2 inches and smaller after service entrance above grade:

   (1) Copper tube conforming to ASTM B88, type L, with soldered joints and wrought copper ASME B16.22 or cast brass ASME B16.18 fittings.

   (2) Copper tube extracted branch taps with brazed joints are acceptable where the tapped pipe is at least 1 inch diameter and where branch is at least 2 pipe sizes smaller.

   (3) Press fittings for Copper Pipe and Tube: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. Sealing elements for copper press fittings shall be EPDM, FKM or HNBR. Sealing elements shall be factory installed or an alternative supplied fitting manufacturer. Sealing element shall be selected based on manufacturer’s approved application guidelines.

b. Below grade:

   (1) Copper tube conforming to ASTM B88, type K soft, with brazed joints and wrought copper ASME B16.22 fittings.

   (2) Where below-grade run of piping is shorter than 50 feet, below-grade joints are not acceptable.
c. 2-1/2 to 4 inches after service entrance:

(1) Copper tube conforming to ASTM B88, type L, with soldered joints and wrought copper ASME B16.22 or cast brass ASME B16.18 fittings.

(2) Copper tube conforming to ASTM B88, type L, with roll-groove joints and manufactured grooved fittings conforming to ASTM B75/B75M C12200 or ASTM B152/B152M C1100 and ASME B16.22 for wrought copper, or per ASTM B584 copper alloy CDA 836 (85-5-5-5) per ASME B16.18.

d. 5 inches and larger after service entrance:

(1) Seamless or welded, hot-dipped galvanized steel conforming to ASTM A53/A53M or ASTM B36/B36M with roll grooved joints and galvanized, malleable-iron, grooved fittings and couplings.

(2) Copper tube conforming to ASTM B88, type L, with soldered joints and wrought copper ASME B16.22 fittings.

(3) Copper tube conforming to ASTM B88, type L, with roll-groove joints and manufactured grooved fittings conforming to ASTM B75/B75M C12200 or ASTM B152/B152M C1100 and ASME B16.22 for wrought copper, or per ASTM B584 copper alloy CDA 836 (85-5-5-5) per ASME B16.18.

2.4.2 Deionized Water Piping

CPVC Plastic Pipe, Fittings, and Solvent Cement: ASTM D2846/D2846M, Schedule 40 CPVC. Provide transition union connections or threaded gate valve between copper tubing and chlorinated polyvinyl chloride (CPVC) piping. Provide male threaded adapters with PTFE (polytetrafluoroethylene) pipe thread paste for threaded connections to valves, strainers, and equipment.

2.4.3 Drainage Piping (Soil, Waste, Vent, Indirect, and Storm)

a. Above grade:

(1) Cast-iron conforming to ASTM A74, hubbed pipe and fittings with ASTM C564 elastomeric push joints.

(2) Cast-iron conforming to CISPI 301 or ASTM A888, hubless pipe, fittings, and CISPI 310 elastomeric sealing sleeves with stainless-steel or cast iron clamps.

(3) Copper tube conforming to ASTM B306, type DWV or heavier, with soldered joints and wrought copper ASME B16.29 or cast brass ASME B16.23 drainage and vent fittings. Piping within MRI shielding shall be copper.

(4) Seamless or welded, hot-dipped galvanized steel conforming to ASTM A53/A53M or ASTM B36/B36M, cast iron drainage type fittings, galvanized malleable vent fittings and threaded joints.

b. Below grade: Cast-iron conforming to ASTM A74, hubbed pipe and fittings with ASTM C564 elastomeric push joints.
2.4.4 Drainage Piping (Corrosive Waste)

a. Above grade:

   (1) Corrosive waste borosilicate glass conforming to ASTM C1053, with mechanical joints and borosilicate glass fittings.

   (2) Corrosive waste cast iron (14 percent silica) pipe and fittings conforming to ASTM A518/A518M and ASTM A861. Mechanical joints, and bell and spigot joints are acceptable in exposed (accessible) locations. Bell and spigot joints only are acceptable in concealed (non-accessible) locations.

   (3) Corrosive waste Schedule 40 fire retardant polypropylene DWV pipe and fittings conforming to ASTM D4101, ASTM F1412, ASTM D635, and ASTM D3311. Mechanical joints, and fused joints are acceptable in exposed (accessible) locations. Fused joints only are acceptable in concealed (non-accessible) locations.

   (4) Chlorinated Polyvinyl Chloride Chemical DWV piping system complying with ASTM F2618 and socket (solvent cement) joints.

b. Below grade:

   (1) Corrosive waste cast iron (14 percent silica) pipe and fittings conforming to ASTM A518/A518M and ASTM A861, with bell and spigot joints.

   (2) Corrosive waste Schedule 80 polypropylene DWV pipe and fittings conforming with ASTM D4101 and ASTM D3311 with fused joints.

   (3) Chlorinated Polyvinyl Chloride Chemical DWV piping system complying with ASTM F2618 and socket (solvent cement) joints.

2.4.5 Pressure Drainage Piping

a. Cast iron pressure pipe and fittings, with mechanical joints.

b. Galvanized steel, cast iron drainage fittings with threaded joints.

2.4.6 Exposed Piping in Finished Areas

a. Chrome or nickel plated brass to wall or floor.

b. Piping 2 inches and larger may be provided with chrome or nickel plated brass sleeves to cover pipe and fittings in lieu of plating.

2.4.7 Trap Primer Pipe Between Primer Device and Drain

a. Above grade: Copper tube conforming to ASTM B88, type K or L, with soldered joints and wrought copper ASME B16.22 or cast brass ASME B16.18 fittings.

b. Below grade: Copper tube conforming to ASTM B88, type K soft, with soldered joints and wrought copper ASME B16.22 or cast brass ASME B16.18 fittings.
2.5 PIPE JOINT MATERIALS

Grooved pipe and hubless cast-iron soil pipe shall not be used underground. Solder containing lead shall not be used with copper pipe. Mark cast iron soil pipe and fittings with the collective trademark of the Cast Iron Soil Pipe Institute. Joints and gasket materials shall conform to the following:

a. Coupling for Cast-Iron Pipe: for hub and spigot type ASTM A74, AWWA C606. For hubless type: CISPI 310


d. Flange Gaskets: Gaskets shall be made of non-asbestos material in accordance with ASME B16.21. Gaskets shall be flat, 1/16 inch thick, and contain Aramid fibers bonded with Styrene Butadiene Rubber (SBR) or Nitro Butadiene Rubber (NBR). Gaskets shall be the full face or self centering flat ring type. Gaskets used for hydrocarbon service shall be bonded with NBR.

e. Brazing Material: Brazing material shall conform to AWS A5.8/A5.8M, BCuP-5.

f. Brazing Flux: Flux shall be in paste or liquid form appropriate for use with brazing material. Flux shall be as follows: lead-free; have a 100 percent flushable residue; contain slightly acidic reagents; contain potassium borides; and contain fluorides.

g. Solder Material: Solder metal shall conform to ASTM B32 and be Code approved "Lead Free" having a chemical composition equal to or less than 0.2 percent lead.

h. Solder Flux: Flux shall be liquid form, non-corrosive, Code approved "Lead Free" and conform to ASTM B813, Standard Test 1.

i. PTFE Tape: PTFE Tape, for use with Threaded Metal or Plastic Pipe.


n. Flanged fittings including flanges, bolts, nuts, bolt patterns, etc., shall be in accordance with ASME B16.5 class 150 and shall have the manufacturer's trademark affixed in accordance with MSS SP-25. Flange material shall conform to ASTM A105/A105M. Blind flange material shall conform to ASTM A516/A516M cold service and ASTM A515/A515M for hot service. Bolts shall be high strength or intermediate strength with material conforming to ASTM A193/A193M. Submit written certification by the bolt manufacturer that the bolts furnished comply with the
specified requirements.

2.6 MISCELLANEOUS MATERIALS

Miscellaneous materials shall conform to the following:


c. Asphalt Roof Cement: ASTM D2822/D2822M.

d. Hose Clamps: SAE J1508.

e. Supports for Off-The-Floor Plumbing Fixtures: ASME A112.6.1M.

f. Metallic Cleanouts: ASME A112.36.2M.

g. 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.

h. Coal-Tar Protective Coatings and Linings for Steel Water Pipelines: AWWA C203.

i. Hypochlorites: AWWA B300.

j. Liquid Chlorine: AWWA B301.

k. Gauges - Pressure Indicating Dial Type - Elastic Element: ASME B40.100.

l. Thermometers: ASTM E1. Mercury shall not be used in thermometers.

2.7 PIPE INSULATION MATERIAL

Provide insulation as specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

2.8 PIPE HANGERS, INSERTS, AND SUPPORTS

Provide pipe hangers, inserts, and supports conforming to MSS SP-58. Hangers in MRI Suite shall be non-ferrous (copper, aluminum, stainless steel).

2.9 VALVES

Provide valves 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. Valves 3 inches and larger shall have flanged iron bodies and bronze trim. Pressure ratings shall be based upon the application. Grooved end valves may be provided if the manufacturer certifies that the valves meet the performance requirements of applicable MSS standard. Valves shall conform to the following standards:
<table>
<thead>
<tr>
<th>Description</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butterfly Valves</td>
<td>MSS SP-67</td>
</tr>
<tr>
<td>Cast-Iron Gate Valves, Flanged and Threaded Ends</td>
<td>MSS SP-70</td>
</tr>
<tr>
<td>Cast-Iron Swing Check Valves, Flanged and Threaded Ends</td>
<td>MSS SP-71</td>
</tr>
<tr>
<td>Ball Valves with Flanged Butt-Welding Ends for General Service</td>
<td>MSS SP-72</td>
</tr>
<tr>
<td>Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends</td>
<td>MSS SP-110</td>
</tr>
<tr>
<td>Cast-Iron Plug Valves, Flanged and Threaded Ends</td>
<td>MSS SP-78</td>
</tr>
<tr>
<td>Bronze Gate, Globe, Angle, and Check Valves</td>
<td>MSS SP-80</td>
</tr>
<tr>
<td>Steel Valves, Socket Welding and Threaded Ends</td>
<td>ASME B16.34</td>
</tr>
<tr>
<td>Cast-Iron Globe and Angle Valves, Flanged and Threaded Ends</td>
<td>MSS SP-85</td>
</tr>
<tr>
<td>Backwater Valves</td>
<td>ASME A112.14.1</td>
</tr>
<tr>
<td>Vacuum Relief Valves</td>
<td>ANSI Z21.22/CSA 4.4</td>
</tr>
<tr>
<td>Water Pressure Reducing Valves</td>
<td>ASSE 1003</td>
</tr>
<tr>
<td>Water Heater Drain Valves</td>
<td>ASME BPVC SEC IV, Part HLW-810</td>
</tr>
<tr>
<td>Trap Seal Primer Valves</td>
<td>ASSE 1018</td>
</tr>
<tr>
<td>Temperature and Pressure Relief Valves for Hot Water Supply Systems</td>
<td>ANSI Z21.22/CSA 4.4</td>
</tr>
<tr>
<td>Temperature and Pressure Relief Valves for Automatically Fired Hot Water Boilers</td>
<td>ASME CSD-1 Safety Code, Part CW, Article 5</td>
</tr>
</tbody>
</table>

2.10 **PLUMBING FIXTURES**

2.10.1 General

Fixtures shall be water conservation type, in accordance with **ICC IPC**. Fixtures for use by the physically handicapped shall be in accordance with **ICC A117.1 COMM**. Provide vitreous china fixtures that are nonabsorbent, hard-burned, and vitrified throughout the body. No fixture will be accepted that shows cracks, crazes, blisters, thin spots, or other flaws. Equip fixtures with appurtenances such as traps, faucets, stop valves, and drain fittings. Each fixture and piece of equipment requiring connections to the drainage system 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, shower mixing valves, shower head face plates, 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 shall be copper alloy with all visible surfaces chrome plated. Maximum allowable lead content in wetted surfaces of pipes, pipe
17-0007, Design Dental Treatment & Recovery Rooms at NH100

fittings, plumbing fittings and fixtures, as determined by a weighted average shall not exceed 0.25 percent.

2.10.2 Flushometer Valves

Provide flushometer valves with an ADA compliant, metal oscillating, non-hold-open handle, backcheck angle control stop, and vacuum breaker. Flushometer valves shall be either a large diaphragm, or fixed volume piston type with filtered metering bypass. Valve shall not be able to be converted externally or internally to exceed a low consumption flush. Handle packing, main seat, stop seat and vacuum breaker shall be molded from a chloramine resistant rubber compound. Provide valve body, cover, tailpiece and control stop in conformance with ASTM Alloy Classification for semi-red brass. All exposed surfaces shall be chrome plated. Handle shall have factory applied antimicrobial coating. Flushometer valves shall conform to ASSE 1037.

2.10.3 Automatic Controls

Where specified with a fixture, provide automatic, sensor operated faucets complying with ASSE 1037 and UL 1951. Faucet systems shall consist of solenoid-activated valves with light beam sensors.

2.10.4 Fixture Descriptions

2.10.4.1 Sinks

Provide ASME A112.19.3/CSA B45.4, Type 302(18-8) or 304(18-8) stainless steel sinks with integral mounting rim for flush installation, with undersides fully sound deadened, with supply openings for use with top mounted faucet, and with 3.5 inch drain outlet. Sink depth less than or equal to 10 inch shall be 18 gage. Sink depth greater than 10 inch shall be 16 gage. Provide aerator with faucet. Water flow rate shall not exceed 1.5 gpm when measured at a flowing water pressure of 60 psi. Provide chrome plated 3/8 inch OD soft-copper tube supplied with set-screw escutcheons, and loose key stops. Provide chrome plated 1-1/2 inch semi-cast P-trap with cleanout with 17 gage x 1-1/2 inch chrome plated copper tube arm with set-screw escutcheon. Provide separate 1.5 inch P-trap and drain piping to vertical vent piping from each compartment. Coordinate hole quantities, locations, and centerings with faucet types indicated in fixture descriptions. Provide exact numbers of holes necessary. Use of faucet hole covers is not acceptable. Dimensions given are overall, and bowl in the following order: front to back, left to right, depth. Sinks located in casework designated as handicap accessible shall be same as specified except the basin depth shall not be greater than 6-1/2 inches and the drain outlet shall be located to the rear of the basin.

2.10.4.1.1 S-1 (JSN CS010)

Single bowl, counter-mounted, 18 x 15 x 6-1/2 inches, bowl 12 x 12 x 6-1/2 inches. Drain outlet shall be located to the rear of the basin. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.2 S-2 (JSN CS080)

Single bowl, counter-mounted, 20 x 22 x 7-1/2 inches, bowl 14 x 18 x 7-1/2 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.
2.10.4.1.3  S-3 (JSN CS090)

Single bowl, counter-mounted, 22 x 22 x 7-1/2 inches, bowl 16 x 19 x 7-1/2 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.4  S-4 (JSN CS140)

Single bowl, counter-mounted, 22 x 17 x 10 inches, bowl 16 x 14 x 10 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.5  S-5 (JSN CS150)

Single bowl, counter-mounted, 22 x 22 x 10 inches, bowl 16 x 19 x 10 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.6  S-6 (JSN CS180)

Single bowl, counter-mounted, 22 x 25 x 12 inches, bowl 16 x 22 x 12 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.7  S-7 (JSN CS200)

Single bowl, counter-mounted, 22 x 31 x 12 inches, bowl 16 x 28 x 12 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.8  S-8 (JSN CS230)

Double bowl, counter-mounted, 22 x 33 x 10 inches, each bowl 16 x 14 x 10 inches. Faucet shall be 8 inch spread, single handle, swing spout.

2.10.4.1.9  S-9 (JSN CS250)

Single bowl, counter-mounted, 15 x 15 x 6 inches, bowl 9 x 12 x 6 inches. Faucet shall be 4 inch centerset with two 4 inch wristblades and 5 inch diameter fixed gooseneck spout.

2.10.4.1.10  S-10 (JSN P3520)

Sink, plaster, 22 x 30 x 9-1/2 inches; vitreous china; faucet with 2 inch spray, 6 inch handles, screwdriver stops, grid drain 1-1/2 inch tailpieces, 2 inch O.D. drain connection to trap and wall; plaster-interceptor trap (PT-1), space shall be left above for removal of screens. Provide with floor-mounted heavy-duty type sink carrier with acid-resisting white coated exposed arms and hanger support plate.

2.10.4.2  Sink, Flushing Rim

SF-1 (JSN P6350): 30 x 20 x 18 inches; vitreous china with an integral flushing rim to include faucet with fork brace 6 inch handles, 10-1/4 inches wall to spout outlet, and plain end spout with bucket hook; stainless steel spring type front and side rim guards and 4 inch outlet. Provide flushometer valve. Provide 10 inch high terrazzo base.
2.10.4.3 Sink, Surgeons Scrub

2.10.4.3.1 SSS-1 (JSN P6980)

Three station, wall-mounted, gooseneck spouts, knee push controls. Construction shall be of seamless welded 16 gauge, Type 304, stainless steel. Cabinet shall be sound-deadened with a fire-resistant material. Unit shall be wall mounted using a mounting carrier. Front panels shall be easily removed for access to the water control valves, waste connections, stops and strainers. Sink bottoms shall be sloping to minimize splashing and a 1-1/2 inch OD tailpiece with an 3 inch flat strainer drain. Provide each compartment (station) with a gooseneck assembly with a 1-1/2 inch sprayhead that can be removed for sterilization. Provide adjustable thermostatic mixing valve with anti-scald feature for each compartment and controlled from the top mounted control panel. Provide mechanical pilot type water control valves for each compartment actuated by one push of a knee-operated front panel and turned off by a second push. Plastic splash shield shall be provided between compartments. Provide knee-controlled soap dispensers at each compartment.

2.10.4.3.2 SSS-2 (Similar to JSN P6990)

Three station, wall-mounted, gooseneck spouts, electronically timed with long (10 minute) and short (3, 4, 5 minute) cycles. Construction shall be of seamless welded 16 gauge, Type 304, stainless steel. Cabinet shall be sound-deadened with a fire-resistant material. Unit shall be wall mounted using a mounting carrier. Front panels shall be easily removed for access to the water control valves, waste connections, stops and strainers. Sink bottoms shall be sloping to minimize splashing and a 1-1/2 inch OD tailpiece with an 3 inch flat strainer drain. Provide each compartment (station) with a gooseneck assembly with a 1-1/2 inch sprayhead that can be removed for sterilization. Provide adjustable thermostatic mixing valve with anti-scald feature for each compartment and controlled from the top mounted control panel. Control shall be watertight and top mounted. Timing device shall be internal to reduce tampering. Plastic splash shield shall be provided between compartments. Provide foot-controlled soap dispensers at each compartment. Sink shall include 120 volt, 2 ampere power to an internal junction box.

2.11 CLEANOUTS

a. Provide cleanouts with coated cast-iron bodies (unless otherwise noted) with extra-heavy, threaded, tapered, brass plug with solid hexagonal nut and American Standard pipe threads. Provide flashing collars and clamps for cleanout bodies being installed in floors with finishes installed over waterproofing. Cleanouts on piping completely accessible from within pipe chases do not require covers. Cleanouts in exposed piping in equipment rooms do not require covers.

b. Provide interior floor-mounted cleanouts with a two-piece, threaded, adjustable housing. Provide top and cover based on floor finish:

(1) Resilient tile and sheet finish: Round flange top with scoriated cover.

(2) Ceramic tile finish: Square flange top with scoriated cover.

(3) Poured finish: Round, wide-flange top with scoriated cover.
(4) Carpet finish: Round top with standard top tapped for carpet-marker bolt.

(5) Terrazzo finish: Round top with recessed-for-terrazzo cover.

(6) Quarry tile finish: Square, heavy-duty top with heavy-duty scoriated cover.

(7) Concrete finish (unfinished areas): Heavy, round frame; satin-bronze, scoriated tractor top, ANSI heavy duty load class.

c. Provide isolation cleanouts with a lower and an upper flashing collar, flashing clamps with seepage openings, and adjustable ferrule with 4 inch diameter bronze top. Ferrule shall be tapped for cleanout plug. Seal ferrule to lower clamping collar with press-fit neoprene gasket. Seal cleanout plug with neoprene gasket.

2.12 TRAPS

2.12.1 Fixture Traps

Unless otherwise specified, traps shall be copper-alloy adjustable tube type with slip joint inlet and swivel. Traps shall be with a cleanout. Provide traps with removable access panels for easy clean-out at sinks and lavatories. Tubes shall be copper alloy with walls not less than 0.032 inch thick within commercial tolerances, except on the outside of bends where the thickness may be reduced slightly in manufacture by usual commercial methods. Inlets shall have rubber washer and copper alloy nuts for slip joints above the discharge level. Swivel joints shall be below the discharge level and shall be of metal-to-metal type as required for the application. Nuts shall have flats for wrench grip. Outlets shall have internal pipe thread, except that when required for the application, the outlets shall have sockets for solder-joint connections. The depth of the water seal shall be not less than 2 inches and not more than 4 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. A copper alloy "P" trap assembly consisting of an adjustable "P" trap and threaded trap wall nipple with cast brass wall flange shall be provided for lavatories. The assembly shall be a standard manufactured unit and may have a rubber-gasketed swivel joint.

2.12.2 Drain Traps

Unless otherwise specified, traps shall be cast iron, one piece pattern, deep seal with depth of water seal of 4 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. The trap assembly shall be a standard manufactured unit. Traps for drains located in fan and plenum housings shall maintain seal against the static pressure.

2.13 TRAP PRIMER ASSEMBLIES

Provide fully automatic trap primer assemblies, factory assembled and prepiped and including 3/4 inch NPT female inlet, bronze body 3/4 inch female NPT ball valve, 3/4 inch water hammer arrester, ASSE 1001 atmospheric vacuum breaker, and ASTM B88 3/4 inch Type L copper tubing distribution manifold. Distribution manifold shall be calibrated to provide equal water distribution to each trap. Provide minimum supply of 2 ounces of water to each trap. Provide manifold with 5/8 inch x 1/2 inch
compression fitting outlets. All solder joints shall be made with lead free solder. Provide electronic assembly tested and certified per UL 73 and including circuit breaker, 5 second dwell function, manual override, 24 hour geared timer, and solenoid valve. Provide single point water supply and power supply connections. Components shall be installed in a NEMA 250 Type 1 recessed cabinet.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

3.2 GENERAL INSTALLATION REQUIREMENTS

a. 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. The plumbing system shall be installed complete with necessary fixtures, fittings, traps, valves, and accessories. Piping shall be concealed wherever possible. Under no circumstances reduce pipe size on Contract Documents without written consent of Contracting Officer. Extend water and drainage piping 5 feet outside the building, unless otherwise indicated. A 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 when otherwise shown. Exterior underground utilities shall be at least 12 inches below the average local frost depth or 18 inches below finish grade whichever is greater. 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.

b. Provide piping to fixtures, outlets, and equipment requiring drainage, vent, and water utilities. 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.

c. 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.

d. 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.

e. Branch sizes to individual fixtures shall be as scheduled. Consult manufacturer's data, Architectural drawings, and/or Plumbing drawings of rooms containing equipment and plumbing fixtures prior to roughing in piping. Stub piping through wall directly behind equipment item, or fixture being served. Connect equipment furnished by Owner or other divisions of the specification in accordance with this section.

3.3 DOMESTIC WATER PIPING SYSTEMS

3.3.1 General

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.

3.3.2 Valves

Provide manual isolation valves at base of risers, on branch runouts from piping mains, on each branch serving a rest room, on each branch serving an equipment item, and on each branch to hose bibb or wall hydrant.

3.3.3 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, or manufactured expansion fittings. Risers shall be securely anchored 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. If mechanical grooved pipe coupling systems are provided, the deviation from design requirements for expansion and contraction may be allowed pending approval of Contracting Officer.

3.3.4 Thrust Restraint

Plugs, caps, tees, valves and bends deflecting 11.25 degrees or more,
either vertically or horizontally, in waterlines 4 inches in diameter or larger shall be provided with thrust blocks, to prevent movement. Thrust blocking shall be concrete of a mix not leaner than: 1 cement, 2.5 sand, 5 gravel; and having a compressive strength of not less than 2000 psi after 28 days. Blocking shall be placed between solid ground and the fitting to be anchored. Unless otherwise indicated or directed, the base and thrust bearing sides of the thrust block shall be poured against undisturbed earth. The side of the thrust block not subject to thrust shall be poured against forms. The area of bearing will be as shown. Blocking shall be placed so that the joints of the fitting are accessible for repair. Steel rods and clamps, protected by galvanizing or by coating with bituminous paint, shall be used to anchor vertical down bends into gravity thrust blocks.

3.3.5 Commercial-Type Water Hammer Arresters

Provide commercial-type water hammer arresters on hot- and cold-water supplies. Arresters shall be located as generally indicated, with precise location and sizing to be in accordance with PDI WH 201 Sizing and Placement Data. Water hammer arresters, where concealed, shall be accessible by means of access doors or removable panels. Commercial-type water hammer arresters shall conform to ASSE 1010. Vertical capped pipe columns (air chambers) shall not be permitted.

3.3.6 Water Meter Remote Readout Register

a. Provide true absolute remote readout encoder register providing direct electronic transfer of meter reading information from water meter to automatic meter reading device. The remote register shall be mounted at the location indicated, or as directed by the Contracting Officer.

b. Provide permanently sealed register to exclude dirt and/or moisture infiltration. Provide with a straight reading odometer-type display, and 360 degree test circle with center sweep hand and low flow (leak) detector. Provide tamperproof locking feature to resist tampering with the register. Provide factory potted moisture resistant wire assembly for pit applications.

c. Provide registers with full 6-wheel encoding, and a 6-wheel odometer assembly for direct manual reading. The register shall transmit data using open architecture variable length protocol in ASCII format (American Standard Code for Information Interchange). Provide with capacity of remote installation up to 300 feet to an outside wall mounted touch pad.

d. The register shall use an absolute encoder to directly read the actual position of the index odometer wheels, when interrogated by a reading device. The reading device shall provide all necessary power. Pulse outputs and/or memory shall not require programming. The register shall not require battery power to operate. When a reading device interrogates the register, the translator encoder shall communicate to the device in ASCII computer language the absolute meter reading, and an eight-digit identification number. Any error or nonread shall be immediately indicated by the meter reading equipment.

3.3.7 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 ICC IPC 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. Reduced pressure principle backflow prevention devices shall be installed horizontally and located in an accessible location not more than 4 feet above finished floor. Pipe drain from reduced pressure principle backflow prevention devices to the exterior, or a floor drain of adequate capacity, or a mop sink.

3.3.8 Copper-Silver Ionization Systems

3.3.8.1 System Bypass

Provide 3 valve bypass around system.

3.3.8.2 Testing

Provide one year of laboratory testing from distal sites for copper and silver ion levels to demonstrate appropriate levels for copper and silver. Copper level shall be 0.2 to 0.4 mg/L over baseline not to exceed Safe Drinking Water Act (40 CFR 143) level of 1.0 mg/L (1.3 mg/L is enforceable limit by EPA unless the applicable State has established a lower level). Silver level shall be 0.03 to 0.05 mg/L over baseline not to exceed Safe Drinking Water Act (40 CFR 143) of 0.1 mg/L (no maximum enforceable limit). Provide one test per quarter during the first year following Government acceptance of the facility. Provide factory test certifications attesting unit performance is meeting the requirements of this specification.

3.4 DRAINAGE AND VENT PIPING SYSTEMS

3.4.1 General

a. Provide wye fittings and eighth bends, or combination wye and eighth fittings at changes of direction and junctions. Sanitary tee fittings shall only be used in vertical pipe. Sanitary crosses are not permitted. Provide P-trap for each direct waste-pipe connection to equipment. Provide ice makers with an indirect drain consisting of either a floor sink or a dedicated, under-counter P-trap. Provide air gaps at indirect drains.

b. Install horizontal soil, waste, and storm piping with the following minimum slopes; 3 inch and smaller pipes shall be 1/4 inch per foot; 4 inch to 6 inch shall be 1/8 inch per foot; 8 inch and larger pipes: 1/16 inch per foot. Slopes indicated on plans override those indicated here.

c. Provide vent stacks parallel to soil and waste stacks to receive branch vents from fixtures. Each vent stack shall originate from a soil or waste stack at its base. To permit proper flashing, offset...
through-the-roof piping away from walls on roof before passing through roof. Carry vent stacks 4 inch and larger full size through roof. Install vent lines so they will drain and not trap water. Where possible combine soil, waste or vent stacks before passing through roof to minimize roof openings. Where minimum vent-through-roof size is larger than vent size, provide increaser a minimum of 12 inch below roof line.

d. Provide drip pans under drainage piping installed over critical areas to include but not limited to: operating rooms, recovery rooms, delivery rooms, nurseries, food preparation areas, food serving areas, food storage areas, central service areas, and electronic data processing areas. Provide drain piping from drip pans. Discharge drain piping to drain in exposed area.

e. Installed piping shall not be insulated, concealed, or furred around until it has been tested to satisfaction of the Contracting Officer. If inspection or test indicates defects, replace such defective work or material and repeat inspection and tests. Repairs shall be made with new materials. Peening and chiseling of holes or screwed joints is not allowed.

3.4.2 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 location 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 shall be T-pattern, 90-degree branch drainage fittings with cast-brass screw plugs. Plugs shall be the same size as the pipe up to and including 4 inches. Cleanout tee branches with screw plug shall be installed at the foot of 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 cast iron. Provide cleanout extensions through floor above where cleanouts are required in piping above critical areas, or to an accessible location outside of critical area.

3.4.3 Sight Drains

Sight drains shall be installed so that the indirect waste will terminate 2 inches above the flood rim of the funnel to provide an acceptable air gap.
3.4.4 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 for acid-resisting waste shall be of the same material as the pipe.

3.5 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.

3.5.1 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.

3.5.2 Mechanical Couplings

Grooved mechanical joints shall be prepared according to the coupling manufacturer's instructions. Pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, or narrow-land micrometer. Groove width and dimension of groove from end of the pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations, such as behind solid walls or ceilings, unless an access panel is shown on the drawings for servicing or adjusting the joint.

3.5.3 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.

3.5.4 Grooved Mechanical Joints

Grooves shall be prepared according to the coupling manufacturer's instructions. Grooved fittings, couplings, and grooving tools shall be products of the same manufacturer. Pipe and groove dimensions shall comply with the tolerances specified by the coupling manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application. Groove width and dimension of groove from end of pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations.

3.5.5 Cast Iron Soil Pipe

Bell and spigot compression and hubless gasketed clamp joints for soil,
waste and vent piping shall be installed per the manufacturer's recommendations.

### 3.5.6 Copper Tube and Pipe

#### 3.5.6.1 Brazed Joint

In conformance with AWS B2.2/B2.2M 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.

#### 3.5.6.2 Soldered Joint

Make with flux. Soldered joints shall conform to ASME B31.5 and CDA A4015.

#### 3.5.6.3 Mechanically Extracted Joint

Make in accordance with ICC IPC.

#### 3.5.6.4 Press Connection

Make copper press connections in strict accordance with the manufacturer's installation instructions for manufactured rated size. The joints shall be pressed using the tool(s) approved by the manufacturer of that joint. Minimum distance between fittings shall be in accordance with the manufacturer's requirements.

### 3.6 Pipe Sleeves and Flashing

Pipe sleeves shall be furnished and set in their proper and permanent location.

#### 3.6.1 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 with sealants conforming to ASTM C920 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 concrete 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.

3.6.2 Flashing Requirements

Pipes passing through roof shall be installed through a 16 ounce copper flashing, each within an integral skirt or flange. Flashing shall be suitably formed, and the skirt or flange shall extend not less than 8 inches from the pipe and shall be set over the roof or floor membrane in a solid coating of bituminous cement. The flashing shall extend up the pipe a minimum of 10 inches. For cleanouts, the flashing shall be turned down into the hub and caulked after placing the ferrule. Pipes passing through pitched roofs shall be flashed, using lead or copper flashing, with an adjustable integral flange of adequate size to extend not less than 8 inches from the pipe in all directions and lapped into the roofing to provide a watertight seal. The annular space between the flashing and the bare pipe or between the flashing and the metal-jacket-covered insulation shall be sealed as indicated. Flashing for dry vents shall be turned down into the pipe to form a waterproof joint. Pipes, up to and including 10 inches in diameter, passing through roof or floor waterproofing membrane may be installed through a cast-iron sleeve with caulking recess, anchor lugs, flashing-clamp device, and pressure ring with brass bolts. Flashing shield shall be fitted into the sleeve clamping device. Pipes passing through wall waterproofing membrane shall be sleeved as described above. A waterproofing clamping flange shall be installed.

3.6.3 Optional Counterflashing

Instead of turning the flashing down into a dry vent pipe, or caulking and sealing the annular space between the pipe and flashing or metal-jacket-covered insulation and flashing, counterflashing may be accomplished by utilizing the following:

a. A standard roof coupling for threaded pipe up to 6 inches in diameter.

b. A tack-welded or banded-metal rain shield around the pipe.

3.6.4 Pipe Penetrations of Slab on Grade Floors

Where pipes, fixture drains, floor drains, cleanouts or similar items penetrate slab on grade floors, except at penetrations of floors with
waterproofing membrane as specified in paragraphs Flashing Requirements and Waterproofing, 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.

3.6.5 Pipe Penetrations

Provide sealants for all pipe penetrations. All pipe penetrations shall be sealed to prevent infiltration of air, insects, and vermin.

3.6.6 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.

3.7 PIPE HANGERS, INSERTS, AND SUPPORTS

Installation of pipe hangers, inserts and supports shall conform to MSS SP-58, except as modified herein.

a. Type 1, provide with adjustable type steel support rods.

b. Types 5, 12, and 26 shall not be used.

c. Type 3 shall not be used on insulated pipe.

d. 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.

e. Type 19 and 23 C-clamps shall be used for attachment to steel joists and shall be torqued per MSS SP-58. Provide both locknuts and retaining devices furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.

f. Type 20 attachments shall be used on steel angles and vertical web steel channels and shall be furnished with an added malleable-iron heel plate or adapter. Attach to horizontal web steel channel with drilled hole on centerline and double nut and washer.

g. Type 21, 28, 29, and 30 clamps shall be used for attachment to steel W or S beams.

h. Type 24 may be used only on trapeze hanger systems or on fabricated frames.

i. 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.

j. 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.

k. Horizontal pipe supports shall be spaced as specified in MSS SP-58 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.

l. 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.

m. 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:

10. 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 than 60 degrees F a Type 40 shield, attached to the pipe or insulation, may freely rest on a steel plate.

n. 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.

o. 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.

p. 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.

q. 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
3.7.1 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.

3.8 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. Drain lines and hot water lines of fixtures for handicapped/accessible fixtures shall be insulated and do not require polished chrome finish. Plumbing fixtures and accessories shall be installed within the space shown.

3.8.1 Fixture Connections

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.

3.8.2 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 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. Bumpers for water closet seats shall be installed on the wall.

3.8.3 Height of Fixture Rims Above Floor

Unless otherwise noted, mounting heights shall be as indicated. Installation of fixtures for use by the physically handicapped shall be in accordance with ICC A117.1 COMM.

3.8.4 Shower Bath Outfits

The area around the water supply piping to the mixing valves and behind the escutcheon plate shall be made watertight by caulking or gasketing.
3.8.5 Fixture Supports

Fixture supports for off-the-floor lavatories, urinals, water closets, and other fixtures of similar size, design, and use, shall be of the chair-carrier type. The carrier shall provide the necessary means of mounting the fixture, with a foot or feet to anchor the assembly to the floor slab. Adjustability shall be provided to locate the fixture at the desired height and in proper relation to the wall. Support plates, in lieu of chair carrier, shall be fastened to the wall structure only where it is not possible to anchor a floor-mounted chair carrier to the floor slab.

3.8.5.1 Support for Solid Masonry Construction

Chair carrier shall be anchored to the floor slab. Where a floor-anchored chair carrier cannot be used, a suitable wall plate shall be imbedded in the masonry wall.

3.8.5.2 Support for Concrete-Masonry Wall Construction

Chair carrier shall be anchored to floor slab. Where a floor-anchored chair carrier cannot be used, a suitable wall plate shall be fastened to the concrete wall using through bolts and a back-up plate.

3.8.5.3 Support for Steel Stud Frame Partitions

Chair carrier shall be used. The anchor feet and tubular uprights shall be of the heavy duty design, and feet (bases) shall be steel and welded to a square or rectangular steel tube upright. Wall plates, in lieu of floor-anchored chair carriers, shall be used only if adjoining steel partition studs are suitably reinforced to support a wall plate bolted to these studs.

3.8.5.4 Support for Wood Stud Construction

Where floor is a concrete slab, a floor-anchored chair carrier shall be used. Where entire construction is wood, wood crosspieces shall be installed. Fixture hanger plates, supports, brackets, or mounting lugs shall be fastened with not less than No. 10 wood screws, 1/4 inch thick minimum steel hanger, or toggle bolts with nut. The wood crosspieces shall extend the full width of the fixture and shall be securely supported.

3.8.5.5 Wall-Mounted Water Closet Gaskets

Where wall-mounted water closets are provided, reinforced wax, treated felt, or neoprene gaskets shall be provided. The type of gasket furnished shall be as recommended by the chair-carrier manufacturer.

3.8.6 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.

3.8.7 Shower Pans

Before installing shower pan, subfloor shall be free of projections such as nail heads or rough edges of aggregate. Drain shall be a bolt-down, clamping-ring type with weepholes, installed so the lip of the subdrain is
flush with subfloor.

3.8.7.1 General

The floor of each individual shower, the shower-area portion of combination shower and drying room, and the entire shower and drying room where the two are not separated by curb or partition, shall be made watertight with a shower pan fabricated in place. The shower pan material shall be cut to size and shape of the area indicated, in one piece to the maximum extent practicable, allowing a minimum of 6 inches for turnup on walls or partitions, and shall be folded over the curb with an approximate return of 1/4 of curb height. The upstands shall be placed behind any wall or partition finish. Subflooring shall be smooth and clean, with nailheads driven flush with surface, and shall be sloped to drain. Shower pans shall be clamped to drains with the drain clamping ring.

3.8.8 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-resistant steel, polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be one-piece held in place by setscrew.

3.9 IDENTIFICATION SYSTEMS

3.9.1 Labels

Provide labels for sensor operators at flush valves and faucets. Include the following information on each label:

a. Identification of the sensor and its operation with graphic description.

b. Range of the sensor.

c. Battery replacement schedule.

3.9.2 Pipe Color Code Marking

Color code marking of piping shall be as specified in Section 09 90 00 PAINTS AND COATINGS.

3.9.3 Color Coding Scheme for Locating Hidden Utility Components

Scheme shall be provided in buildings having suspended grid ceilings. The color coding scheme shall identify points of access for maintenance and operation of operable components which are not visible from the finished space and installed in the space directly above the suspended grid ceiling. The operable components shall include valves. The color coding scheme shall consist of a color code board and colored metal disks. Each colored metal disk shall be approximately 3/8 inch in diameter and secured to removable ceiling panels with fasteners. The fasteners shall be inserted into the ceiling panels so that the fasteners will be concealed from view. The fasteners shall be manually removable without tools and shall not separate from the ceiling panels when panels are dropped from ceiling height. Installation of colored metal disks shall follow completion of the finished surface on which the disks are to be fastened.
The color code board shall have the approximate dimensions of 3 foot width, 30 inches height, and 1/2 inch thickness. The board shall be made of wood fiberboard and framed under glass or 1/16 inch transparent plastic cover. Unless otherwise directed, the color code symbols shall be approximately 3/4 inch in diameter and the related lettering in 1/2 inch high capital letters. The color code board shall be mounted and located in the mechanical or equipment room.

3.10 PAINTING

3.10.1 General

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. New equipment painting shall be factory applied or shop applied, and shall be as specified herein or in PART 2 paragraph FACTORY PAINTING, and provided under each individual section.

3.10.2 Shop Painting Systems for Metal Surfaces

a. Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees F shall be cleaned to bare metal.

b. Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Color of finish coat shall be aluminum or light gray.

(1) Temperatures Less Than 120 Degrees F: Immediately after cleaning, the metal surfaces shall receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat.

(2) Temperatures Between 120 and 400 Degrees F: Metal surfaces shall receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.

(3) Temperatures Greater Than 400 Degrees F: Metal surfaces shall receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.

3.11 TRAINING

a. Provide 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.

b. 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.

c. 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.

3.12 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.

3.13 TESTS, FLUSHING AND DISINFECTION

Submit 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.

3.13.1 Plumbing System

The following tests shall be performed on the plumbing system in accordance with ICC IPC, 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, 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.


3.13.1.1 Submittal Requirements

Submit the following:

a. Detail drawings for the complete plumbing system including piping layouts and locations of connections; dimensions for roughing-in, foundation, and support points; schematic diagrams and wiring diagrams or connection and interconnection diagrams. Detail drawings shall indicate clearances required for maintenance and operation. Where piping and equipment are to be supported other than as indicated, details shall include loadings and proposed support methods. Plan, elevation, view, and detail drawings, shall be drawn to scale.

b. Diagrams, instructions, and other sheets proposed for posting. Manufacturer's recommendations for the installation of bell and spigot
and hubless joints for cast iron soil pipe.

c. Manuals in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

3.13.2 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.

3.13.3 System Flushing

3.13.3.1 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. 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 is 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. All faucets and drinking water fountains, to include any device considered as an end point device by NSF/ANSI 61, Section 9, shall be flushed a minimum of 0.25 gallons per 24 hour period, ten times over a 14 day period.

3.13.3.2 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. 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. Unless more stringent local requirements exist, lead levels shall not exceed limits established by 40 CFR 50.12 Part 141.80(c)(1). The water supply to the building shall be tested separately to ensure that any lead contamination found during potable water system testing is due to work being performed inside the building.

3.13.4 Operational Test

Upon completion of flushing and prior to disinfection procedures, 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. Pump suction and discharge pressures.
f. Temperature of each domestic hot-water supply.
g. Operation of each floor and roof drain by flooding with water.
h. Operation of each vacuum breaker and backflow preventer.
i. Complete operation of each water pressure booster system, including pump start pressure and stop pressure.

3.13.5 Disinfection

After operational tests are complete, disinfect the entire domestic hot- and cold-water distribution system. Flush the system 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). Use a properly adjusted hypochlorite solution injected into the main with a hypochlorinator, or liquid chlorine injected into the main through a solution-feed chlorinator and booster pump. 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.

-- End of Section --
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 SANITARY ENGINEERING (ASSE)

ASSE 6000 SERIES (2012) Professional Qualification Standard for Medical Gas Systems Installers, Inspectors and Verifiers

ASME INTERNATIONAL (ASME)


ASME B16.50 (2013) Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings

ASME B40.100 (2013) Pressure Gauges and Gauge Attachments

ASME BPVC SEC VIII D1 (2015) BPVC Section VIII-Rules for Construction of Pressure Vessels Division 1

ASTM INTERNATIONAL (ASTM)


COMPRESSED GAS ASSOCIATION (CGA)


CGA V-5 (2008; R 2013) Diameter-Index Safety System (Non-Interchangeable Low Pressure
17-0007, Design Dental Treatment & Recovery Rooms at NH100

Connections for Medical Gas Applications);  
6th Edition

INTERNATIONAL CODE COUNCIL (ICC)


INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)


NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2014) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 55 (2016) Compressed Gases and Cryogenic Fluids Codes


UNDERWRITERS LABORATORIES (UL)

UL 508A (2013; Reprint Aug 2016) UL Standard for Safety Industrial Control Panels

1.2 SYSTEM DESCRIPTION

a. Provide the following gas, support, and vacuum systems conforming to NFPA 99 Level 3 criteria: oxygen (O) dental compressed air (DA) oral evacuation (OE).

b. Provide the following gas, support, and vacuum systems conforming to NFPA 99 Level 1 criteria: oxygen (O).

1.2.1 Design Requirements

1.2.1.1 Patient Care Systems

Oxygen (O), Medical Compressed Air (MA), systems intended for patient care shall not be supplied to or used for any purpose other than patient care applications.

1.2.1.2 Medical-Surgical Vacuum (MV)

Systems are dry vacuum systems and shall not be supplied to or used for any purpose other than patient care applications.

1.2.1.3 Oral Evacuation (OE)

System is a wet vacuum system and shall not be supplied to or used for any purpose other than patient care applications.

1.2.1.4 Support Utilities

Nitrogen (N), Dental Compressed Air (DA), Instrument Compressed Air (IA), Laboratory Compressed Air (LA), and Process Compressed Air (PA) systems are
support utilities and shall not be supplied to or used for patient respiration applications.

1.2.1.5 High-volume Laboratory Dust Evacuation (LE)

System is a dry vacuum system, support utility and shall not be supplied to or used for patient care applications.

1.2.1.6 Laboratory Compressed Air (LA) and Process Compressed Air (PA)

May be configured as any of the following:

a. Provided as separate systems with their own compressors, in which case the LA and/or PA system shall conform to NFPA 99 Level 3 criteria.

b. Combined with and powered by the Dental Compressed Air (DA) system, in which case the LA and/or PA system shall conform to NFPA 99 Level 3 criteria.

c. Combined with and powered by the Instrument Compressed Air (IA) system, in which case the LA and/or PA system shall conform to NFPA 99 Level 1 criteria. (IA is a Level 1 system).

1.2.2 Sustainable Design Requirements

1.2.2.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.

1.2.3 Performance Requirements

a. Provide all labor, equipment and services necessary for and incidental to the installation of piped dental gas, support, and vacuum systems and medical gas, support, and vacuum systems. Oxygen systems shall be complete to the source valve, ready for connection to the bulk gas supply system. All systems shall be complete, started, tested and ready for use.

b. Government Furnished Materials provided to the Contractor for installation under this section include initial supply of gases in cylinders or containers as appropriate for cylinder sources.

c. Provide system delivery pressure as follows:

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<td>Oxygen, medical compressed air</td>
<td>55 psi</td>
</tr>
<tr>
<td>Dental compressed air</td>
<td>90 psi</td>
</tr>
</tbody>
</table>


d. Provide system vacuum as follows:
1.2.4 Accessibility of Equipment

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, and equipment requiring access, in locations freely accessible through access doors.

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals
   Local/Regional Materials
   Manufacturer Qualifications
   Installer Qualifications
   Inspector Qualifications
   Verifier Qualifications
   Inspection, Testing, and Verification Agency

SD-02 Shop Drawings
   Dental Gas, Support and Vacuum Systems
   Medical Gas, Support and Vacuum Systems

SD-03 Product Data
   Dental Compressed Air (DA) Source
   Dental Oral Evacuation (OE) Source
   Pipe and Fittings
   Valves and Assemblies
   Hangers and Supports
   Dental Gas and Support Systems Outlets and Vacuum Systems Inlets
   Medical Gas and Support Systems Outlets and Vacuum Systems Inlets

SD-06 Test Reports
   Test Reports

SD-07 Certificates
   Station Outlets/Inlets

SD-10 Operation and Maintenance Data
   Dental Gas, Support, and Vacuum Systems
1.4 QUALITY ASSURANCE

1.4.1 Manufacturer Qualifications

Manufacturers shall be regularly engaging in the manufacturing, supplying, and servicing of specified products and equipment, as well as, providing engineering services, for gas and vacuum systems for healthcare facilities. Provide evidence demonstrating compliance for a minimum of 5 years, and on 5 projects of similar complexity.

1.4.2 Installer Qualifications

a. Dental gas, support, and vacuum systems and Medical gas, support, and vacuum systems shall be installed only by Certified Medical Gas Installers. Installer ASSE 6000 SERIES (Standard #6010 Medical Gas System Installer) certification card shall have been issued within the previous 36 months and Installers certified through a recognized third party certification agency. Certification shall include the successful completion of a minimum 32-hour training course including a written and a practical examination covering all facets of ASSE 6000 SERIES Standard #6010, NFPA 99, and NFPA 55. Course instruction shall have been conducted by a Medical Gas Systems Instructor certified to ASSE 6000 SERIES (Standard #6050 Medical Gas Instructors). The installer shall have a minimum of four (4) years of documented practical experience in the installation of medical gas and vacuum piping systems. Detail drawings for the complete systems including piping layouts and location of connections; dimensions for roughing-in, foundation, and support points; schematic diagrams; and wiring diagrams or connection and interconnection diagrams. Detail drawings shall indicate clearances required for maintenance and operation. Where piping and equipment are to be supported other than as indicated, include loadings and proposed support method. All plans, elevations, views, and details, shall be drawn to scale.

b. Dental oral evacuation systems shall be installed only by contractors/tradespersons who have at least 5 years experience installing central oral evacuation systems for dental operatories.

1.4.3 Agency Qualifications

Retained by the general contractor, but independent of the facility, installing contractor, and product manufacturer(s).

1.4.3.1 Inspector qualifications

Systems shall be inspected only by Certified Medical Gas System Inspectors. Inspector ASSE 6000 SERIES (Standard #6020 Medical Gas Systems Inspectors) certification card shall have been issued within the previous 36 months and Inspectors certified through a recognized third party certification agency. Certification shall include the successful completion of a minimum 24-hour training course including a written and a practical examination covering all facets of ASSE 6000 SERIES (Standard #6020), NFPA 99, NFPA 55. Course instruction shall be conducted by a Medical Gas Systems Instructor certified to ASSE 6000 SERIES (Standard #6050 Medical Gas Systems Instructors). Certification to ASSE 6000 SERIES (Standard #6030 Medical Gas Systems Verifier) meets the requirements of this section. The inspector shall have a minimum of four (4) years of
documented practical experience in the inspection of medical gas and vacuum systems.

1.4.3.2 Verifier qualifications

Systems shall be verified only by Certified Medical Gas System Verifiers. Verifier ASSE 6000 SERIES (Standard #6030 Medical Gas System Verifiers) certification card shall have been issued within the previous 36 months and verifiers certified through a recognized third party certification agency. Certification shall include the successful completion of a minimum 32-hour training course including a written and a practical examination covering all facets of ASSE 6000 SERIES Standard #6030, NFPA 99, NFPA 55 and CGA M-1. Course instruction shall be conducted by a Medical Gas Systems Instructor certified to ASSE 6000 SERIES (Standard #6050 Medical Gas Systems Instructors). The verifier shall have a minimum of four (4) years of documented practical experience in the verification of medical gas and vacuum systems. The verifier shall have a current certificate of insurance, in the individual’s name or employing verification company for general liability, and professional liability insurance.

1.4.4 Certifying Agency Qualifications

Agency shall be an American National Standards Institute accredited certifier. Agency is responsible for testing and certifying individuals in compliance with ASSE 6000 SERIES Standards. Provide installer, inspector, and verifier certifications by one of the following agencies or by an agency with comparable qualifications:

a. Medical Gas Professional Healthcare Organization (MGPHO).


1.4.5 Regulatory Requirements

1.4.5.1 Standards

The Standards for design, materials, installation, and testing of gas and vacuum systems for healthcare facilities:


b. Interpret reference to the "Authority Having Jurisdiction" to mean the "Contracting Officer." For Government owned property, interpret references to the "owner" to mean the "Contracting Officer." For leased facilities, interpret references to the "owner" to mean the "lessor." Interpret references to the "permit holder" to mean the "Contractor."

c. The provisions of Chapter 1, "Administration" in NFPA 99 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.

1.4.5.2 Referenced Publications

In each of the publications referred to herein, interpret references to the
1.4.5.3 Alternative Qualifications

Products having less than a three-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.

1.4.5.4 Service Support

Provide equipment items 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. Submit manuals in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver equipment and parts to site factory cleaned and processed in their original factory sealed package ready for installation. 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 COMMISSIONING

1.6.1 Inspection, Testing, and Verification Agency

Commissioning shall include retaining the Inspection, Testing, and Verification Agency prior to commencement of the installation of these systems. The Inspection, Testing, and Verification Agency shall coordinate their scope of work with that of the Project CxC, Commissioning Specialist and shall function in coordination with, not in lieu of, the Project CxC, Commissioning Specialist.

1.6.2 Responsibilities

The Inspection, Testing, and Verification Agencies responsibilities include:

a. Review of the project drawings and specifications and providing comments and additional clarification(s), as needed, to the Contracting Officer and the Designer of Record.

b. Witnessing by a certified inspector or certified verifier of the brazing of a minimum of two joints (one vertical and one horizontal) by each brazer assigned to the project. Evaluation of adequacy of the brazed joints shall be through observation of the brazing techniques, and by destructive methods (cutting the joints in half). This will be required of all brazers utilized throughout the duration of the project. Brazing of project materials shall not be permitted until the brazer qualifications, and the adequacy of their joints have been determined to be acceptable.

c. Review and comment on the compliance of the project submittals required
d. Performing site observation visits prior to 1) backfilling exterior or interior below grade piping, 2) concealing above ceiling piping, and 3) concealing in wall piping. Conduct site observation visits by a certified inspector or certified verifier. Provide for each visit a written report stating progress of installation and any deficiencies needing corrective action.

e. Review of revisions/substitutions relating to the Contract Documents and/or the Project Commissioning Plan.

f. Coordination with the Project CxC, Commissioning Specialist in establishing a commissioning plan for components specific to the systems specified herein.

g. Coordination with the Project CxC, Commissioning Specialist of the equipment start-up, and the system testing and verification procedures required by this specification.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS

Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of such products, essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening, and have been in satisfactory commercial or industrial use for 3 years prior to bid opening. The 3-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 3 year period. Submit manufacturer's catalog data with highlighting to show model, size, options, etc., that are intended for consideration. Provide adequate data to demonstrate compliance with contract requirements.

2.2 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.

2.3 DENTAL COMPRESSED AIR (DA) SOURCE

a. Provide complete factory-packaged, factory-tested, continuous-duty source(s). Each source shall contain air compressors, receiver, dryers, filters, control panel, source shutoff, compressor isolation valves and other components required by NFPA 99, and necessary to provide complete performance. Each source shall require single-point connections to power wiring, warning system wiring, and piping system.

b. Tank-mounted air compressors shall be manufactured to comply with UL listing requirements. Air compressors shall have manufacturer's name and address, together with trade name and catalog number, on a nameplate securely attached to the equipment. Provide guards to shield
exposed moving parts. Provide an intake air filter and silencer with each compressor. Provide aftercooler and moisture separator between compressors and air receivers, to remove moisture before the air enters the receiver. Aftercoolers shall be air cooled. The air shall pass through a sufficient number of tubes to affect cooling. Tubes shall be sized to give maximum heat transfer. Cooling capacity of the aftercooler shall be sized for the total capacity of the compressors.

2.3.1 Air Receiver

Provide air receiver delivering air to dental operatories designed for 150 psi working pressure, factory air tested to 1.5 times the working pressure, meeting ASME BPVC SEC VIII D1. Provide receiver equipped with safety relief valves and accessories, including but not limited to pressure gauge, sight glass, and automatic and manual drains. The outside of receiver shall be galvanized or supplied with factory applied commercial enamel finish. The interior of the receiver shall be a factory applied vinyl lining. Provide a display of the ASME seal on the receiver, or a certified test report from an approved independent testing laboratory indicating conformance to the ASME Code. Provide receiver(s) with a three (3) valve bypass for servicing.

2.3.2 Control Panel

Provide UL 508A listed and labeled control panel in a NEMA 250 Type 12 enclosure. Provide Hand-Off-Auto switch for each compressor for selection of normal operation (automatic alternation) or manual selection of lead and lag compressors. Provide automatic alternation of compressors based on a first-on/first-off principle with provisions for simultaneous operation. The lag compressor shall be able to start automatically if the lead compressor fails to operate. Provide manual reset for thermal malfunction shutdown. All control and alarm functions shall remain energized while any compressor in the system remains electrically online. Provide magnetic motor starters with integral overload and short circuit protection, with lockable disconnecting means. Provide running light and elapsed run-time meter for each compressor. Provide circuit breakers with single point power feed connection. Provide 120 VAC control circuit transformers with fused primary and secondary. Provide pressure control switches or pressure transducer. Provide integral PLC controller for automatically switching operating sequence of compressors. Provide back-up circuit in case of PLC failure. Provide digital display interface. User interface shall display all alarm conditions, pump maintenance intervals, compressor performance warnings, average system air demand, average dewpoint and CO levels on system, compressors on/off status, system model number and serial number, and phone number to call for service. Provide audible and visual local alarms with silence button, remote alarm connections, and safety devices as required by NFPA 99. Local alarms shall have contacts to allow indication of a fault condition at the master alarm panel if one or more local alarms are activated. Provide the following alarms:

a. Lag compressor In Use.

b. High discharge temperature.

c. High carbon monoxide levels.

2.3.3 Desiccant Air Dryers

Provide two identical twin-tower heatless desiccant air dryers. Provide
dryers to achieve a pressure dewpoint \(-40^\circ F\) at the maximum calculated NFPA system capacity. Provide lubricant free operation. Provide economizer cycle that reduces purge air requirements to match actual moisture loading. Provide solid-state cycle timer, OSHA purge exhaust mufflers, and a pressure gauge for each tower.

### 2.3.4 Filtration and Pressure Reducing Station

Provide two pre-filters rated 0.01 micron filtration with an efficiency of 99.9999 percent D.O.P. (Validated), two activated carbon filters, and two 1 micron final filters with an efficiency 99.9999 percent D.O.P. (Validated) installed downstream of the carbon filters. Provide all filters with a differential pressure gauge with color change indicator and automatic drain valve except the activated carbon filters. Provide downstream of the final filters a dual-line pressure regulating assembly consisting of two pressure regulators with pressure gauges, inlet and outlet isolation ball valves, and pressure relief valves. All filters/pressure regulators shall be arranged so that the isolation of one filter/ regulator will not affect the operation of the second filter/regulator.

### 2.3.5 Dew Point Monitor

Provide dew point monitor to continuously monitor the dew point of the dental compressed air. Provide ceramic type (aluminum oxide type is not acceptable) sensor with system accuracy of +/- 2 degrees F. The dew point alarm shall be factory set at 36 degrees F and be field adjustable. Provide activation of local alarm and all master alarms when the dew point at system pressure exceeds + 39 degrees F. Provide activation of monitor's signal at all master alarm panels if the monitor loses power. Monitor shall meet requirements of NFPA 99.

### 2.3.6 Carbon Monoxide Monitor

Provide carbon monoxide monitor to continuously monitor the dental compressed air for carbon monoxide and to actuate a local alarm if the carbon monoxide level is 10 ppm or higher. Provide activation of monitor's signal at all master alarm panels if the monitor loses power. Monitor shall meet requirements of NFPA 99.

### 2.4 Dental Oral Evacuation (OE) Source

Provide complete factory-packaged, factory-tested, continuous-duty source(s). Each source shall contain vacuum pumps, separator(s), control panel, source shutoff, pump isolation valves and other components required by NFPA 99, and necessary to provide complete performance. Each source shall require single-point connections to power wiring, warning system wiring, and piping system.

#### 2.4.1 Pipe Isolators

Provide flexible, resilient band-sealed (clamped) sleeves furnished to isolate the vacuum pump from associated piping. Size sleeve couplings in accordance with the exhauster intake and output connections. Provide pipe isolators with steel coupling guards.
2.4.2 Valves

2.4.2.1 Volume Control Valve

Provide the input of each vacuum pump with an adjustable air volume control valve to prevent accidental vacuum pump overload and to provide a means of adjusting the upper design capacity limit. The volume control valve shall be built in or immediately adjacent to the first or input stage of the vacuum pump and shall be preset by the manufacturer during certification procedure. The valve shall be a butterfly type with cast iron body with corrosive resistant internals.

2.4.2.2 Antisurge Valve

Provide the input of each vacuum pump with an antisurge valve that will operate proportionally and automatically throughout the vacuum pump's designed range. This valve shall continually sense the motor current and maintain a predetermined operational level of volume by proportionally bleeding air into the system. The valve shall be equipped with a silencer to attenuate air noise to 85 dBA or below. The valve shall be installed in, on, or near the first stage of the vacuum pump and can be mounted in conjunction with the directional flow valve.

2.4.2.3 Directional Flow Valve

Provide the input of each vacuum pump with a directional flow valve to prevent back flow of air through the shutdown. The directional flow valve shall be cast iron with corrosive resistant internals.

2.4.3 Exhaust Silencer

Provide each vacuum pump exhaust with a separate air discharge silencer of the open-bore expansion type. No interior baffling or shrouding will be permitted. The silencer shall satisfactorily attenuate air noise to a level below 85 dBA.

2.4.4 Control Panel

Provide UL 508A listed and labeled control panel in a NEMA 250 Type 12 enclosure. Provide Hand-Off-Auto switch for each vacuum pump for selection of normal operation (automatic alternation) or manual selection of lead and lag vacuum pump. Provide automatic alternation of vacuum pumps based on a first-on/first-off principle with provisions for simultaneous operation. The lag vacuum pump shall be able to start automatically if the lead vacuum pump fails to operate. Provide manual reset for thermal malfunction shutdown. All control and alarm functions shall remain energized while any vacuum pump in the system remains electrically online. Provide magnetic motor starters with integral overload and short circuit protection, with lockable disconnecting means. Provide running light and elapsed run-time meter for each vacuum pump. Provide circuit breakers with single point power feed connection. Provide 120 VAC control circuit transformers with fused primary and secondary. Provide vacuum control switches. Provide integral PLC controller for automatically switching operating sequence of vacuum pumps. Provide back-up circuit in case of PLC failure. Provide digital display interface. User interface shall display all alarm conditions, vacuum pump maintenance intervals, vacuum pump performance warnings, average system vacuum demand, vacuum pumps on/off status, system model number and serial number, and phone number to call for service. Provide audible and visual local alarms with silence button, remote alarm...
connections, and safety devices as required by NFPA 99. Local alarms shall have contacts to allow indication of a fault condition at the master alarm panel if one or more local alarms are activated. Provide the following alarms: Lag vacuum pump In Use.

2.4.5 Vacuum Relief Valve

Provide vacuum relief valve. The valve shall operate automatically. The valve shall be equipped with a silencer to attenuate air noise to 85 dBA.

2.4.6 Amalgam Separator

Provide amalgam separator consisting of a sedimentation collection chamber that is removable. Separation process shall be sedimentation which may be supplemented with filtration, and/or ion exchange. Unit shall be compatible for use on wet and dry vacuum systems. Assembly shall be wall or floor mounted. Provide minimum 1-1/2 inch inlet and outlet connection. Unit shall be ISO 11143 Certified and have a minimum of 99 percent removal efficiency.

2.5 PIPE AND FITTINGS

2.5.1 Service Entrance

Piping at service entrance (from 12 inches inside building to 5 feet outside): Same as Indicated for outside utilities.

2.5.2 Positive pressure piping systems up to 200 psi

Hard-drawn seamless copper tubing (ASTM B819), Type K or L, bearing one of the following markings, OXY, MED, OXY/MED, and brazed solder-type wrought copper fittings (ASME B16.22), or brazed fittings (ASME B16.50) cleaned for oxygen service by the manufacturer in accordance with Pamphlet CGA G-4.1. Cast fittings shall not be used. Minimum size shall be 1/2 inch. Install branch piping full size to each terminal device, including vertical drops, and provide reducer fitting at the device pigtail. Type L tubing is not acceptable for installation below grade. Provide with NF nitrogen purge and capped/plugged ends until prepared for installation. Tubing joining material shall be ANSI/AWS-BCuP series filler material.

2.5.3 Dental Oral Evacuation System

Provide polyvinyl chloride (PVC) drainage, waste and vent (DWV) pipe and fittings conforming to ASTM D2665. Solvent cement for PVC pipe fittings shall conform to ASTM D2564. Fittings, supports, and joint assembly shall comply with ICC IPC. Fittings shall be the long-radius type for turns and the wye type for branches. The most distant end of each trunk line from the separators may terminate with a vacuum relief valve.

2.6 VALVES AND ASSEMBLIES

2.6.1 Valves

a. Positive pressure piping systems up to 200 psi: Bronze, full port, quarter-turn ball type, three piece construction, 600 psi WOG, blow-out proof stem, in-line repairable. Cleaned for oxygen service by manufacturer in accordance with Pamphlet CGA G-4.1. All sizes: 316 stainless steel ball and stem, glass reinforced polytetrafluoroethylene (RPTFE) seat seals and packings. Clean, cap and deliver to site in
sealed package bearing manufacturer's identifying tag or stamp. Keep sealed until prepared for installation. Provide with valve manufacturer installed brazed Type K copper tube extensions a minimum of 6 inch long on the inlet and outlet side of the valve for making connection to the pipeline(s). A purge port shall be provided on both the inlet and outlet tube extensions. Valves in locations other than zone valve boxes shall be lockable.

b. Vacuum piping systems up to 20 inches Hg vacuum: Bronze full port, quarter-turn ball type, three piece construction, 29 inches Hg vacuum, blow out proof stem, in-line repairable. All sizes: 316 stainless steel ball and stem, glass reinforced polytetrafluoroethylene (RPTFE) seat seals and packings. Provide with valve manufacturer installed brazed Type K copper tube extensions a minimum of 6 inch long on the inlet and outlet side of the valve for making connection to the pipeline(s). A purge port shall be provided on both the inlet and outlet tube extensions. Valves in locations other than zone valve boxes shall be lockable.

2.6.2 Zone Valve Assemblies

a. Recessed wall box, minimum 18 GA sheet steel, baked enamel finish. Stainless steel or chrome front trim. Transparent plastic door with pull handle or ring for emergency access to valves. Service access to valves shall be by removal and replacement of door, which shall neither cause damage nor require special tools. Opaque plastic is not acceptable. Openings to box interior shall be dust-tight. Provide each shutoff valve with pressure gauge and integral extension tubes for joining to piping system outside of box. Provide gauge port on each tubing extension. Valves shall not be lockable.

b. Up to 5 shutoff valves of 1 inch size or smaller may be installed in one box. Use single-valve boxes for 1-1/4 inch valves and larger. Front trim with interlocking edges where single-valve boxes are jointed together for multiple valve installations. Provide custom-made boxes as specified above for those valves that are too large for pre-manufactured boxes.

c. Surface mounted wall box, same as recess mounted except provide with exposed surface finish primed for field painting and provide only where surface mounting is specifically indicated on drawings.

d. Arrange shutoff valves in following order from top to bottom: Oxygen, nitrous oxide, carbon dioxide, dental compressed air, medical compressed air, nitrogen, WAGD, dental surgical vacuum, and medical-surgical vacuum. If 2 or more valves for same service are located in common box, larger of valves shall be lower.

2.7 HANGERS AND SUPPORTS

Pipe hangers and supports shall be copper plated when in direct contact with copper tubing. Tubing installed on trapeze hanger shall be secured in place with appropriately sized clamp and be fully isolated from dissimilar metals.

2.8 GAUGES

a. Provide for line pressure use adjacent to source equipment, ASME B40.100 pressure gauges, 4 1/2 inches in diameter with metal case for oxygen,
nitrous oxide, carbon dioxide, dental compressed air, medical
compressed air, laboratory compressed air, process compressed air, and
nitrogen, accurate to within two percent. Range shall be two times
operating pressure. Dial graduations and figures shall be black on a
white background, or white on a black background. Gauges shall be
expressly made for and cleaned for oxygen use, labeled for appropriate
service, and marked "USE NO OIL". Provide bourdon tube and brass
movement. Install with gauge cock. Gauges for all services downstream
of main shutoff valve shall be same as those adjacent to source
equipment except diameter may be reduced to 1-1/2 inches. Dial ranges
shall be 0 to 100 psi for pressurized gases and compressed air services
except nitrogen and instrument compressed air; 0 to 300 psi for
nitrogen and instrument compressed air.

b. Provide for vacuum line use adjacent to source equipment, ASME B40.100
vacuum compound gauges, 4 1/2 inches in diameter with metal case for
dental surgical vacuum, medical-surgical vacuum, dental oral
evacuation, WAGD, and laboratory dust evacuation, accurate to within
two percent. Dial graduations and figures shall be black on a white
background, or white on a black background. Label for vacuum service.
Provide with bourdon tube and brass movement. Install with gauge
cock. Gauges for all services upstream of main shutoff valve shall be
same as those adjacent to source except diameter may be reduced to 1
1/2 inches. Dial range shall be 0 to 30 inches Hg vacuum.

2.9 DENTAL GAS AND SUPPORT SYSTEMS OUTLETS AND VACUUM SYSTEMS INLETS

2.9.1 Station Outlets/Inlets

Submit proof that outlets/inlets, as an assembly, are listed by
Underwriters Laboratories, Inc., and are manufactured in accordance with
applicable NFPA 99 and CGA standards. Provide station outlets/inlets
(Oxygen, Nitrogen, Nitrous Oxide, Dental Surgical Vacuum, WAGD, Instrument
Compressed Air) conforming to NFPA 99. Provide station outlets/inlets for
concealed piping made of brass and having an adjustable valve mechanism to
compensate for variation in wall thickness. Each unit shall be securely
mounted and self-sealing. Each unit as an assembly shall conform to the
requirements of the Underwriters Laboratories Inc.; submit proof of such
conformance. The label or listing of the specified agency will be
acceptable evidence. In lieu of the label or listing, the Contractor may
submit a written certificate from any approved nationally recognized
testing organization adequately equipped and competent to perform such
services, including the follow-up service, stating that the item has been
tested and conforms to the requirements, including method of testing, of
the specified agency. Station outlets/inlets shall be equipped with
threaded DISS connector per CGA standards noninterchangeable quick
disconnect coupler, except for nitrogen which shall be equipped with DISS
connections as assigned for gas and vacuum systems in CGA V-5, except that
inlets for the WAGD system shall be 7/8 inch nuthreaded connections. DISS
outlets shall be used for all dental vacuum and ceiling mount
applications. Provide recessed wall type outlets/inlets unless specified
otherwise. Station outlets shall be cleaned for oxygen service in
accordance with Pamphlet CGA G-4.1 and the assembly shall be capped and the
finished assembly poly bagged for shipment.

2.9.1.1 Couplers

Where quick-disconnect couplers are furnished they shall be of the
noninterchangeable type. Connector shall lock firmly into position and
shall have a finger-type quick release.

2.9.1.2 Faceplates

Faceplates shall be polished chromium-plated metal or satin-finish stainless steel secured with chromium-plated countersunk screws. Provide service identification either cast into, or permanently etched by the manufacturer into each faceplate.

2.9.1.3 Rough-In Assembly

The rough in assembly shall be of modular design and include a gas specific 16 gauge steel mounting plate designed to permit on-site ganging of multiple outlets, on 5 inch center line spacing. A machined brass outlet block shall be permanently attached to the mounting bracket to permit the 1/2 inch OD, type-K copper inlet to swivel 360 degrees for attachment to the piping system. The rough in assembly shall contain a double seal to prevent gas leakage between the rough in and latch-valve assemblies after the wall is finished. A single o-ring seal shall not be acceptable. The latch-valve assembly shall telescope up to 3/4 inches to allow for variation in finished wall thickness from 1/2 to 1-1/4 inches.

2.9.1.4 Ceiling Applications/Hose Assemblies

Provide hose assemblies for all ceiling outlets for the finished ceiling height as indicated on drawings. Provide each hose with a heavy-duty chain type dual retractor for pressure gases and for vacuum. Retractions made of stainless cable are not acceptable. Allow an extra 18 inches of hose length for retractors.

2.9.1.5 Vacuum Slides

Provide one vacuum slide of the same manufacturer of the vacuum inlet for each vacuum inlet. Coordinate location with room elevations.

2.9.2 Dental Compressed Air Outlets

Provide dental compressed air outlets as follows:

a. Provide dental treatment rooms (DTR) with a 1/2 inch service pipe terminated with a 1/2 x 3/8 inch compression angle stop valve.

b. Dental laboratory. Provide each of the following, and coordinate locations with the laboratory casework supplier.

(1) 1/2 inch service pipe terminated with a ball valve.

(2) 1/2 inch service pipe terminated with a needle valve.

(3) 1/2 inch service pipe terminated with a quick disconnect brass body coupler and sleeve, 3/8 inch NPT, 300 psi maximum pressure rating, Buna-N seals, and complying with the dimensional requirements of military specification MIL-C-4109.

c. Provide dental instrument processing center with a 5/8 inch OD service pipe terminated with a quick disconnect brass body coupler and sleeve, 3/8 inch NPT, 300 psi maximum pressure rating, Buna-N seals, and complying with the dimensional requirements of military specification MIL-C-4109.
2.9.3 Dental Oral Evacuation Inlets (Dental Treatment Room)

Provide dental treatment rooms (DTR) with a 1/2 inch service pipe terminated 2 inches above bottom of floor box or above finished floor. Cover pipe end to prevent entrance of debris. Prepare end for continuation of service by another Division.

2.10 MEDICAL GAS AND SUPPORT SYSTEMS OUTLETS AND VACUUM SYSTEMS INLETS

2.10.1 Station Outlets/Inlets

Provide station outlets/inlets (Oxygen, Nitrogen, Nitrous Oxide, Carbon Dioxide, Medical Compressed Air, Medical-Surgical Vacuum, WAGD, Instrument Compressed Air) conforming to NFPA 99. Provide station outlets/inlets for concealed piping made of brass and having an adjustable valve mechanism to compensate for variation in wall thickness. Each unit shall be securely mounted and self-sealing. Each unit as an assembly shall conform to the requirements of the Underwriters Laboratories Inc.; submit proof of such conformance. The label or listing of the specified agency will be acceptable evidence. In lieu of the label or listing, the Contractor may submit a written certificate from any approved nationally recognized testing organization adequately equipped and competent to perform such services, including the follow-up service, stating that the item has been tested and conforms to the requirements, including method of testing, of the specified agency. Station outlets/inlets shall be equipped with threaded DISS connector per CGA standards noninterchangeable quick disconnect coupler, except for nitrogen which shall be equipped with DISS connections as assigned for gas and vacuum systems in CGA V-5, except that inlets for the WAGD system shall be 7/8 inch nonthreaded connections. DISS outlets shall be used for all ceiling mount applications. Provide recessed wall type outlets/inlets unless specified otherwise. Station outlets shall be cleaned for oxygen service in accordance with Pamphlet CGA G-4.1 and the assembly shall be capped and the finished assembly poly bagged for shipment.

2.10.1.1 Couplers

Where quick-disconnect couplers are furnished they shall be of the noninterchangeable type. Connector shall lock firmly into position and shall have a finger-type quick release.

2.10.1.2 Faceplates

Faceplates shall be polished chromium-plated metal or satin-finish stainless steel secured with chromium-plated countersunk screws. Provide service identification either cast into, or permanently etched by the manufacturer in to each faceplate.

2.10.1.3 Rough-In Assembly

The rough in assembly shall be of modular design and include a gas specific 16 gauge steel mounting plate designed to permit on-site ganging of multiple outlets, on 5 inch center line spacing. A machined brass outlet block shall be permanently attached to the mounting bracket to permit the 1/2 inch OD, type-K copper inlet to swivel 360 degrees for attachment to the piping system. The rough in assembly shall contain a double seal to prevent gas leakage between the rough in and latch-valve assemblies after the wall is finished. A single o-ring seal shall not be acceptable. The latch-valve assembly shall telescope up to 3/4 inches to allow for...
variation in finished wall thickness from 1/2 to 1-1/4 inches.

2.10.1.4 Ceiling Applications/Hose Assemblies

Provide hose assemblies for all ceiling outlets for the finished ceiling height as indicated on drawings. Provide each hose with a heavy-duty chain type dual retractor for pressure gases and for vacuum. Retractions made of stainless cable are not acceptable. Allow an extra 18 inches of hose length for retractors.

2.10.1.5 Vacuum Slides

Provide one vacuum slide of the same manufacturer of the vacuum inlet for each vacuum inlet. Coordinate location with room elevations.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

3.2 COMPRESSED AIR AND VACUUM SOURCES

Installation shall be in accordance with manufacturer's instructions and recommendations. Align compressor and vacuum pump couplings in accordance with manufacturers' specifications. Provide factory service representative to supervise installation and to set pressure and vacuum switches. System start-up shall be performed by factory trained personnel and documented.

3.2.1 Central Dry Separator for High-Volume Laboratory Dust Evacuation

Locate the separator so that the lower canister can be removed easily and cleaned. The separator shall be equipped with a cut-off valve to permit shutdown when the system is not in use.

3.2.2 Amalgam Separator for Dental Oral Evacuation

Amalgam separator shall be installed between the treatment rooms and the central wet separator in a location that is accessible from a standing position adjacent to the separator.

3.3 PIPING SYSTEMS

a. Piping shall be cleaned, tested, and installed as specified in NFPA 99.


c. Make up threaded joints, as permitted by NFPA 99, with polytetrafluoroethylene tape, or other thread sealant approved for oxygen service. Thread sealant shall be applied to male threads only.

d. Install pipe lines where they will not be subject to physical damage.

e. Install branch piping full size to each outlet/inlet, including
vertical drops. Provide reducer at the outlet/inlet pigtail connection.

f. Provide protection of underground piping against frost, corrosion, and physical damage by installing piping in nonmetallic ducts or casings. Encase underground piping passing beneath load bearing surfaces and traffic areas in split PVC pipe sized to accommodate piping. Secure split PVC piping with galvanized steel draw bands. Support at regular intervals by insulating spacers providing complete circumferential clearance.

g. Install piping intended to contain cryogenic liquids such that the liquid does not come in contact with concrete in the event of a leak.

h. Piping shall be connected near the top of receivers.

i. Compressed air intake pipe, and vacuum pump exhaust pipe shall be extended to the outside of the building and their end turned down and screened against insects.

j. Provide vibration-absorbing couplings between the compressed air and vacuum source(s) and the system pipeline, and the compressed air and vacuum sources and the intake air/vacuum pump exhaust piping.

k. Provide laboratory and process air piping system(s) separate from the dental and medical compressed air system(s).

l. Dental oral evacuation system piping shall be installed with a minimum slope of $\frac{1}{4}$ inch per 10 feet from the DTR utility box to the separator tanks.

m. Provide pipelines with appropriate system labeling conforming to NFPA 99.

3.4 STATION OUTLETS/INLETS

3.4.1 Wall Outlets/Inlets

Wall outlets/inlets shall be located 60 inches from finished floor or as indicated. Back boxes shall be permanently stamped with the gas or vacuum service identification and shall be safety-keyed to accept only the appropriate gas or vacuum faceplate.

3.4.2 DISS Connections

Where threaded connections are furnished, DISS connections as described in CGA V-5 shall be used to provide noninterchangeable connections. In order to facilitate connection making, the threads of the connection shall engage before the check valve is depressed and pressure is allowed to enter the attached fitting. No leakage shall occur when threads are fingertight.

3.4.3 Height of Hose-reel Type Outlets/Inlets

Termination shall be a minimum of 80 inches above the finished floor.

3.5 VALVES AND ASSEMBLIES

Valve cabinets shall be recess mounted on the corridor side of the partition. Cabinets shall house alarm system sensors and zone control valves. The valves shall be installed in the cabinet 5 feet above the floor at the center line of the box and shall provide complete shutoff of
each of the piped services. Provide valves and exposed piping connecting the valves with appropriate system labeling conforming to NFPA 99. Valves and exposed piping connecting the valves shall be labeled or identified in an approved manner with colors as follows:

<table>
<thead>
<tr>
<th>System</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed Air</td>
<td>Yellow</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Green</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>Black</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Blue</td>
</tr>
<tr>
<td>Vacuum</td>
<td>White</td>
</tr>
</tbody>
</table>

Each valve shall be securely mounted in a fixed position by means of brackets. Position of each valve shall allow for a firm grip to facilitate easy closing and opening. Each valve or valve box shall be labeled in substance as follows:

"Caution - (Name of applicable system) Valves. Do not close except in emergency.

3.6 GAUGES

a. Calibrate and zero gauges at job site.

b. Permanently label gauges with system name.

3.7 TRAINING

a. Provide 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.

b. 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.

c. 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.

3.8 GAS, SUPPORT, AND VACUUM SYSTEMS TESTING

3.8.1 Test Reports

a. Certified installers, inspectors, and verifiers shall conduct, document
tests in accordance with NFPA 99, furnish their own test equipment and supplies (including gases) for their respective tests. Reports shall be certified with the signature of an officer of the company responsible for conducting the test.

b. Submit reports in booklet form, within two weeks of test date with separate copies of each report for Contractor Quality Control, and Contracting Officer. Submit reports of both failed and passed tests. Except as indicated under specific test description, reports may be subdivided by tested area to allow timely submission. Submit test reports showing all field tests performed to adjust each component and field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed systems. Each test report shall indicate the final position of controls.

c. Document each report separately in an easy-to-follow manner, organized by areas and systems tested. (An area is typically a group of outlets downstream of a zone valve assembly.)

d. At the beginning of each report, document the following information:
   
   (1) Name of project.
   (2) Date of report.
   (3) Name of company responsible for performing test.
   (4) Name of person conducting test.
   (5) Date of test.
   (6) Area(s) tested.
   (7) Name and address of facility.

e. Pressure readings shall be made with calibrated gauges that have accuracies of +/- 1 psi.

f. Temperature readings shall be made with calibrated thermometers that have accuracies of +/- 1 degrees F.

3.8.2 Report Status

Project is acceptable only after systems have passed tests performed by the Inspection, Testing, and Verification Agency. Failure of test requires corrective action and retesting. Corrective actions taken to pass test and subsequent retesting shall be provided at no extra cost.

3.8.3 Tests and Reports Prior to Start of Installation

Conduct test of existing medical gas/vacuum warning system to verify existing conditions and document.

3.8.4 Level 3 Systems Testing

3.8.4.1 General

a. Inspection and testing shall be performed on all new piped systems,
additions, renovations, temporary installations, or repaired systems, to ensure by a documented procedure, that all applicable provisions of NFPA 99 and the Contract Documents have been adhered to and system integrity has been achieved or maintained.

b. Inspection and testing shall include all components of the system or portions thereof, including, but not limited to, medical gas source(s), compressed air sources (e.g., compressors, dryers, filters, regulators), alarms and monitoring safeguards, pipelines, isolation valves, and station inlets (vacuum) and outlets (positive pressure gases).

c. All systems that are breached and components that are subject to additions, renovations, or replacement (e.g., new medical gas sources, compressors, dryers, alarms) shall be inspected and tested. Systems shall be deemed breached at the point of pipeline intrusion by physical separation or by system component removal, replacement, or addition. Breached portions of the systems subject to inspection and testing shall be confined to only the specific altered zone and components in the immediate zone or area that is located upstream (inlet side) for vacuum systems and downstream (outlet side) for positive pressure gases at the point or area of intrusion.

d. Provide inspection, testing and verifier reports containing detailed findings and results directly to the Contracting Officer. All inspection, testing, and verification records shall be maintained on-site within the facility. The Contracting Officer shall review the records prior to the use of all systems.

e. The Contracting Officer will accept the Verifier's Report as determining that the gas/vacuum delivered to the outlet/inlet is that shown on the outlet/inlet label and the proper connecting fittings are installed for the specific gas/vacuum service.

3.8.4.2 Initial Tests and Reports - All Level 3 Systems

The installing Contractor, a representative of the system supplier, or a representative of the system manufacturer is responsible for conducting and documenting these tests. Test gas shall be oil-free, dry Nitrogen NF. Provide all necessary materials and test apparatus to satisfactorily perform tests.

a. Initial Blow Down Test.

b. Initial Pressure Test for Positive Pressure Gas Systems and Copper Vacuum Piping.

c. Initial Leak Test for PVC Vacuum Piping. Subject piping to a vacuum of not less than 12 inches Hg vacuum.

d. Initial Cross-Connection Test. Conduct this test only after completion of every system within test area.

e. Initial Piping Purge Test.

f. Initial Standing Pressure Test for Positive-Pressure Gas Piping.

g. Initial Standing Vacuum Test for Copper and PVC Vacuum Systems. Subject PVC piping to a vacuum of not less than 12 inches Hg which
shall not reduce to less than 8 inches Hg vacuum at the end of the 24 hour test period.

3.8.4.3 I,T&V Agency Tests and Reports

The Inspection, Testing and Verification Agency is responsible for conducting and documenting gas and Nitrogen tests. Test gas shall be oil-free, dry Nitrogen NF. Provide all necessary materials and test apparatus to satisfactorily perform tests.

a. Verifier Final Tie-In Test.
b. Verifier Standing Pressure Test.
c. Verifier Cross-Connection Test.
d. Verifier Warning System Test.
e. Verifier Piping Purge Test.
f. Verifier Piping Particulate Test.
g. Verifier Piping Purity Test.
h. Verifier Operational Pressure Test.
i. Verifier Gas Concentration Test.
jk. Labeling.
k. Oxygen and Nitrous Oxide Source Equipment Operational Test.

3.8.4.4 Final Tests and Reports - All Level 3

The installing Contractor, a representative of the system supplier, a representative of the system manufacturer, or a certified system verifier is responsible for conducting and documenting Gas, Support, and Vacuum Systems (except Oxygen and Nitrous Oxide) tests. Test gas shall be oil-free, dry Nitrogen NF. Provide all necessary materials and test apparatus to satisfactorily perform tests.

a. Final Tie-In Test.
b. Final Standing Pressure Test.
c. Final Standing Vacuum Test.
d. Final Cross-Connection Test.
e. Final Piping Purge Test.
f. Labeling.
g. Gas, Support Systems Source Equipment Operational Test.
h. Vacuum Systems Source Equipment Operational Test.
i. Dental Oral Evacuation (OE) System Test
Materials needed: Two vacuum gauges, accuracy of at least ±0.5" Hg at 6-8" Hg. Flow restrictors (quantity = 70 percent x number of dental treatment rooms). Flow restrictor components:

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Hose, smooth bore OE tubing, 5/8 inch ID x 4 inch long.</td>
</tr>
<tr>
<td>B</td>
<td>Hose adaptor, brass, 1/2 inch male pipe thread x 3/8 inch hose barb.</td>
</tr>
<tr>
<td>C</td>
<td>Tubing, vinyl, 1/2 inch ID x 1-3/8 inch long.</td>
</tr>
<tr>
<td>D</td>
<td>Tubing, vinyl, 1/2 inch OD, 3/16 inch ID x 1 inch long.</td>
</tr>
<tr>
<td>E</td>
<td>Tubing, soft copper, 5/16 inch x 2 inch long.</td>
</tr>
</tbody>
</table>

Clear burrs on cut ends with 15/16 inch drill bit.

Flow restrictor assembly:

a. Insert threaded end of the hose barb (Part B) completely into the 5/8 inch OE hose (Part A).
b. Slip the 1/2 inch ID tubing (Part C) completely over the hose barb (Part B).
c. Slip 1/2 inch OD tubing (Part D) into the 1/2 inch ID tubing (Part C) to butt against the hose barb (Part B).
d. Slip the copper tubing (Part E) into the 1/2 inch OD tubing (Part D) approximately 3/4 inch.
e. Flow restrictors as designed allow a flow of 7.4 SCFM when attached to plumbing under 6 inches Hg vacuum pressure.

(1) Install vacuum gauge No. 1 on a pipe common to the power units close to the separating tanks. Install this gauge in a manner that will have minimal effect on airflow through the pipe.

(2) Install vacuum gauge No. 2 on the OE inlet in the floor box of the dental treatment room (DTR) farthest from the vacuum power units. Note that this inlet will be closed, with no flow passing through it.

(3) Place a flow restrictor over one OE inlet in 70 percent of the facility DTRs. DTRs fitted with flow restrictors should include a mix of DTRs most distant and DTRs nearest the vacuum source.

(4) Block off all other OE inlets and any other openings in the fixed pipe system.

(5) Operate the vacuum system with one pump inoperable and note the readings on the two vacuum pressure gauges. Next, operate the vacuum system with a different pump inoperable and note the reading on both vacuum pressure gauges. Continue this process until a vacuum reading has been obtained with each of the system pumps taking a turn as the inoperable pump.

(6) An acceptable OE system shall be able to maintain a minimum of 6
inches Hg vacuum as measured on the vacuum gauge on the furthest DTR inlet (gauge No. 2) under the conditions outlined above. The system piping pressure drop between the vacuum gauge near the power units (gauge No. 1) and the vacuum gauge at the farthest DTR (gauge No. 2) should be no more than 1 inch Hg vacuum.

3.8.5 Level 1 Systems Testing

3.8.5.1 General

a. Inspection and testing shall be performed on all new piped systems, additions, renovations, temporary installations, or repaired systems, to assure by a documented procedure, that all applicable provisions of NFPA 99 and the Contract Documents have been adhered to and system integrity has been achieved or maintained.

b. Inspection and testing shall include all components of the system or portions thereof, including, but not limited to, bulk source(s), cylinder manifolds, compressed air sources (e.g., compressors, dryers, filters, regulators), source alarms and monitoring safeguards, master alarms, pipelines, isolation valves, area alarms, zone valves, and station inlets (vacuum) and outlets (pressure gases).

c. All systems that are breached and components that are subject to additions, renovations, or replacement (e.g., new gas sources: bulk, manifolds, compressors, dryers, alarms) shall be inspected and tested. Systems shall be deemed breached at the point of pipeline intrusion by physical separation or by system component removal, replacement, or addition. Breached portions of the systems subject to inspection and testing shall be confined to only the specific altered zone and components in the immediate zone or area that is located upstream for vacuum systems and downstream for pressure gases at the point or area of intrusion.

d. Provide inspection, testing, and verifier reports containing detailed findings and results directly to the Contracting Officer. All inspection, testing, and verification records shall be maintained on-site within the facility. The Contracting Officer or their appointed representative shall review the records prior to the use of all systems.

e. Before piping systems are initially put into use the Contracting Officer shall accept the Verifier's Report as determining that the gas/vacuum delivered to the outlet/inlet is that shown on the outlet/inlet label and the proper connecting fittings are installed for the specific gas/vacuum service.

3.8.5.2 Installer Performed Tests and Reports

The installing Contractor is responsible for conducting and documenting these tests. Test gas shall be oil-free, dry Nitrogen NF. Provide all necessary materials and test apparatus to satisfactorily perform tests. Tests apply to all Gas, Support, and Vacuum Systems.


b. Initial Blow Down Test.

c. Initial Pressure Test.
d. Cross Connection Test.
e. Piping Purge Test.
f. Standing Pressure Test for Positive Pressure Piping.
g. Standing Vacuum Test for Vacuum Piping.

3.8.5.3 I,T&V Agency Tests and Reports

The Inspection, Testing, and Verification Agency is responsible for conducting and documenting these tests. Test gas shall be oil-free, dry Nitrogen NF. Provide all necessary materials and test apparatus to satisfactorily perform tests. Tests apply to all Gas, Support, and Vacuum Systems.

a. Final Tie-In Test.
b. Initial Alarm Test. For each system, document operation of existing alarm systems prior to interconnecting new and existing systems.
c. Standing Pressure Test.
d. Cross Connection Test.
e. Individual Pressurization Test.
f. Pressure Differential Test.
g. Valve Test.
i. Piping Purge Test.
j. Piping Particulate Test.
k. Piping Purity Test.
l. Operational Pressure Test.
m. Medical Gas Concentration Test.

n. Medical Compressed Air Purity Test.
o. Labeling.
p. Source Equipment Verification:

(1) Gas Cylinder Supply Sources.
(2) Medical Compressed Air Compressor Sources.
(3) Medical-Surgical Vacuum Sources.

-- End of Section --
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)


INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)


NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to all sections of Division 23, "Mechanical" of this project specification, unless specified otherwise in the individual section.

1.3 QUALITY ASSURANCE

1.3.1 Material and Equipment Qualifications

Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.3.2 Alternative Qualifications

Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, can be shown.

1.3.3 Service Support

The equipment items shall be supported by service organizations. Submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These
service organizations shall be reasonably convenient to the equipment
installation and able to render satisfactory service to the equipment on a
regular and emergency basis during the warranty period of the contract.

1.3.4 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's
name, address, model number, and serial number securely affixed in a
conspicuous place; the nameplate of the distributing agent will not be
acceptable.

1.3.5 Modification of References

In each of the publications referred to herein, consider the advisory
provisions to be mandatory, as though the word, "shall" had been
substituted for "should" wherever it appears. Interpret references in
these publications to the "authority having jurisdiction", or words of
similar meaning, to mean the Contracting Officer.

1.3.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract
documents, advisory provisions shall be considered mandatory, the word
"should" shall be interpreted as "shall." Reference to the "code official"
shall be interpreted to mean the "Contracting Officer." For Navy owned
property, references to the "owner" shall be interpreted to mean the
"Contracting Officer." For leased facilities, references to the "owner"
shall be interpreted to mean the "lessor." References to the "permit
holder" shall be interpreted to mean the "Contractor."

1.3.5.2 Administrative Interpretations

For ICC Codes referenced in the contract documents, the provisions of
Chapter 1, "Administrator," do not apply. These administrative
requirements are covered by the applicable Federal Acquisition Regulations
(FAR) included in this contract and by the authority granted to the Officer
in Charge of Construction to administer the construction of this project.
References in the ICC Codes to sections of Chapter 1, shall be applied
appropriately by the Contracting Officer as authorized by his
administrative cognizance and the FAR.

1.4 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 ELECTRICAL REQUIREMENTS

Furnish motors, controllers, disconnects and contactors with their
respective pieces of equipment. Motors, controllers, disconnects and
contactors shall 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.
Extended voltage range motors will not be permitted. Controllers and
contactors shall have a maximum of 120 volt control circuits, and shall
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 shall be included under the section that specified that motor or equipment. 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."

1.6 ELECTRICAL INSTALLATION REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.6.1 New Work

Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be provided under Division 16, except internal wiring for components of package equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the section specifying that motor or equipment.

1.6.2 Modifications to Existing Systems

Where existing mechanical systems and motor-operated equipment require modifications, provide electrical components under Division 26.

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 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.

1.8 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.

1.9.1.2 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).

1.9.1.3 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:
PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF NEW EQUIPMENT

New equipment painting shall be factory applied or shop applied, and shall be as specified herein, and provided under each individual section.

3.1.1 Factory Painting Systems

Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall withstand 500 hours in a salt-spray fog test. Salt-spray fog test shall be in accordance with ASTM 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.

3.1.2 Shop Painting Systems for Metal Surfaces

Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees F shall be cleaned to bare metal.

Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Color of finish coat shall be aluminum or light gray.

a. Temperatures Less Than 120 Degrees F: Immediately after cleaning, the metal surfaces subject to temperatures less than 120 degrees F shall receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat.
b. Temperatures Between 120 and 400 Degrees F: Metal surfaces subject to temperatures between 120 and 400 degrees F shall receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.

c. Temperatures Greater Than 400 Degrees F: Metal surfaces subject to temperatures greater than 400 degrees F shall receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.
MAXIMO EQUIPMENT INVENTORY UPDATE

Employee: __________________ Phone: ____________ Date: ____/____/____
Bldg: ____________ Specific Location: ________________________________

_ AC, Computer Room                  _ Heat Pump, Indoor Unit
_ AC, Package                         _ Heat Pump, Outdoor Unit
_ AC, Package Terminal                _ Heat Pump, Package
_ Assembly, Trap line                 _ Heat Pump, Package Terminal
_ Backflow Preventer                  _ Pump, Circulating, Chilled Water
_ Boiler                               _ Pump, Circulating, Domestic Water
_ Chiller, Air Cooled Recip           _ Pump, Circulating, Dual Temp Water
_ Chiller, Air Cooled Screw           _ Pump, Circulating, Heating Water
_ Chiller, Air Cooled Scroll          _ Pump, Condensate
_ Chiller, Package Terminal           _ Pump, Sump
_ Chiller, Water Cooled Screw         _ Regulator, Temperature
_ Compressor, Control Air             _ Tank, Hot Water Storage
_ Compressor, Industrial Air          _ Tower, Cooling
_ Dryer, Refrigerated Air             _ Unit, Air Handling
_ Exchanger, Heat                     _ Unit, AC Condensing
_ Evaporator, Freezer                 _ Unit, Freezer Condensing
_ Evaporator, Refrigerator            _ Unit, Refrigerator Condensing
_ Fan, Exhaust                        _ Unit, Fan Coil
_ Generator                           _ Unit, TAB (Attach Room No. List)
_ Heater, Space                       _ Unit, VAV (Attach Room No. List)
_ Heater, Unit                        _ Valve, Pressure Reducing
_ Heat Pump, Geo-Thermal              _ Valve, Steam Pilot
_ Water Heater                        _ 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)_________
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INSERT EXCEL FORM - VAV/TAB ROOM NUMBER LIST

-- End of Section --
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  1989 National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)


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

SMACNA TAB HVAC Sys  1993 HVAC Systems - Testing, Adjusting and Balancing

1.2 DESCRIPTION OF WORK

The work includes testing, adjusting, and balancing (TAB) of new and existing heating, ventilating, and cooling (HVAC) air and water distribution systems including equipment, ducts, and piping 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 DALT or 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.
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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 Stds, AABC MN-1, OR SMACNA TAB HVAC Sys report forms as contained within the referenced standards:

(1) Air Systems
   (a) Fan report for air handlers, return fans, and exhaust fans.
   (b) Duct traverse supply/return/exhaust/relief ducts.
   (c) Terminal supply, return, and exhaust outlets.
   (d) DX cooling coils - reports entering/leaving, wet/dry bulb temperatures.

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 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 and water systems shall be proportionately balanced and reported in the certified 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 Stds, 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.

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 certified 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 design 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 --
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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 C 916 (1985; R 1990) Adhesives for Duct Thermal Insulation


ASTM E 84 (2000a) Surface Burning Characteristics of Building Materials

ASTM E 96 (1997; Rev A) Water Vapor Transmission of Materials

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-A-3316 (Rev. C; Am. 2) Adhesives, Fire-Resistant, Thermal Insulation

MIL-C-19565 (Rev. C; Am. 1) Coating Compounds, Thermal Insulation, Fire- and Water-Resistant, Vapor Barrier
1.2 SYSTEM DESCRIPTION

Provide new and modify existing field-applied insulation for heating, ventilating, and cooling (HVAC) air distribution systems which are located within, on, under, and adjacent to buildings; and for plumbing piping systems.

1.2.1 Air Distribution System

Obtain Contracting Officer's written approval of systems under Section 23 05 92, "Testing/Adjusting/Balancing: Small Heating/Ventilating/Cooling Systems" before applying field-applied insulation to air distribution systems.

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**

- Heating, ventilating, and air conditioning systems insulation
- Duct 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 E 84 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 building.

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 HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS INSULATION

Provide insulation on ducts and diffusers of Heating, Ventilating and Air Conditioning Systems (HVAC).

2.1.1 Duct Insulation in Concealed Spaces

Blanket flexible mineral fiber insulation conforming to ASTM C 553, Type 1, Class B-3, .75 pound per cubic foot nominal, 3.0 inches thick, minimum
installed R8. Provide flexible insulation in concealed spaces only.

2.1.2 Duct Insulation Finishes

2.1.2.1 All-Purpose Jacket

Provide a factory applied all-purpose jacket with or without integral vapor barrier as required by the service. In exposed locations, provide jackets with a white surface suitable for field painting. All-purpose jacket shall have a maximum water vapor permeance of 0.05 perm per ASTM E 96; a puncture resistance of not less than 50 Beach units; and a tensile strength of not less than 35 pounds-force per inch of width in accordance with ASTM D 828.

2.1.2.2 Vapor-Barrier Material

ASTM C 1136, for duct in equipment room and exposed areas and Type I or II in remaining areas. Material shall be resistant to flame, moisture penetration, and shall not support mold growth. Provide vapor barrier on HVAC duct insulation, except insulation for heating only.

2.2 EQUIPMENT

Insulate all equipment and accessories as specified in Table II. In outside locations, provide insulation one inch thicker than specified. Increase the specified insulation thickness for equipment only where necessary to equal the thickness of angles or other structural members to make a smooth, exterior surface. Factory applied insulation shall meet the flame spread and smoke-developed rating of 25/50.

2.3 ADHESIVES, SEALANTS, AND COATING COMPOUNDS

2.3.1 Insulation and Vapor Barrier Adhesive

Provide ASTM C 916, 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.

2.3.2 Lagging Adhesive

MIL-A-3316, Class 1, for bonding fibrous glass cloth to unfaced fibrous glass insulation; for bonding cotton brattice cloth to faced and unfaced fibrous glass insulation board; for sealing edges of and bonding fibrous glass tape to joints of fibrous glass board; or for bonding lagging cloth to thermal insulation, or Class 2, for attaching fibrous glass insulation to metal surfaces.

2.3.3 Mineral Fiber Insulation Cement

ASTM C 195, thermal conductivity 0.85 maximum at 200 degrees F mean when tested in accordance with ASTM C 177.

2.3.4 Vapor Barrier Coating

MIL-C-19565, Type II, indoor only above surface temperature 60 degrees F, color white.
2.4  ACCESSORY MATERIALS

2.4.1  Staples

ASTM A 167, Type 304 or 316 stainless steel outside-clinch type.

2.4.2  Insulation Bands

1/2 inch wide; 0.24 gage galvanized steel or 0.26 gage stainless steel or 0.24 gage aluminum.

2.4.3  Bands for Metal Jackets

3/8-inch minimum width; 0.26 gage stainless steel or 0.24 gage aluminum.

2.4.4  Anchor Pins

Provide anchor pins and speed washers recommended by insulation manufacturer.

2.4.5  Wire

Soft annealed stainless steel, 0.047-inch nominal diameter.

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. Insulate return ducts, outside air intakes and supply ducts to the room outlets, flexible runouts, plenums, casings, mixing boxes, filter boxes, coils, fans, and the portion of air terminals not in the conditioned spaces. Ensure full range of motion of equipment actuators. Modify insulation to avoid obstruction with valve handles, safety reliefs, 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, except at fire dampers in duct systems. 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 and ductwork. 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. Unless otherwise indicated, do not insulate the following:

a. Factory preinsulated flexible ductwork;

b. Vertical portion of interior roof drain pipelines, chrome plated pipes, and fire protection pipes;

c. Vibration isolating connections;

d. Adjacent insulation;
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e. ASME stamps;
f. Fan name plates; and
g. Access plates in fan housings.

3.2 DUCTS (HVAC) INSULATION

3.2.1 Rigid Insulation

Secure rigid insulation by impaling over pins or anchors located not more than 3 inches from joint edges of boards, spaced not more than 12 inches on centers and secure with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Apply insulation with joints tightly butted. Neatly bevel insulation around name plates and access plates and doors. Each pin or anchor shall be capable of supporting a 20-pound load. Cut off protruding ends of pins, after clips are sealed with coating compound for inside work or manufacturer's recommended weatherproof coating for outside work, and reinforced with open weave glass membrane.

3.2.2 Flexible Blanket Insulation

Apply insulation with all joints tightly butted. Secure insulation to ductwork with adhesive in 6-inch wide strips on 12-inch centers. Staple laps of jacket with outward clinching staples. Sealing shall be in accordance with paragraph 3.3.3 below. For ductwork over 24 inches on horizontal duct runs, provide pins, washers and clips. Provide pins on sides of vertical ductwork being insulated. Space pins and clips on 18-inch centers and not more than 18 inches from duct corners. Carry insulation over standing seams and trapeze-type hangers. Install speed washers with pins and pin trimmed to washer. Sagging of flexible duct insulation will not be permitted. Cut off protruding ends of pins after clips are secured and sealed with coating compound for inside work. For warm air ducts, overlap insulation not less than 2 inches at joints and secure the laps with outward clinch staples on 4-inch centers. In cold air ducts, vapor seal all joints and staple as specified.

3.2.3 Insulation Finishes and Joint Sealing

Fill all breaks, punctures, and voids with vapor barrier coating compound for inside work or manufacturer's recommended weatherproof coating for outside service. Vapor seal all joints by embedding a single layer of 3-inch wide open weave glass membrane, 20 by 20 mesh maximum size between two 1/16-inch wet film thickness coats of vapor barrier coating compound. Draw glass fabric smooth and tight with a 1 1/2-inch overlap. At jacket penetrations such as hangers, thermometers, and damper operating rods, fill voids in the insulation with vapor barrier coating. Brush a coat of vapor barrier coating where required on HVAC ducts. Provide vapor barrier jacket continuous across seams, reinforcing, and projections. Where height of projections is greater than insulation thickness, carry insulation and jacket over the projection. For joints for heating only systems, provide insulation with two coats of fire resistant adhesive with glass fabric mesh embedded between coats.

3.2.4 Access Plates and Doors

On acoustically lined ducts, plenums, and casings, provide insulation on access plates and doors. On externally insulated ducts, plenums, and...
casings, provide insulation-filled hollow steel panels and doors for access openings. Bevel insulation around access plates and doors.

3.3 EQUIPMENT INSULATION

3.3.1 General Procedures

Apply equipment insulation suitable for temperature and service in rigid block or semirigid board or flexible form to fit as closely as possible to equipment. Groove or score insulation where necessary to fit the contours of equipment. Stagger end joints where possible. Bevel the edges of the insulation for cylindrical surfaces to provide tight joints. Join sections of cellular glass insulation with bedding compound. After the cellular glass insulation is in place on areas to be insulated, except where metal-encased, fill joints, seams, chipped edges, or depressions with bedding compound to form a smooth surface. Fill mineral fiber joints with insulating cement. Bevel insulation around name plates, ASME and access plates. For insulation on equipment that must be opened periodically for inspection, cleaning, or repair, construct insulation to be removable and replaceable without damage. Protect exposed insulation corners with corner angles under wires and bands.

3.4 PAINTING AND IDENTIFICATION

Paint in accordance with Section 09 90 00, "Paints and Coatings." Piping identification shall be as specified in other sections.

3.5 FIELD INSPECTION

Visually inspect to ensure that materials provided conform to specifications. Inspect installations progressively for compliance with requirements.
PART 1   GENERAL

1.1 REFERENCES

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

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


ASHRAE 135.1 (Errata 1 2015; INT 1 2013; Addenda O 2014) Method of Test for Conformance to BACnet

ARCNET TRADE ASSOCIATION (ATA)

ATA 878.1 (1999) Local Area Network: Token Bus

ASME INTERNATIONAL (ASME)

ASME B31.1 (2016) Power Piping

ASTM INTERNATIONAL (ASTM)


CONSUMER ELECTRONICS ASSOCIATION (CEA)


INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)


IEEE C62.45 (2002; R 2008) Recommended Practice on Surge Testing for Equipment Connected to
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Low-Voltage (1000v and less)AC Power Circuits

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)


NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1449 (2014; Reprint Mar 2015) Surge Protective Devices
UL 506 (2008; Reprint Oct 2013) Specialty Transformers
UL 508A (2013; Reprint Aug 2016) UL Standard for Safety Industrial Control Panels

1.2 DEFINITIONS

1.2.1 ANSI/ASHRAE Standard 135

ANSI/ASHRAE Standard 135: BACnet - A Data Communication Protocol for Building Automation and Control Networks, referred to as "BACnet". ASHRAE developed BACnet to provide a method for diverse building automation devices to communicate and share data over a network.

1.2.2 ARCNET

ATA 878.1 - Attached Resource Computer Network. ARCNET is a deterministic LAN technology; meaning it's possible to determine the maximum delay before a device is able to transmit a message.

1.2.3 BACnet

Building Automation and Control Network; the common name for the communication standard ASHRAE 135. The standard defines methods and protocol for cooperating building automation devices to communicate over a variety of LAN technologies.

1.2.4 BACnet Building Controller (B-BC)

ASHRAE 135 building controller that is the main interface for the building control system.
1.2.5 BACnet/IP

An extension of BACnet, Annex J, defines this mechanism using a reserved UDP socket to transmit BACnet messages over IP networks. A BACnet/IP network is a collection of one or more IP subnetworks that share the same BACnet network number. See also "BACnet Broadcast Management Device".

1.2.6 BACnet Internetwork

Two or more BACnet networks, possibly using different LAN technologies, connected with routers. In a BACnet internetwork, there exists only one message path between devices.

1.2.7 BACnet Network

One or more BACnet segments that have the same network address and are interconnected by bridges at the physical and data link layers.

1.2.8 BACnet Segment

One or more physical segments of BACnet devices on a BACnet network, connected at the physical layer by repeaters.

1.2.9 BBMD

BACnet Broadcast Management Device (BBMD). A communications device, typically combined with a BACnet router. A BBMD forwards BACnet broadcast messages to BACnet/IP devices and other BBMDs connected to the same BACnet/IP network. Every IP subnetwork that is part of a BACnet/IP network must have only one BBMD. See also "BACnet/IP".

1.2.10 BAS

Building Automation Systems, including DDC (Direct Digital Controls) used for facility automation and energy management.

1.2.11 BAS Owner

The regional or local user responsible for managing all aspects of the BAS operation, including: network connections, workstation management, technical support, control parameters, and daily operation. The BAS Owner for this project is Camp Lejeune Public Works.

1.2.12 BIBBs

BACnet Interoperability Building Blocks. A collection of BACnet services used to describe supported tasks. BIBBs are often described in terms of "A" (client) and "B" (server) devices. The "A" device uses data provided by the "B" device, or requests an action from the "B" device.

1.2.13 BI

BACnet International, formerly two organizations: the BACnet Manufacturers Association (BMA) and the BACnet Interest Group - North America (BIG-NA).

1.2.14 BI/BTL

BACnet International/BACnet Testing Laboratories (Formerly BMA/BTL). The organization responsible for testing products for compliance with the
BACnet standard, operated under the direction of BACnet International.

1.2.15 Bridge

Network hardware that connects two or more network (or BACnet internetwork) segments at the physical and data link layers. A bridge may also filter messages.

1.2.16 Broadcast

A message sent to all devices on a network segment.

1.2.17 Device

Any control system component, usually a digital controller, that contains a BACnet Device Object and uses BACnet to communicate with other devices. See also "Digital Controller".

1.2.18 Device Object

Every BACnet device requires one Device Object, whose properties represent the network visible properties of that device. Every Device Object requires a unique Object Identifier number on the BACnet internetwork. This number is often referred to as the device instance.

1.2.19 Device Profile

A collection of BIBBs determining minimum BACnet capabilities of a device, defined in ASHRAE Standard 135-2004, Annex L. Standard device profiles include BACnet Operator Workstations (B-OWS), BACnet Building Controllers (B-BC), BACnet Advanced Application Controllers (B-AAC), BACnet Application Specific Controllers (B-ASC), BACnet Smart Actuator (B-SA), and BACnet Smart Sensor (B-SS). Each device used in new construction is required to have a PICS statement listing BIBBs supported.

1.2.20 Digital Controller

An electronic controller, usually with internal programming logic and digital and analog input/output capability, which performs control functions. In most cases, synonymous with a BACnet device described in this specification. See also "Device".

1.2.20.1 Terminal Device Controllers

Terminal device controllers typically are controllers with less control features, may have integrated actuators, and may be mounted directly on equipment (with enclosures).

1.2.20.2 Field Controllers

Field controllers typically have a greater capability for input/output and customization, do not have integral actuators, are mounted in an enclosure not on the equipment and are used for equipment such as VAV air handlers.

1.2.20.3 Plant Controllers

Plant controllers are typically used to control various equipment in mechanical rooms such as pumps, heat exchangers, and chillers.
1.2.20.4 BACnet Building Controller (B-BC) also known as Supervisory Building Controller (SBC)

The BACnet Building Controller is used to coordinate all equipment in a building, input scheduling, and is used as a connection point for transferring configuration files to the other controllers. The SBC shall communicate with other controllers and equipment through a BACnet MS/TP bus. Depending on approvals and capabilities, the SBC may be used as a point of connection between the Camp Lejeune EMCS network (IP) and the building level control network (BACnet MS/TP).

1.2.21 Direct Digital Control (DDC)

Digital controllers performing control logic. Usually the controller directly senses physical values, makes control decisions with internal programs, and outputs control signals to directly operate switches, valves, dampers, and motor controllers.

1.2.22 DDC System

A network of digital controllers, communication architecture, and user interfaces. A DDC system may include programming, sensors, actuators, switches, relays, factory controls, operator workstations, and various other devices, components, and attributes.

1.2.23 Energy Management & Control System (EMCS)

The EMCS at Camp Lejeune is an enterprise system that actively receives energy and building condition information from multiple sources and provides load shedding, electric metering, alarming, trending, scheduling, set point adjustment and device status of all supervisory building controllers for maintenance personnel. The EMC receives real time electrical utility pricing data and automatically manages to Camp Lejeune's energy target. The existing EMCS consists of two servers, 1) Johnson Controls Incorporated (JCI) Metasys Extended Architecture (ADX server), and 2) Niagara AX supervisor (JCI FX web supervisor). Both of the systems communicate over the MRAN and either may be used to fulfill the requirements of this specification.

1.2.24 Ethernet

A family of local-area-network technologies providing high-speed networking features over various media.

1.2.25 Firmware

Software programmed into read only memory (ROM), flash memory, electrically erasable programmable read only memory (EEPROM), or erasable programmable read only memory (EPROM) chips.

1.2.26 Middleware (previously called Gateway)

Communication hardware and software connecting two or more different protocols, similar to human language translators. The Middleware translates one protocol into equivalent concepts for the other protocol. In BACnet applications, a middleware has BACnet on one side and non-BACnet protocols on the other side.
1.2.27 Half Router

A device that participates as one partner in a BACnet point-to-point (PTP) connection. Two half-routers in an active PTP connection combine to form a single router.

1.2.28 Hub

A common connection point for devices on a network.

1.2.29 Internet Protocol (IP, TCP/IP, UDP/IP)

A communication method, the most common use is the World Wide Web. At the lowest level, it is based on Internet Protocol (IP), a method for conveying and routing packets of information over various LAN media. Two common protocols using IP are User Datagram Protocol (UDP) and Transmission Control Protocol (TCP). UDP conveys information to well-known "sockets" without confirmation of receipt. TCP establishes "sessions", which have end-to-end confirmation and guaranteed sequence of delivery.

1.2.30 Input/Output (I/O)

Physical inputs and outputs to and from a device, although the term sometimes describes software, or "virtual" I/O. See also "Points".

1.2.31 I/O Expansion Unit

An I/O expansion unit provides additional point capacity to a digital controller.

1.2.32 IP subnet

Internet protocol (IP) identifies individual devices with a 32-bit number divided into four groups from 0 to 255. Devices are often grouped and share some portion of this number. For example, one device has IP address 209.185.47.68 and another device has IP address 209.185.47.82. These two devices share Class C subnet 209.185.47.00.

1.2.33 Local-Area Network (LAN)

A communication network that spans a limited geographic area and uses the same basic communication technology throughout.

1.2.34 LonTalk

CEA-709.1-D. A communication protocol developed by Echelon Corp. LonTalk is not permitted.

1.2.35 MAC Address

Media Access Control address. The physical node address that identifies a device on a Local Area Network.

1.2.36 Master-Slave/Token-Passing (MS/TP)

ISO 8802-3. One of the LAN options for BACnet. MSTP uses twisted-pair wiring for relatively low speed and low cost communication (up to 4,000 ft at 76.8K bps).
1.2.37 Native BACnet Device

A device that uses BACnet as its primary, if not only, method of communication with other BACnet devices without intermediary gateways. A system that uses native BACnet devices at all levels is a native BACnet system.

1.2.38 Network

Communication technology for data communications. BACnet approved network types are BACnet over Internet Protocol (IP), Point to Point (PTP) Ethernet, ARCNET, MS/TP, and LonTalk®. In general, networks within the building, all controllers and equipment will be BACnet MS/TP, unless noted otherwise.

1.2.39 Network Number

A site-specific number assigned to each network segment to identify for routing. This network number must be unique throughout the BACnet internetwork.

1.2.40 Object

The concept of organizing BACnet information into standard components with various associated properties. Examples include analog input objects and binary output objects.

1.2.41 Object Identifier

An object property used to identify the object, including object type and instance. Object Identifiers must be unique within a device.

1.2.42 Object Properties

Attributes of an object. Examples include present value and high limit properties of an analog input object. Properties are defined in ASHRAE 135; some are optional and some are required. Objects are controlled by reading from and writing to object properties.

1.2.43 Peer-to-Peer

Peer-to-peer refers to devices where any device can initiate and respond to communication with other devices.

1.2.44 Performance Verification Test (PVT)

The procedure for determining if the installed BAS meets design criteria prior to final acceptance. The PVT is performed after installation, testing, and balancing of mechanical systems. Typically the PVT is performed by the Contractor in the presence of the Government.

1.2.45 PID

Proportional, integral, and derivative control; three parameters used to control modulating equipment to maintain a setpoint. Derivative control is often not required for HVAC systems (leaving "PI" control).
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1.2.46 PICS

Protocol Implementation Conformance Statement (PICS), describing the BACnet capabilities of a device. See BACnet, Annex A for the standard format and content of a PICS statement.

1.2.47 Points

Physical and virtual inputs and outputs. See also "Input/Output".

1.2.48 PTP

Point-to-Point protocol connects individual BACnet devices or networks using serial connections like modem-to-modem links.

1.2.49 Repeater

A network component that connects two or more physical segments at the physical layer.

1.2.50 Router

A BACnet router is a component that joins together two or more networks using different LAN technologies. Examples include joining a BACnet Ethernet LAN to a BACnet MS/TP LAN. If a router is connected directly to the MRAN, it must be listed on the approved DIACAP equipment list and must be Marine Corps DADMS listed and approved.

1.2.51 Stand-Alone Control

Refers to devices performing equipment-specific and small system control without communication to other devices or computers for physical I/O, excluding outside air and other common shared conditions. Devices are located near controlled equipment, with physical input and output points limited to 64 or less per device, except for complex individual equipment or systems. Failure of any single device or communications will not cause other network devices to fail. Internal time clocks and onboard scheduling are required to allow for stand-alone control. BACnet "Smart" actuators (B-SA profile) and sensors (B-SS profile) communicating on a network with a parent device are exempt from stand-alone requirements. Provide stand-alone control routines to provide for energy saving sequences such as free cooling. Provide stand-alone control routines that operate without connection to the BACnet/IP and MS/TP networks during a loss of communication.

1.3 SUBCONTRACTOR SPECIAL REQUIREMENTS

Perform all work in this section in accordance with the paragraph SUBCONTRACTOR SPECIAL REQUIREMENTS in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS. The paragraph specifies that all contract requirements of this section shall be accomplished directly by a first tier subcontractor. No work required shall be accomplished by a second tier subcontractor.

1.4 BACnet DIRECT DIGITAL CONTROL SYSTEMS FOR HVAC DESCRIPTION

a. Merge new BACnet DDC with existing BACnet DDC system(s) including associated equipment and accessories. Existing DDC system is manufactured by JCI.
b. All new devices are accessible using a Web browser interface and communicate using ASHRAE 135 BACnet communications without the use of gateways, unless gateways are shown on the design drawings and specifically requested by the Government. Where gateways are allowed, they must support ASHRAE 135, including all object properties and read-write services shown on Government approved interoperability schedules. Manufacturer's products, including design, materials, fabrication, assembly, inspection, and testing shall be in accordance with ASHRAE 135, ASME B31.1, and NFPA 70, except where indicated otherwise.

1.4.1 Design Requirements

1.4.1.1 Control System Drawings Title Sheet

Provide a title sheet for the control system drawing set. Include the project title, project location, contract number, the controls contractor preparing the drawings, an index of the control drawings in the set, and a legend of the symbols and abbreviations used throughout the control system drawings.

1.4.1.2 List of I/O Points

Also known as a Point Schedule, provide for each input and output point physically connected to a digital controller: point name, point description, point type (Analog Output (AO), Analog Input (AI), Binary Output (BO), Binary Input (BI)), point sensor range, point actuator range, point address, BACnet object, associated BIBBS (where applicable), and point connection terminal number. Typical schedules for multiple identical equipment are allowed unless otherwise requested in design or contract criteria. All points shall adhere to the Camp Lejeune Standard naming conventions.

1.4.1.3 Control System Components List

Provide a complete list of control system components installed on this project. Include for each controller and device: control system schematic name, control system schematic designation, device description, manufacturer, model, part number, firmware version, serial number, physical location (e.g. Building 4, room 112 overhead), and power requirements (i.e. AC/DC voltage and power draw). For sensors, include point name, sensor range, and operating limits. For valves, include body style, Cv, design flow rate, pressure drop, valve characteristic (linear or equal percentage), and pipe connection size. For actuators, include point name, spring or non-spring return, modulating or two-position action, normal (power fail) position, nominal control signal operating range (0-10 volts DC or 4-20 milliamps), and operating limits.

1.4.1.4 Control System Schematics

Provide control system schematics. Typical schematics for multiple identical equipment are allowed unless otherwise requested in design or contract criteria. Include the following:

a. Location of each input and output device

b. Flow diagram for each piece of HVAC equipment

c. Name or symbol for each control system component, such as V-1 for a
valve
d. Setpoints, with differential or proportional band values
e. Written sequence of operation for the HVAC equipment
f. Valve and Damper Schedules, with normal (power fail) position
g. Control cabinet general layout, include all devices, point count, cable type (18/2, 18/3, etc), 24VAC VA power requirement for all devices including those powered from the cabinet.

1.4.1.5 HVAC Equipment Electrical Ladder Diagrams
Provide HVAC equipment electrical ladder diagrams. Indicate required electrical interlocks.

1.4.1.6 Component Wiring Diagrams
Provide a wiring diagram for each type of input device and output device. Indicate how each device is wired and powered; showing typical connections at the digital controller and power supply. Show for all field connected devices such as control relays, motor starters, actuators, sensors, and transmitters.

1.4.1.7 Terminal Strip Diagrams
Provide a diagram of each terminal strip. Indicate the terminal strip location, termination numbers, and associated point names.

1.4.1.8 BACnet Communication Architecture Schematic
Provide a schematic showing the project's entire BACnet communication network, including Internet Protocol (IP), Media Access Control (MAC), BACnet network, Device ID, field bus address, BBMDs, any devices using BACnet FDR, and Firmware version / Operating System, LAN devices including routers and bridges, gateways, controllers, workstations, and field interface devices. If applicable, show connection to existing networks.

1.5 SUBMITTALS
Submit detailed and annotated manufacturer's data, drawings, and specification sheets for each item listed, that clearly show compliance with the project specifications.

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

SD-02 Shop Drawings

Include the following in the project's control system drawing set:

Control System Drawings Title Sheet
List of I/O Points
Control System Components List
Control System Schematics
HVAC Equipment Electrical Ladder Diagrams

Component Wiring Diagrams

Terminal Strip Diagrams

BACnet Communication Architecture Schematic

SD-03 Product Data

Direct Digital Controllers

Include BACnet PICS for each controller/device type, including smart sensors (B-SS) and smart actuators (B-SA).

BACnet Gateways

Include BACnet and workstation display information; bi-directional communication ability; compliance with interoperability schedule; expansion capacity; handling of alarms, events, scheduling and trend data; and single device capability (not depending on multiple devices for exchanging information from either side of the gateway).

Include BACnet PICS for Operator Workstation software.

Sensors and Input Hardware

Output Hardware

Surge and Transient Protection

SD-05 Design Data

Performance Verification Testing Plan

Pre-Performance Verification Testing Checklist

SD-06 Test Reports

Performance Verification Testing Report

Bus Waveform Report

SD-07 Certificates

Contractor's Qualifications

SD-09 Manufacturer's Field Reports

Pre-PVT Checklist

SD-10 Operation and Maintenance Data

Comply with requirements for data packages in Section 01 78 23 OPERATION AND MAINTENANCE DATA, except as supplemented and modified in this specification.
1.6 QUALITY ASSURANCE

1.6.1 Standard Products

Provide material and equipment that are standard manufacturer's products currently in production and supported by a local service organization.

1.6.2 Delivery, Storage, and Handling

Handle, store, and protect equipment and materials to prevent damage before and during installation according to manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

1.6.3 Operating Environment

Protect components from humidity and temperature variation, dust, and contaminants. If components are stored before installation, keep them within the manufacturer's limits.

1.6.4 Finish of New Equipment

New equipment finishing shall be factory provided. Manufacturer's standard factory finishing shall be proven to withstand 125 hours in a salt-spray fog test. Equipment located outdoors shall be proven to withstand 500 hours in a salt-spray fog test.

Salt-spray fog test shall be according to ASTM B117, with acceptance criteria as follows: immediately after completion of the test, the finish shall show no signs of degradation or loss of adhesion beyond 0.125 inch on either side of the scratch mark.

1.6.5 Verification of Dimensions

The contractor shall verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing work.

1.6.6 Contractor's Qualifications

Submit documentation certifying the controls Contractor performing the work has completed at least three DDC systems installations of a similar design to this project, and programmed similar sequences of operation for at least two years.

1.6.7 Modification of References

The advisory provisions in ASME B31.1, NFPA 70 and the manufacturer's recommendations are mandatory. Substitute "shall" for "should" wherever it appears and interpret all references to the "authority having jurisdiction" and "owner" to mean the Contracting Officer.
1.6.8  Project Sequence

The control system work for this project shall proceed in the following order:

a.  Preparatory meeting for controls work.

b.  Submit and receive approval on the Shop Drawings, Product Data, and Certificates specified under the paragraph SUBMITTALS.

c.  Submit and receive approval for Performance Verification Testing (PVT) Plan.

d.  Perform the control system installation work, including all field check-outs and tuning.

e.  Provide support to TAB personnel as specified under the paragraph TEST AND BALANCE SUPPORT.

f.  Submit and receive approval of the Controls System Operators Manual specified under the paragraph CONTROLS SYSTEM OPERATORS MANUALS.

g.  Perform the Performance Verification Testing.

h.  Submit and receive approval on the PVT Report.

i.  PVT Report Acceptance test for Season 1.

j.  Submit and receive approval on the Training Documentation specified under the paragraph INSTRUCTION TO GOVERNMENT PERSONNEL and VFD Service Support. Submit at least 30 days before training.

k.  Deliver the final Controls System Operators Manuals and VFD Service Manuals.

l.  Conduct the Phase I Training and VFD on-site/hands-on training.

m.  Conduct the Phase II Training.

n.  Submit and receive approval of Closeout Submittals.

o.  PVT Report Acceptance Test for Season 2.

PART 2  PRODUCTS

2.1  DDC SYSTEM

a.  Provide a networked DDC system for stand-alone control in compliance with the latest revision of the ASHRAE 135 BACnet standard. Include all programming, objects, and services required to meet the sequence of control. Provide BACnet MS/TP communications between the DDC system and native BACnet devices furnished with HVAC equipment and plant equipment including boilers, chillers, and variable frequency drives. Devices provided shall be certified in the BACnet Testing Laboratories (BTL) Product Listing and in accordance with ASHRAE 135.1 Method of Test for Conformance to BACnet. Controls provided integral to equipment shall be part of the DDC system and shall fully comply with this specification. Coordinate integration of integral controls into the system as a whole. BACnet over IP is not permitted within the DDC.
b. Assist the Government in interfacing the new DDC system with the site’s existing server and operator workstation and software. Create graphics, scheduling, alarming, and trending.

2.1.1 EMCS Interface

The Energy Management & Control System (EMCS) at Camp Lejeune is comprised of two separate systems. Both of the systems communicate over the basewide Marine Air-Ground Task Force Regional Area Network (MRAN). One uses the Johnson Controls Metasys extended architecture including an ADX server and NAE 8500(s). Connection from the building BAS is by a Johnson Controls Network Automation Engine (NAE) or Network Control Engine (NCE) to the ADX server, or by a LOYTEC Router connected to the DDC MS/TP bus and MRAN using BACnet over IP to communicate to the NAE 8500. The second system uses a Niagara AX wed supervisor with a JACE in the building communicating using Fox protocol. Because of IT security and permissions, only these systems and equipment are permitted as part of the EMCS.

2.1.1.1 BACnet Building Controller

Provide either a Johnson Controls NAE, NCE, or a JACE. This will serve as both the BACnet Building Controller and the connection point between the buildings DDC and the EMCS.

2.1.1.2 LOYTEC Router

In addition to the BACnet Building Controller, provide a LOYTEC MP201 router to act as a BACnet MS/TP to BACnet IP gateway.

2.1.2 Direct Digital Controllers

Direct digital controllers shall be UL 916 rated.

2.1.2.1 I/O Point Limitation

The total number of I/O hardware points used by a single stand-alone digital controller, including I/O expansion units, shall not exceed 64, except for complex individual equipment or systems. Place I/O expansion units in the same cabinet as the digital controller.

2.1.2.2 Environmental Limits

Controllers shall be suitable for, or placed in protective enclosures suitable for the environment (temperature, humidity, dust, and vibration) where they are located.

2.1.2.3 Stand-Alone Controllers

Provide stand-alone direct digital controllers with internal time clocks. Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of any building communication failure. All I/O points specified for a piece of equipment shall be integral to its controller and serial connected expansion modules. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network.
2.1.2.4 Internal Clock

Provide internal clocks and scheduling for all Direct Digital Controllers. Provide controllers with BTL listed profiles for all BACnet Building Controllers (B-BC) and BACnet Advanced Application Controllers (B-AAC) using BACnet time synchronization services. This includes but is not limited to VAV Controllers, Fan Coil controllers, Heat Pump controllers and any terminal controllers. BACnet Application specific controllers (B-ASC) will only be accepted for dedicated small exhaust system control such as restroom and mechanical room exhaust fans. Automatically synchronize system clocks daily from an operator-designated controller. The system shall automatically adjust for daylight saving time.

2.1.2.5 Memory

Provide sufficient memory for each controller to support the required control, communication, trends, alarms, and messages. Protect programs residing in memory with EEPROM, flash memory, or by an uninterruptible power source (battery or uninterruptible power supply). The backup power source shall have capacity to maintain the memory during a 72-hour continuous power outage. Rechargeable power sources shall be constantly charged while the controller is operating under normal line power. Batteries shall be replaceable without soldering. Trend and alarm history collected during normal operation shall not be lost during power outages less than 72 hours long.

2.1.2.6 Immunity to Power Fluctuations

Controllers shall operate at 90 percent to 110 percent nominal voltage rating.

2.1.2.7 Transformer

The controller power supply shall be fused or current limiting and rated at 125 percent power consumption.

2.1.2.8 Wiring Terminations

Use screw terminal wiring terminations for all field-installed controllers. Provide field-removable modular terminal strip or a termination card connected by a ribbon cable for all controllers other than terminal units.

2.1.2.9 Input and Output Interface

Provide hard-wired input and output interface for all controllers as follows:

a. Protection: Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with sources up to 24 volts AC or DC for any duration shall cause no controller damage.

b. Binary Inputs: Binary inputs shall monitor on and off contacts from a "dry" remote device without external power, and external 5-24 VDC voltage inputs.

c. Pulse Accumulation Inputs: Pulse accumulation inputs shall conform to binary input requirements and accumulate pulses at a resolution
suitable to the application.

d. Analog Inputs: Analog inputs shall monitor low-voltage (0-10 VDC), current (4-20 mA), or resistance (thermistor or RTD) signals.

e. Binary Outputs: Binary outputs shall send a pulsed 24 VDC low-voltage signal for modulation control, or provide a maintained open-closed position for on-off control. Where appropriate, provide a method to select normally open or normally closed operation.

f. Analog Outputs: Analog outputs shall send modulating 0-10 VDC or 4-20 mA signals to control output devices.

g. Tri-State Outputs: Tri-State outputs shall provide three-point floating control of terminal unit electronic actuators.

2.1.2.10 Digital Controller BACnet Internetwork

Provide intermediate gateways, only when requested by the Government and shown on the contract drawings, to connect existing non-BACnet devices to the BACnet internetwork. Controller and operator interface communication shall conform to ASHRAE 135, BACnet. If a controller becomes non-responsive, the remaining controllers shall continue operating and not be affected by the failed controller.

2.1.2.11 Communications Ports

a. Direct-Connect Interface Ports: Provide at least one extra communication port at each local BACnet network for direct connecting a notebook computer or BACnet hand-held terminal so all network BACnet objects and properties may be viewed and edited by the operator.

b. BACnet routers supporting ARCnet shall also be capable of supporting MS/TP.

2.1.2.12 BACnet Gateways

Provide BACnet communication ports, whenever available as a plant equipment OEM standard option, for DDC integration via a single communication cable. Typical BACnet controlled plant equipment includes, but is not limited to, boilers, chillers, and variable frequency motor drives.

Provide gateways to connect BACnet to legacy systems, existing non-BACnet devices, and existing non-BACnet DDC controlled plant equipment, only when specifically requested and approved by the Government, and shown on the Government approved BACnet Communication Architecture Schematic. Provide with each gateway an interoperability schedule, showing each point or event on the legacy side that the BACnet "client" will read, and each parameter that the BACnet network will write to. Describe this interoperability in terms of BACnet services, or Interoperability Building Blocks (BIBBS), defined in ASHRAE 135 Annex K. Provide two-year minimum warranty for each gateway, including parts and labor.

The following minimum capabilities are required:

a. Middleware shall be able to read and view all readable object properties listed in the interoperability schedule on the non-BACnet network to the BACnet network and vice versa where applicable.
b. Middleware shall be able to write to all writeable object properties listed in the interoperability schedule on the non-BACnet network from the BACnet network and vice versa where applicable.

c. Middleware shall provide single-pass (only one protocol to BACnet without intermediary protocols) translation from the non-BACnet protocol to BACnet and vice versa.

d. Middleware shall meet the requirements of Data Sharing Read Property (DS-RP-B), Data Sharing Write Property (DS-WP-B), Device Management Dynamic Device Binding-B (DM-DDB-B), and Device Management Communication Control (DM-DCC-B) BIBBs, in accordance with ASHRAE 135.

e. Middleware shall include all hardware, software, software licenses, and configuration tools for operator-to-gateway communications. Provide backup programming and parameters on CD media and the ability to modify, download, backup, and restore gateway configuration.

2.1.2.13 Digital Controller Cabinet

Provide each digital controller in a factory fabricated locked cabinet enclosure.

Cabinets located indoors shall protect against dust and have a minimum NEMA 1 rating, except where indicated otherwise. Cabinets located outdoors or in damp environments shall protect against all outdoor conditions and have a minimum NEMA 4 rating. Mechanical rooms that contain steam service or equipment including new steam boiler rooms are considered damp environments. Outdoor control panels and controllers must be able to withstand extreme ambient conditions, without malfunction or failure, whether or not the controlled equipment is running. If necessary, provide a thermostatically controlled panel heater in freezing locations, and an internal ventilating fan in locations exposed to direct sunlight. Cabinets shall have a hinged lockable door and an offset removable metal back plate, except controllers integral with terminal units, like those mounted on VAV boxes. Provide like-keyed locks for all hinged panels provided and a set of two keys at each panel, with one key inserted in the lock.

2.1.2.14 Main Power Switch and Receptacle

Provide each control cabinet with a main external power on/off switch located inside the cabinet. Also provide each cabinet with a separate 120 VAC duplex receptacle.

2.1.3 DDC Software

2.1.3.1 Programming

Provide programming to execute the sequence of operation indicated. Provide all programming and tools to configure and program all controllers. All software shall be licensed to Marine Corps Base, Camp Lejeune Complex for unrestricted use on Camp Lejeune Complex and reproduction for use on Camp Lejeune Complex. Software keys and "dongles" are not permitted. Provide programming routines in simple, easy-to-follow logic with detailed text comments describing what the logic does and how it corresponds to the project's written sequence of operation. All logic programming and control functions shall be closed loop, command and feedback for fault detection and alarming when status != command.
a. Graphic-based programming shall use a library of function blocks made from pre-programmed code designed for BAS control. Function blocks shall be assembled with interconnecting lines, depicting the control sequence in a flowchart. If providing a computer with device programming tools as part of the project, graphic programs shall be viewable in real time showing present values and logical results from each function block.

b. Menu-based programming shall be done by entering parameters, definitions, conditions, requirements, and constraints.

c. For line-by-line and text-based programming, declare variable types (variable types include but are not limited to the following: local, global, real, and integer) at the beginning of the program. Use descriptive comments frequently to describe the programming.

d. If providing a computer with device programming tools as part of the project, provide a means for detecting program errors and testing software strategies with a simulation tool. Simulation may be inherent within the programming software suite, or provided by physical controllers mounted in a NEMA 1 test enclosure. The test enclosure shall contain one dedicated controller of each type provided under this contract, complete with power supply and relevant accessories.

2.1.3.2 Parameter Modification

All writeable object properties, and all other programming parameters needed to comply with the project specification shall be adjustable for devices at any network level, including those accessible with web-browser communication, and regardless of programming methods used to create the applications.

2.1.3.3 Short Cycling Prevention

Provide setpoint differentials and minimum on/off times to prevent equipment short cycling.

2.1.3.4 Equipment Status Delay

Provide an adjustable delay from when equipment is commanded on or off and when the control program looks to the status input for confirmation.

2.1.3.5 Run Time Accumulation

Use the Elapsed Time Property to provide re-settable run time accumulation for each Binary Output Object connected to mechanical loads greater than 1 HP, electrical loads greater than 10 KW, or wherever else specified.

2.1.3.6 Timed Local Override

Provide an adjustable override time for each push of a timed local override button.

2.1.3.7 Time Synchronization

Provide time synchronization, including adjustments for leap years, daylight saving time, and operator time adjustments.
2.1.3.8 Scheduling

Provide operating schedules as indicated, with equipment assigned to
groups. Changing the schedule of a group shall change the operating
schedule of all equipment in the group. Groups shall be capable of
operator creation, modification, and deletion. Provide capability to view
and modify schedules in a seven-day week format. Provide capability to
enter holiday and override schedules one full year at a time.

2.1.3.9 Object Property Override

Allow writeable object property values to accept overrides to any valid
value. Where specified or required for the sequence of control, the
Out-Of-Service property of Objects shall be modifiable using BACnet's write
property service. When documented, exceptions to these requirement are
allowed for life, machine, and process safeties.

2.1.3.10 Alarms and Events

Alarms and events shall be capable of having programmed time delays and
high-low limits. When a web server is connected to the BACnet
internetwork, alarms/events shall report to web server as defined by an
authorized operator. Otherwise alarms/events shall be stored within a
device on the BACnet network until connected to a user interface device and
retrieved. Provide alarms/events in agreement with the point schedule,
sequence of operation, and the BAS Owner. At a minimum, provide
programming to initiate alarms/events any time a piece of equipment fails
to operate, a control point is outside normal range or condition shown on
schedules, communication to a device is lost, a device has failed, or a
controller has lost its memory.

2.1.3.11 Trending

Provide BACnet trending all object present values, set points, and other
parameters indicated for trending on project schedules. Trends may be
associated into groups, and a trend report may be set up for each group.
Trends are stored within a device on the BACnet network, with operator
selectable trend intervals from 10 seconds up to 60 minutes. The minimum
number of consecutive trend values stored at one time shall be 100 per
variable. When trend memory is full, the most recent data shall overwrite
the oldest data.

The BACnet system shall allow for Change-Of-Value (COV) subscription based
trending at user defined thresholds.

The B-BC shall upload trends automatically upon reaching 3/4 of the device
buffer limit (via Notification_Threshold property), by operator request, or
by time schedule for archiving. Archived and real-time trend data shall be
available for viewing numerically and graphically for at the workstation
and connected notebook computers.

2.1.3.12 Device Diagnostics

Each controller shall have diagnostic LEDs for power, communication, and
device fault condition. The DDC system shall recognize and report a
non-responsive controller.
2.1.3.13 Power Loss

Upon restoration of power, the DDC system shall perform an orderly restart and restoration of control.

2.2 SENSORS AND INPUT HARDWARE

Coordinate sensor types with the BAS Owner to keep them consistent with existing installations.

2.2.1 Field-Installed Temperature Sensors

Where feasible, provide the same sensor type throughout the project. Avoid using transmitters unless absolutely necessary.

2.2.1.1 Thermistors

Precision thermistors may be used in applications below 200 degrees F. Sensor accuracy over the application range shall be 0.36 degree F or less between 32 to 150 degrees F. Stability error of the thermistor over five years shall not exceed 0.25 degrees F cumulative. A/D conversion resolution error shall be kept to 0.1 degrees F. Total error for a thermistor circuit shall not exceed 0.5 degrees F.

2.2.1.2 Resistance Temperature Detectors (RTDs)

Provide RTD sensors with platinum elements compatible with the digital controllers. Encapsulate sensors in epoxy, series 300 stainless steel, anodized aluminum, or copper. Temperature sensor accuracy shall be 0.1 percent (1 ohm) of expected ohms (10k ohms) at 32 degrees F. Temperature sensor stability error over five years shall not exceed 0.25 degrees F cumulative. Direct connection of RTDs to digital controllers without transmitters is preferred. When RTDs are connected directly, lead resistance error shall be less than 0.25 degrees F. The total error for a RTD circuit shall not exceed 0.5 degrees F.

2.2.1.3 Temperature Sensor Details

a. Room Type: Provide the sensing element components within a decorative protective cover suitable for surrounding decor. Provide room temperature sensors with timed override button.

b. Duct Probe Type: Ensure the probe is long enough to properly sense the air stream temperature.

c. Duct Averaging Type: Continuous averaging sensors shall be one foot in length for each 4 square feet of duct cross-sectional area, and a minimum length of 6 feet.

d. Pipe Immersion Type: Provide minimum three-inch immersion. Provide each sensor with a corresponding pipe-mounted sensor well, unless indicated otherwise. Sensor wells shall be stainless steel when used in steel piping, and brass when used in copper piping. Provide the sensor well with a heat-sensitive transfer agent between the sensor and the well interior.

e. Outside Air Type: Provide the sensing element on the building's north side with a protective weather shade that positions the sensor approximately 3 inches off the wall surface, does not inhibit free air
flow across the sensing element, and protects the sensor from snow, ice, and rain.

2.2.2 Transmitters

Provide transmitters with 4 to 20 mA or 0 to 10 VDC linear output scaled to the sensed input. Transmitters shall be matched to the respective sensor, factory calibrated, and sealed. Size transmitters for an output near 50 percent of its full-scale range at normal operating conditions. The total transmitter error shall not exceed 0.1 percent at any point across the measured span. Supply voltage shall be 12 to 24 volts AC or DC. Transmitters shall have non-interactive offset and span adjustments. For temperature sensing, transmitter drift shall not exceed 0.03 degrees F a year.

2.2.2.1 Relative Humidity Transmitters

Provide transmitters with an accuracy equal to plus or minus 3 percent from 0 to 90 percent scale, and less than one percent drift per year. Sensing elements shall be the polymer type.

2.2.2.2 Pressure Transmitters

Provide transmitters integral with the pressure transducer.

2.2.3 Current Transducers

Provide current transducers to monitor motor amperage, unless current switches are shown on design drawings or point tables.

2.2.4 Motor Run Status

Unless otherwise noted, provide current switches to indicate run status of pumps and fans. Sensitivity of the switch on belt driven equipment should distinguish between loaded motor and unloaded motor such as a fan with a broken belt.

2.2.5 Pneumatic to Electric Transducers

Pneumatic to electronic transducers shall convert a 0 to 20 psig signal to a proportional 4 to 20 mA or 0 to 10 VDC signal (operator scaleable). Supply voltage shall be 24 VDC. Accuracy and linearity shall be 1.0 percent or better.

2.2.6 Input Switches

2.2.6.1 Timed Local Overrides

Provide buttons or switches to override the DDC occupancy schedule programming for each major building zone during unoccupied periods, and to return HVAC equipment to the occupied mode. This requirement is waived for zones clearly intended for 24 hour continuous operation.

2.2.7 Freeze Protection Thermostats

Provide special purpose thermostats with flexible capillary elements 20 feet minimum length for coil face areas up to 40 square feet. Provide longer elements for larger coils at 1-foot of element for every 4 square feet of coil face area, or provide additional thermostats. Provide switch
contacts rated for the respective motor starter's control circuit voltage. Include auxiliary contacts for the switch's status condition. A freezing condition at any 18-inch increment along the sensing element's length shall activate the switch. The thermostat shall be equipped with a manual push-button reset switch so that when tripped, the thermostat requires manual resetting before the HVAC equipment can restart.

2.2.8 Air Flow Measurement Stations

Air flow measurement stations shall have an array of velocity sensing elements and straightening vanes inside a flanged sheet metal casing. The velocity sensing elements shall be the RTD or thermistor type, traversing the ducted air in at least two directions. The air flow pressure drop across the station shall not exceed 0.08 inch water gage at a velocity of 2,000 fpm. The station shall be suitable for air flows up to 5,000 fpm, and a temperature range of 40 to 120 degrees F. The station's measurement accuracy over the range of 125 to 2,500 fpm shall be plus or minus 3 percent of the measured velocity. Station transmitters shall provide a linear, temperature-compensated 4 to 20 mA or 0 to 10 VDC output. The output shall be capable of being accurately converted to a corresponding air flow rate in cubic feet per minute. Transmitters shall be a 2-wire, loop powered device. The output error of the transmitter shall not exceed 0.5 percent of the measurement.

2.2.9 Air Flow Measurement for Terminal Devices

Air flow measurement for terminal devices such as variable air volume boxes, with or without fan power shall have an array of pressure sensing elements than sense total pressure and static pressure. The flow measurement shall be integral to the device controller and shall be by differential pressure sensor. The air flow shall measure flows down to 300 fpm with an accuracy of 5 percent of reading.

2.3 OUTPUT HARDWARE

2.3.1 Actuators

Provide direct-drive electric actuators for all control applications, except where indicated otherwise. All actuators shall include a feedback loop for detecting actuator faults. The actuator shall report actual position back to the control system. Binary actuators shall provide open/closed status, at a minimum. Modulating actuators and process shall provide position feedback expressed (directly or through span conversion) as percent open/closed. Actuator status shall be derived from actuator position; however, effect may be used in cases where direct feedback is not practical such as VAV coils and dampers.

Use airflow sensors as a feedback loop for damper actuators. Use differential temperature as a feedback mechanism for VAV coil valve actuation.

2.3.1.1 Electric Actuators

Each actuator shall deliver the torque required for continuous uniform motion and shall have internal end switches to limit the travel, or be capable of withstanding continuous stalling without damage. Actuators shall function properly within 85 to 110 percent of rated line voltage. Provide actuators with hardened steel running shafts and gears of steel or copper alloy. Fiber or reinforced nylon gears may be used for torques less
than 16 inch-pounds. Provide two-position actuators of single direction, spring return, or reversing type. Provide modulating actuators capable of stopping at any point in the cycle, and starting in either direction from any point. Actuators shall be equipped with a switch for reversing direction, and a button to disengage the clutch to allow manual adjustments. Provide the actuator with a hand crank for manual adjustments, as applicable. Thermal type actuators may only be used on terminal fan coil units, terminal VAV units, convectors, and unit heaters. Spring return actuators shall be provided on all control dampers and all control valves except terminal fan coil units, terminal VAV units, convectors, and unit heaters; unless indicated otherwise. Each actuator shall have distinct markings indicating the full-open and full-closed position, and the points in-between.

2.3.2 Output Signal Conversion

2.3.2.1 Electronic-to-Pneumatic Transducers

Electronic to pneumatic transducers shall convert a 4 to 20 mA or 0 to 10 VDC digital controller output signal to a proportional 0 to 20 psig pressure signal (operator scaleable). Accuracy and linearity shall be 1.0 percent or better. Transducers shall have feedback circuit that converts the pneumatic signal to a proportional 4 to 20 mA or 0 to 10 VDC signal.

2.3.3 Output Switches

2.3.3.1 Control Relays

Field installed and DDC panel relays shall be double pole, double throw, UL listed, with contacts rated for the intended application, indicator light, and dust proof enclosure. The indicator light shall be lit when the coil is energized and off when coil is not energized. Relays shall be the socket type, plug into a fixed base, and replaceable without tools or removing wiring. Encapsulated "PAM" type relays may be used for terminal control applications.

2.4 ELECTRICAL POWER AND DISTRIBUTION

2.4.1 Transformers

Transformers shall conform to UL 506. For control power other than terminal level equipment, provide a fuse or circuit breaker on the secondary side of each transformer.

2.4.2 Surge and Transient Protection

Provide each digital controller with surge and transient power protection. Surge and transient protection shall consist of the following devices, installed externally to the controllers.

2.4.2.1 Power Line Surge Protection

Provide surge suppressors on the incoming power at each direct digital controller or grouped terminal controllers and shall be installed externally to the device or devices being protected. Surge suppressors shall be rated in accordance with UL 1449, have a fault indicating light, and conform to the following:

a. The device shall be a transient voltage surge suppressor, hard-wire
type individual equipment protector for 120 VAC/1 phase/2 wire plus ground.

b. The device shall react within 5 nanoseconds and automatically reset.

c. The voltage protection threshold, line to neutral, shall be no more than 211 volts.

d. The device shall have an independent secondary stage equal to or greater than the primary stage joule rating.

e. The primary suppression system components shall be pure silicon avalanche diodes.

f. The secondary suppression system components shall be silicon avalanche diodes or metal oxide varistors.

g. The device shall have an indication light to indicate the protection components are functioning.

h. All system functions of the transient suppression system shall be individually fused and not short circuit the AC power line at any time.

i. The device shall have an EMI/RFI noise filter with a minimum attenuation of 13 dB at 10 kHz to 300 MHz.

j. The device shall comply with IEEE C62.41.1 and IEEE C62.41.2, Class "B" requirements and be tested according to IEEE C62.45.

k. The device shall be capable of operating between minus 20 degrees F and plus 122 degrees F.

2.4.2.2 MS/TP Communication Line Surge Protection

Provide surge and transient protection for DDC controllers and DDC network related devices connected to phone and network communication lines, in accordance with the following:

a. The device shall provide continuous, non-interrupting protection, and shall automatically reset after safely eliminating transient surges.

b. The protection shall react within 5 nanoseconds using only solid-state silicon avalanche technology.

c. The device shall be installed at the distance recommended by its manufacturer.

2.4.3 Wiring

Provide complete electrical wiring for the DDC System, including wiring to transformer primaries. Unless indicated otherwise, provide all normally visible or otherwise exposed wiring in conduit. Where conduit is required, control circuit wiring shall not run in the same conduit as power wiring over 100 volts. Circuits operating at more than 100 volts shall be in accordance with Section 26 20 00, INTERIOR DISTRIBUTION SYSTEM. Run all circuits over 100 volts in conduit, metallic tubing, covered metal raceways, or armored cable.
2.4.3.1 Power Wiring

The following requirements are for field-installed wiring:

a. Wiring for 24 V circuits shall be insulated copper 18 AWG minimum and rated for 300 VAC service.

b. Wiring for 120 V circuits shall be insulated copper 14 AWG minimum and rated for 600 VAC service.

2.4.3.2 Analog Signal Wiring

Provide in accordance with control manufacturer's recommendations and the following: Field-installed analog signal wiring shall be 18 AWG single or multiple twisted pair. Each cable shall be 100 percent shielded and have a 20 AWG drain wire. Each wire shall have insulation rated for 300 VAC service. Cables shall have an overall aluminum-polyester or tinned-copper cable-shield tape.

2.4.3.3 Conduit

Conduit for controls less than 100 volts shall be colored blue. Junction box cover plates for controls shall be blue.

PART 3 EXECUTION

3.1 INSTALLATION

Perform the installation under the supervision of competent technicians regularly employed in the installation of DDC systems. 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 plans & specification requirements differ. Use the "Preferred" method when alternative methods are given. The word "should" will be considered to mean "shall". Bring any conflicts between manufacturer's recommendations and plans & specification requirements to the Government's attention. All equipment shall be installed level and plum.

3.1.1 Pre-Installation Meeting

Prior to starting the installation, meet with the Contracting Officer's Technical Representative (COTR) and the BAS owner to develop a mutual understanding relative to the details of the DDC system requirements. Requirements to be discussed include required submittals, work schedule, and field quality control.

3.1.2 Demolition

Remove and/or demolish all existing controls, cabling, conductors, conduit, controllers, power circuits and cabinets that are no longer needed after new work is installed.

3.1.3 BACnet Naming and Addressing

Coordinate with the EMCS Owner and provide unique naming and addressing consistent with existing buildings already loaded on the EMCS server. All DDC controllers shall have a Camp Lejeune unique instance number and all Supervisory Building Controllers shall have a Camp Lejeune unique name.
Names are managed by the Government.

a. MAC Address

Every BACnet device shall have an assigned and documented MAC Address unique to its network. For Ethernet networks, document the MAC Address assigned at its creation. For MS/TP networks, assign addresses from 0 to 127. Instance numbers are to be obtained from Camp Lejeune Public Works Operations to ensure duplicates do not occur. Point of Contact:

Bill Schrader  
Public Works Division/EMCS  
1005 Michael Road / Building 1005  
MCB Camp Lejeune, NC  28547  
(910) 450-7846

For MS/TP, assign from 01 to 127.

b. Network Numbering

Assign unique numbers to each new network installed on the BACnet internetwork. Provide ability for changing the network number; either by device switches, network computer, or field operator interface. The BACnet internetwork (all possible connected networks) can contain up to 65,534 possible unique networks.

c. Device Object Identifier Property Number

Assign unique Device "Object_Identifier" property numbers or device instances for each device on the BACnet internetwork. Provide for future modification of the device instance number; either by device switches, network computer, or field interface. Instance numbers must be field assignable. BACnet allows up to 4,194,302 possible unique devices per internetwork.

d. Device Object Name Property Text

Each object on the Camp Lejeune EMCS has a unique point name, which is made up of the object or short name stored in the controller and the equipment identifier, which is stored in the supervisory building controller (SBC). The long point name combines this object name with the name stored in the SBC that describes the controller or location of the object. The device object name property field shall support 32 minimum printable characters. The point name follows the general convention:

```
Area.Building.Location.Equipment.Object Name
```

Example: Hadnot Point.HP512.Second Floor.AHU-3.ASTATIC-SP. See Attachments one through four for equipment names, object names, object groupings, and area names.

e. Object Name Property Text (Other than Device Objects)

The object name identifies the specific point. Only object names on the approved Camp Lejeune list shall be used. From the example above, the point name is: "ASTATIC-SP". See Attachment for the approved Camp Lejeune list. The object name property field shall support 32 minimum printable characters.
f. Object Description

The controller shall also store an alpha numeric description of the object name. The controller shall support a minimum of 30 printable characters. From the example above the object description is: "Actual Static Pressure Setpoint".

g. List of Attachments

Attachment 1 - Equipment Names
Attachment 2 - Object Names
Attachment 3 - Object Grouping
Attachment 4 - Area Names

3.1.4 Minimum BACnet Object Requirements

a. Use of Standard BACnet Objects in accordance with existing Camp Lejeune Standards

For the following points and parameters, use standard BACnet objects, where all relevant object properties can be read using BACnet's Read Property Service, and all relevant object properties can be modified using BACnet's Write Property Service:
all device physical inputs and outputs, all set points, all PID tuning parameters, all calculated pressures, flow rates, and consumption values, all alarms, all trends, all schedules, and all equipment and lighting circuit operating status.

b. BACnet Object Description Property

The Object Description property shall support 32 minimum printable characters. For each object, complete the description property field using a brief, narrative, plain English description specific to the object and project application. For example: "HW Pump 1 Proof." Document compliance, length restrictions, and whether the description is writeable in the device PICS.

c. Analog Input, Output, and Value Objects

Support and provide Description and Device_Type text strings matching signal type and engineering units shown on the points list.

d. Binary Input, Output, and Value Objects

Support and provide Inactive_Text and Active_Text property descriptions matching conditions shown on the points list.

e. Calendar Object

For devices with scheduling capability, provide at least one Calendar Object with ten-entry capacity. All operators may view Calendar Objects; authorized operators may make modifications from a workstation. Enable the writeable Date List property and support all calendar entry data types.

f. Schedule Object

Use Schedule Objects for all building system scheduling. All operators
may view schedule entries; authorized operators may modify schedules from a workstation.

g. Loop Object or Equal

Use Loop Objects or equivalent BACnet objects in each applicable field device for PID control. Regardless of program method or object used, allow authorized operators to adjust the Update Interval, Setpoint, Proportional Constant, Integral Constant, and Derivative Constant using BACnet read/write services.

3.1.5 Minimum BACnet Service Requirements

a. Command Priorities

Use commandable BACnet objects to control machinery and systems, providing the priority levels listed below. If the sequence of operation requires a different priority, obtain approval from the Contracting Officer.

<table>
<thead>
<tr>
<th>Priority Level</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual-Life Safety</td>
</tr>
<tr>
<td>2</td>
<td>Automatic-Life Safety</td>
</tr>
<tr>
<td>3</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>4</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>5</td>
<td>Critical Equipment Control</td>
</tr>
<tr>
<td>6</td>
<td>Minimum On/Off</td>
</tr>
<tr>
<td>7</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>8</td>
<td>Manual Operator</td>
</tr>
<tr>
<td>9</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>10</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>11</td>
<td>Load Shedding</td>
</tr>
<tr>
<td>12</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>13</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>14</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>15</td>
<td>(User Defined)</td>
</tr>
<tr>
<td>16</td>
<td>(User Defined)</td>
</tr>
</tbody>
</table>

b. Alarming
(1) Alarm Priorities - Coordinate alarm and event notification with the BAS Owner.

(2) Notification Class - Enable writeable Priority, Ack Required, and Recipient List properties of Notification Class objects.

(3) Event Notification Message Texts - Use condition specific narrative text and numerical references for alarm and event notification.

c. Updating Displayed Property Values

Allow workstations to display property values at discrete polled intervals, or based on receipt of confirmed and unconfirmed Change of Value notifications. The COV increment shall be adjustable by an operator using BACnet services, and polled intervals shall be adjustable at the operator workstation.

3.1.6 Local Area Networks

Obtain Government approval before connecting new networks with existing networks. Network numbers and device instance numbers shall remain unique when joining networks. Do not change existing network addressing without Government approval. See also "BACnet Naming and Addressing".

3.1.7 BACnet Routers and Protocol Gateways

Provide the quantity of BACnet routers necessary for communications shown on the BACnet Communication Architecture schematic. Provide BACnet routers with BACnet Broadcast Message Device (BBMD) capability on each BACnet internetwork communicating across an IP network. Configure BBMD tables to enable unicast forwarding of broadcast messaging across Layer-3 IP subnets.

3.1.8 Wiring Criteria

a. Run circuits operating at more than 100 volts in rigid or flexible conduit, metallic tubing, covered metal raceways, or armored cable.

b. Run all control wiring in rigid or flexible conduit, metallic tubing, or covered metal raceways. All control wiring located inside mechanical rooms shall be in conduit or metallic tubing.

c. Do not run binary control circuit wiring in the same conduit as power wiring over 100 volts. Where analog signal wiring requires conduit, do not run in the same conduit with AC power circuits or control circuits operating at more than 100 volts.

d. Provide circuit and wiring protection required by NFPA 70.

e. Minimum conduit size is 3/4-inch, except 1/2-inch may be used from last junction box to the terminal device. Maximum conduit fill is 40% or the cable manufacturer's recommended amount whichever is less. Provide plastic end sleeves at all conduit terminations to protect wiring from burrs.

f. Do not bury aluminum-sheathed cable or aluminum conduit in concrete.

g. Input/output identification: Permanently label each field-installed
Wire, cable, and pneumatic tube at each end with descriptive text using a commercial wire marking system. Labels shall fully encircle the wire, cable, or tube. The single line text shall run parallel to the wire, cable, or tube and shall be repeated so as to be viewable without twirling or twisting the wire. Locate the markers within 2 inches of each termination. Label shall include type of network and destination of cable (ex. BACnet/AHU-1). Match the names and I/O number to the project’s point list. Similarly label all power wiring serving control devices, including the work "power" in the label. Number each pneumatic tube every six feet. Label all terminal blocks with alpha/numeric labels. All wiring and the methods shall be in accordance with UL 508A.

h. Conduit identification: All conduits shall be labeled at 36' from terminations, boxes, or bends. Labels shall be 3/8' black lettering on white background and indicate what system the conduit contains. Label shall be visible and legible from at least three sides with a minimum dimension of 1.9 inches x 4 inches.

i. Each terminal device shall have its own terminal conduit run. Device boxes or devices shall not be used as "pass thru" for wiring.

j. Conduit to equipment and devices shall be run tight to walls, and ceilings. Avoid conduit on the floor, i.e. conduit shall not block access to or past equipment. Flex conduit is to be used only when EMT or rigid conduit is not able to satisfy the application such as a transition to a sensor or equipment. Flex conduit shall be limited to a maximum length of 3 ft.

k. For controller power, provide new 120 VAC circuits, with ground if not defined on the electrical drawings. Provide each circuit with a dedicated breaker, and run wiring in its own conduit, separate from any control wiring. Connect the controller's ground wire to the electrical panel ground; conduit grounds are not acceptable.

l. BACnet Building Controllers (B-BC) shall be powered from a dedicated transformer for the B-BC only. Each control cabinet shall have a dedicated 24 volt transformer. The 120 VAC power branch circuit shall be dedicated to the DDC control system.

m. Surge Protection: Install surge protection according to manufacturer's instructions. Multiple controllers fed from a common power supply may be protected by a common surge protector, properly sized for the total connected devices.

n. All terminations in panels shall be made at a terminal block. No wire nuts are allowed in panels.

o. Grounding: Ground controllers and cabinets to a good earth ground as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Conduit grounding is not acceptable; all grounding shall have a direct path to the building earth ground. Ground sensor drain wire shields at the controller end.

p. The Contractor shall be responsible for correcting all associated MS/TP and SA bus wiring, termination, end of line, and ground loop problems.

q. Run wiring in panel enclosures in covered wire track.
3.1.9 Accessibility

Install all equipment so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install digital controllers, data ports, and concealed actuators, valves, dampers, and like equipment in locations freely accessible through access doors.

3.1.10 Digital Controllers

a. Install as stand alone control devices (see definitions).

b. Locate control cabinets at the locations shown on the drawings. If not shown on the drawings, install in the most accessible space, close to the controlled equipment.

c. Provide a dedicated analog output to each output device, such as variable frequency driven pump motors in an alternating arrangement.

3.1.11 Hand-Off-Auto Switches

Wire safety controls such as smoke detectors and freeze protection thermostats to protect the equipment during both hand and auto operation.

3.1.12 Temperature Sensors

Install temperature sensors in locations that are accessible and provide a good representation of sensed media. Installations in dead spaces are not acceptable. Calibrate sensors according to manufacturer's instructions. Do not use sensors designed for one application in a different application.

3.1.12.1 Room Temperature Sensors

Mount the sensors on interior walls to sense the average room temperature at the locations indicated. Avoid locations near heat sources such as copy machines or locations by supply air outlet drafts. Mount the center of the sensor 54 inches above the floor to meet ADA requirements.

3.1.12.2 Duct Temperature Sensors

a. Probe Type: Provide a gasket between the sensor housing and the duct wall. Seal the duct penetration air tight. Seal the duct insulation penetration vapor tight.

b. Averaging Type (and coil freeze protection thermostats): Weave the capillary tube sensing element in a serpentine fashion perpendicular to the flow, across the duct or air handler cross-section, using durable non-metal supports. Prevent contact between the capillary and the duct or air handler internals. Provide a duct access door at the sensor location. The access door shall be hinged on the side, factory insulated, have cam type locks, and be as large as the duct will permit, maximum 18 by 18 inches. For sensors inside air handlers, the sensors shall be fully accessible through the air handler's access doors without removing any of the air handler's internals.

3.1.12.3 Immersion Temperature Sensors

Provide thermowells for sensors measuring piping, tank, or pressure vessel temperatures. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are

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smaller than the length of the wells, provide wells in piping at elbows to sense flow across entire area of well. Wells shall not restrict flow area to less than 70 percent of pipe area. Increase piping size as required to avoid restriction. Provide thermal conductivity material within the well to fully coat the inserted sensor.

3.1.12.4 Outside Air Temperature Sensors

Provide outside air temperature sensors in weatherproof enclosures on the north side of the building, away from exhaust hoods and other areas that may affect the reading. Provide a shield to shade the sensor from direct sunlight.

3.1.13 Damper Actuators

Where possible, mount actuators outside the air stream in accessible areas.

3.1.14 Pressure Sensors

Locate pressure sensors as indicated.

3.1.15 Component Identification Labeling

Using an electronic hand-held label maker with white tape and bold black block lettering, provide an identification label on the exterior of each new control panel, control device, actuator, and sensor. Also provide labels on the exterior of each new control actuator indicating the (full) open and (full) closed positions. For labels located outdoors, use exterior grade label tape, and provide labels on both the inside and outside of the panel door or device cover. Acceptable alternatives are white plastic labels with engraved bold black block lettering permanently attached to the control panel, control device, actuator, and sensor. Have the labels and wording approved by the BAS Owner prior to installation.

3.1.16 Network and Telephone Communication Lines

When telephone lines or network connections by the Government are required, provide the Contracting Officer at least 120 days advance notice of need. Provide one inch conduit and Cat 6 cable from the point of connection of the BAS to the point of connection to the MRAN (most likely in the telephone equipment room).

3.2 TEST AND BALANCE SUPPORT

The controls contractor shall coordinate with and provide on-site support to the test and balance (TAB) personnel specified under Section 23 05 92 TESTING, ADJUSTING, BALANCING SMALL HEATING/VENTILATING/COOLING SYSTEMS. This support shall include:

a. On-site operation and manipulation of control systems during the testing and balancing.

b. Control setpoint adjustments for balancing all relevant mechanical systems, including VAV boxes.

c. Tuning control loops with setpoints and adjustments determined by TAB personnel.
3.3 INTERFACE WITH EXISTING EMCS

Provide 16 hours of assistance to the Government with interfacing the BAS to the Base wide EMCS. The Government will make the final connection of the BAS to the MRAN. This 16 hours does not include completion or corrections to the installed BAS as defined in the contract documents. This 16 hours is for assisting the interface and for making revisions to the BAS that may be needed outside of the contract requirements.

3.4 CONTROLS SYSTEM OPERATORS MANUALS

Provide two electronic and printed copies of a Controls System Operators Manual. The manual shall be specific to the project, written to actual project conditions, and provide a complete and concise depiction of the installed work. Provide information in detail to clearly explain all operation requirements for the control system.

Provide with each manual: CDs of the project's control system drawings, control programs, data bases, graphics, and all items listed below. Include gateway back-up data and configuration tools where applicable. Provide CDs in jewel case with printed and dated project-specific labels on both the CD and the case. For text and drawings, use Adobe Acrobat or MS Office file types. When approved by the Government, AutoCAD and Visio files are allowed. Give files descriptive English names and organize in folders.

Provide printed manuals in sturdy 3-ring binders with a title sheet on the outside of each binder indicating the project title, project location, contract number, and the controls contractor name, address, and telephone number. Each binder shall include a table of contents and tabbed dividers, with all material neatly organized. Manuals shall include the following:

a. A copy of the as-built control system (shop) drawings set, with all items specified under the paragraph SUBMITTALS. Indicate all field changes and modifications.

b. A copy of the project's mechanical design drawings, including any official modifications and revisions.

c. A copy of the project's approved Product Data submittals provided under the paragraph SUBMITTALS.

d. A copy of the project's approved Performance Verification Testing Plan and Report.

e. A copy of the project's approved final TAB Report.

f. Printouts of all control system programs, including controller setup pages if used. Include plain-English narratives of application programs, flowcharts, and source code.

g. Printouts of all physical input and output object properties, including tuning values, alarm limits, calibration factors, and set points.

h. A table entitled "AC Power Table" listing the electrical power source for each controller. Include the building electrical panel number, panel location, and circuit breaker number.

i. The DDC manufacturer's hardware and software manuals in both print and
CD format with printed project-specific labels. Include installation and technical manuals for all controller hardware, operator manuals for all controllers, programming manuals for all controllers, operator manuals for all workstation software, installation and technical manuals for the workstation and notebook, and programming manuals for the workstation and notebook software.

j. A list of qualified control system service organizations for the work provided under this contract. Include their addresses and telephone numbers.

k. A written statement entitled "Technical Support" stating the control system manufacturer or authorized representative will provide toll-free telephone technical support at no additional cost to the Government for a minimum of two years from project acceptance, will be furnished by experienced service technicians, and will be available during normal weekday working hours. Include the toll-free technical support telephone number.

l. A written statement entitled "Software Upgrades" stating software and firmware patches and updates will be provided upon request at no additional cost to the Government for a minimum of two years from contract acceptance. Include a table of all DDC system software and firmware provided under this contract, listing the original release dates, version numbers, part numbers, and serial numbers.

m. Submit any and all updated field controller files, and BACnet Building Controller data base during the acceptance and warranty periods or as a result of a latent defect.

3.5 PERFORMANCE VERIFICATION TESTING (PVT)

3.5.1 General

The PVT shall demonstrate compliance of the control system work with the contract requirements. The PVT shall be performed by the Contractor and may be witnessed by the Government. If the project is phased, provide separate testing for each phase. A Pre-PVT meeting to review the Pre-PVT Checklist is required to coordinate all aspects of the PVT and shall include the Contractor's QA representative, the Contractor's PVT administrator, the Contracting Officer's representative, and the BAS Owner.

3.5.2 Performance Verification Testing Plan

Submit a detailed PVT Plan of the proposed testing for Government approval. Develop the PVT Plan specifically for the control system in this contract. The PVT Plan shall be a clear list of test items arranged in a logical sequence. It shall include each and all sequences of all controllers. Include sequence tested, intended test procedure, required assisted personnel (such as the mechanical contractor), the expected response, and the pass/fail criteria for every component tested. Include pass/fail column for test, and space for comments, signature and date lines for Contractor's PVT administrator and Contractor's QA representative. The PVT plan shall include the prescriptive pre-PVT check list in addition to the Contractor generated controller specific testing sequences. The final part of the PVT Report shall be 48 hour trends. Propose criteria for the trends, ie, change of state, change of value with the trigger value, time in the PVT Plan.
3.5.3 PVT Sample Size

Test all controllers unless otherwise directed. Trends will be reported on all central plant equipment and primary air handling unit controllers, and 20% of terminal controllers such as VAV boxes and fan coil units.

3.5.4 Pre-Performance Verification Testing Checklist

Submit the following as a part of the PVT Plan and the PVT Report. Each item shall include a column for the Contractor's initial/date. This form may be a general form applicable to all controllers and submitted only once in the PVT Plan. Each controller shall have an individual checklist with controller title and identified in the PVT Report.

a. Verify all mechanical installation work is successfully completed and started up by the appropriate personnel.

b. Verify all required control system components, wiring, and accessories are installed.

c. Verify the installed control system architecture matches approved drawings.

d. Verify all control circuits operate at the proper voltage and are free from grounds or faults.

e. Verify all required surge protection is installed.

f. Verify the A/C Power Table specified in the paragraph CONTROLS SYSTEM OPERATORS MANUALS is accurate.

g. Verify all DDC network communications function properly, including uploading and downloading programming changes.

h. Verify each digital controller’s programming is backed up.

i. Verify all wiring, components, and panels are properly labeled.

j. Verify all required points are programmed into devices.

k. Verify all valve and actuator zero and span adjustments are set properly. List each device and span for that device.

l. Verify all sensor readings are accurate and calibrated. List each sensor, sensor reading, and measured value.

m. Verify each control valve and actuator goes to normal position upon loss of power. List each device and normal position.

n. Verify each controller works properly in stand-alone mode by disconnecting the BACnet bus.

3.5.5 Conducting Performance Verification Testing

a. Conduct PVT after approval of the PVT Plan. Notify the Contracting Officer of the planned PVT at least 15 days prior to testing. Provide an estimated time table required to perform the testing. Furnish personnel, equipment, instrumentation, and supplies necessary to perform all aspects of the PVT. Ensure that testing personnel are
regularly employed in the testing and calibration of DDC systems. Using the project's as-built control system (shop) drawings, the project's mechanical design drawings, and the approved PVT Plan, conduct the PVT.

b. During testing, identify any items that do not meet the contract requirements and if time permits, conduct immediate repairs and re-test. Otherwise, deficiencies shall be investigated, corrected, and re-tested later. Document each deficiency and corrective action taken.

c. If re-testing is required, follow the procedures for the initial PVT. The Government may require re-testing of any control system components affected by the original failed test.

3.5.6 Controller Capability and Labeling

Test the following for each controller:

a. Memory: Demonstrate that programmed data, parameters, and trend/ alarm history collected during normal operation is not lost during power failure.

b. Direct Connect Interface: Demonstrate the ability to connect directly to each type of digital controller with a portable electronic device like a notebook computer or PDA. Show that maintenance personnel interface tools perform as specified in the manufacturer's technical literature.

c. Stand Alone Ability: Demonstrate controllers provide stable and reliable stand-alone operation using default values for values normally read over the network.

d. Wiring and AC Power: Demonstrate the ability to disconnect any controller safely from its power source using the AC Power Table. Demonstrate the ability to match wiring labels easily with the control drawings. Demonstrate the ability to locate a controller's location using the BACnet Communication Architecture Schematic and floor plans.

e. Nameplates and Tags: Show the nameplates and tags are accurate and permanently attached to control panel doors, devices, sensors, and actuators.

3.5.7 Workstation and Software Operation

For every user workstation or notebook provided:

a. Show points lists agree with naming conventions.

b. Show that graphics are complete.

c. Show the UPS operates as specified.

3.5.8 BACnet Communications and Interoperability Areas

a. Data Presentation: On each BACnet Operator Workstation, demonstrate graphic display capabilities.

b. Reading of Any Property: Demonstrate the ability to read and display any used readable object property of any device on the network.
c. Setpoint and Parameter Modifications: Show the ability to modify all setpoints and tuning parameters in the sequence of control or listed on project schedules. Modifications are made with BACnet messages and write services initiated by an operator using workstation graphics, or by completing a field in a menu with instructional text.

d. Peer-to-Peer Data Exchange: Show all BACnet devices are installed and configured to perform BACnet read/write services directly (without the need for operator or workstation intervention), to implement the project sequence of operation, and to share global data.

e. Alarm and Event Management: Show that alarms/events are installed and prioritized according to the BAS Owner. Demonstrate time delays and other logic is set up to avoid nuisance tripping, e.g., no status alarms during unoccupied times or high supply air during cold morning start-up. Show that operators with sufficient privilege can read and write alarm/event parameters for all standard BACnet event types. Show that operators with sufficient privilege can change routing (BACnet notification classes) for each alarm/event including the destination, priority, day of week, time of day, and the type of transition involved (types of transition include but are not limited to the following: TO-OFF NORMAL and TO-NORMAL).

f. Schedule Lists: Show that schedules are configured for start/stop, mode change, occupant overrides, and night setback as defined in the sequence of operations.

g. Schedule Display and Modification: Show the ability to display any schedule with start and stop times for the calendar year. Show that all calendar entries and schedules are modifiable from any connected workstation by an operator with sufficient privilege.

h. Archival Storage of Data: Show that data archiving is handled by the operator workstation/server, and local trend archiving and display is accomplished with BACnet Trend Log objects.

i. Modification of Trend Log Object Parameters: Show that an operator with sufficient privilege can change the logged data points, sampling rate, and trend duration.

j. Device and Network Management: Show the following capabilities:

   (1) Display of Device Status Information
   (2) Display of BACnet Object Information
   (3) Silencing Devices that are Transmitting Erroneous Data
   (4) Time Synchronization
   (5) Remote Device Reinitialization
   (6) Backup and Restore Device Programming and Master Database(s)
   (7) Configuration Management of Half-Routers, Routers and BBMDs
3.5.9 Execution of Sequence of Operation

Demonstrate that the HVAC system operates properly through the complete sequence of operation. Use read/write property services to globally read and modify parameters over the internetwork.

3.5.10 Control Loop Stability and Accuracy

For all control loops tested, give the Government trend graphs of the control variable over time, demonstrating that the control loop responds to a 20 percent sudden change of the control variable set point without excessive overshoot and undershoot. If the process does not allow a 20 percent set point change, use the largest change possible. Show that once the new set point is reached, it is stable and maintained. Control loop trend data shall be in real-time with the time between data points 30 seconds or less.

3.5.11 Performance Verification Testing Report

Upon successful completion of the PVT, submit a P VT Report to the Government and prior to the Government taking use and possession of the facility. Do not submit the report until all problems are corrected and successfully re-tested. The report shall include the annotated PVT Plan used during the PVT. Where problems were identified, explain each problem and the corrective action taken. Include a written certification that the installation and testing of the control system is complete and meets all of the contract's requirements.

3.5.12 Bus Waveform Report

Provide printed waveform of the MS/TP bus(es). Use an oscilloscope to test and record the waveform of each bus. This waveform is useful in identifying and troubleshooting bus problems such as inappropriate taps, grounds, end of line terminations and poor connections. Identify each graphic with bus name, location, date and time, and instrument used.

3.5.13 Performance Verification Testing Acceptance Testing

After acceptance of the PVT Report, demonstrate proper and stable operation of the DDC System. During the field acceptance testing, verify, in the presence of the COTR and BAS owner, random selections of sequences reported in the PVT Report. Equipment, controllers, devices, and sequences for field acceptance testing area to be selected by the COTR. Field acceptance testing includes verification of the PVT for the following equipment groups:

Group 1: All pumps, chillers, boilers, return fans, computer room units, and air handling units (rooftop and central stations).

Group 2: 25 percent of terminals such as VAV and fan coil units.

Group 3: 25 percent of supply fans, and exhaust fans.

If any of the acceptance testing is found to not operate correctly, terminate verification for the given group. Make the necessary corrections and prepare a revised PVT Report. Reschedule acceptance testing of the revised report with the COTR. After the PVT has been accepted, submit the revised controller files and BACnet Building Controller database.
3.6 TRAINING REQUIREMENTS

Provide a qualified instructor (or instructors) with two years minimum field experience with the installation and programming of similar BACnet DDC systems. Orient training to the specific systems installed. Coordinate training times and location with the Contracting Officer and BAS Owner after receiving approval of the training course documentation. Training shall take place at the job site or a nearby Government-furnished location. A training day shall occur during normal working hours, last no longer than 8 hours and include a one-hour break for lunch and two additional 15-minute breaks. The project's approved Controls System Operators Manual shall be used as the training text. The Contractor shall ensure the manuals are submitted, approved, and available to hand out to the trainees before the start of training.

3.6.1 Training Documentation

Submit training documentation for review 30 days minimum before training. Documentation shall include an agenda for each training day, objectives, a synopses of each lesson, and the instructor's background and qualifications. The training documentation can be submitted at the same time as the project's Controls System Operators Manual.

3.6.2 Phase I Training - Fundamentals

The Phase I training session shall last one day and be conducted in a classroom environment with complete audio-visual aids provided by the contractor. Provide each trainee a printed 8.5 by 11 inch hard-copy of all visual aids used. Upon completion of the Phase I Training, each trainee should fully understand the project's DDC system fundamentals. The training session shall include the following:

a. BACnet fundamentals (objects, services, addressing) and how/where they are used on this project

b. This project's list of control system components

c. This project's list of points and objects

d. This project's device and network communication architecture

e. This project's sequences of control, and:

f. Alarm capabilities

g. Trending capabilities

h. Troubleshooting communication errors

i. Troubleshooting hardware errors

3.6.3 Phase II Training - Operation

Provide Phase II Training shortly after completing Phase I Training. The Phase II training session shall last one day and be conducted at the DDC system workstation, at a notebook computer connected to the DDC system in the field, and at other site locations as necessary. Upon completion of the Phase II Training, each trainee should fully understand the project's DDC system operation. The training session shall include the following:
a. A walk-through tour of the mechanical system and the installed DDC components (components include but are not limited to the following: controllers, valves, dampers, surge protection, switches, thermostats, and sensors)

b. A discussion of the components and functions at each DDC panel

c. Logging-in and navigating at each operator interface type

d. Using each operator interface to find, read, and write to specific controllers and objects

e. Modifying and downloading control program changes

f. Modifying setpoints

g. Creating, editing, and viewing trends

h. Creating, editing, and viewing alarms

i. Creating, editing, and viewing operating schedules and schedule objects

j. Backing-up and restoring programming and data bases

k. Modifying graphic text, backgrounds, dynamic data displays, and links to other graphics

l. Creating new graphics and adding new dynamic data displays and links

m. Alarm and Event management

n. Adding and removing network devices

-- End of Section --
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.

ASME INTERNATIONAL (ASME)

ASME B31.1 (2016) Power Piping


ASTM INTERNATIONAL (ASTM)

ASTM A 525 (1991; Rev. B) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

ASTM A 653/A 653M (2001a) Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock-Forming Quality

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017) National Electrical Code


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


UNDERWRITERS LABORATORIES (UL)

UL 181 (1996; Rev Dec 1998) Factory-Made Air Ducts and Air Connectors

1.2 SYSTEM DESCRIPTION

Provide new and modify existing heating, ventilating, and cooling (HVAC) systems complete and ready for operation. HVAC systems include equipment,
17-0007, Design Dental Treatment & Recovery Rooms at NH100

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-02 Shop Drawings
- Temperature control systems

SD-03 Product Data
- Dampers
- Diffusers, registers, and grilles
- Duct heaters
- Flexible round ducts
- Humidifiers

SD-08 Manufacturer's Instructions
- Installation manual

SD-10 Operation and Maintenance Data
- Submit in accordance with Section 01 78 23, "Operation and Maintenance Data."

SD-11 Closeout Submittals
- Air filter inventory

1.3.1 Temperature Control Systems

Drawings shall include point-to-point electrical wiring diagrams.

1.3.2 Installation Manual

Provide for each item of equipment.

1.3.3 Air Filter Inventory

Submit an inventory of sizes and quantity of air filters required to be replaced. Inventory shall indicate location of each piece of equipment. Include sketches of drawings.

PART 2 PRODUCTS

2.1 ELECTRICAL

2.1.1 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.

2.1.2 Electrical Work

Provide under Section 26 20 00, "Interior Wiring Systems." Provide control wiring under this section in accordance with NFPA 70.

2.2 METAL DUCT SYSTEMS

Provide shop-fabricated, zinc-coated steel ducts conforming to ASTM A 525 or ASTM A 653/A 653M coating designation G60. Fabricate, construct, brace, reinforce, install, support, and seal ducts and accessories, and test ducts in accordance with SMACNA HVAC Duct Const Stds and SMACNA Leakage Test Mnl. 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.

2.2.1 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.

2.2.2 Turning Vanes

Provide fabricated tees and square elbows with turning vanes in accordance with SMACNA HVAC Duct Const Stds for vanned elbows. Turning vanes shall be single wall with trailing edges.

2.2.3 Dampers

Provide factory manufactured opposed blade adjustable manual dampers where indicated for duct heights of 12 inches and larger. Provide factory manufactured single leaf dampers for duct heights less than 12 inches. Provide damper shafts with 2 inch standoffs to clear 2 inches of duct insulation with bearings at both ends of the shafts. Provide adjustment quadrant with indicator and locking devices. Provide galvanized steel dampers one gage heavier than duct in which dampers are installed.

2.2.4 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.

2.2.5 Access Doors

Provide for access to volume dampers, fire dampers, plenum chambers, and where indicated. Provide each door with double wall zinc-coated steel construction, gasketed airtight, with continuous hinges and cam latches. Insulate access doors with one-inch thick rigid insulation. Provide 12 inch by 12 inch door, except where larger sizes are indicated, or provide 12 inches by height of duct when duct is less than 12 inches high.

2.2.6 Duct Heaters

Electric heating coils shall have aluminized steel flanged frame for duct mounting, complete with terminal box, high limit thermal cutout bulb, and open resistance type heating elements. Coils shall have an airflow switch to keep heaters from operating with no-airflow. Provide controls to keep fan running until heater cools. Provide wire type heating elements insulated from metal by ceramic bushings. Provide UL listed or FM approved duct heaters.

2.2.7 Flexible Round Ducts

UL 181 and NFPA 90A with factory-applied insulation, vapor barrier, and end connections. Fire hazard rating of duct assembly shall not exceed 25 for flame spread and 50 for smoke developed. Provide ducts designed for working pressures of 2 inches W.G. positive and 1.5 inches W.G. negative. Flexible round duct length shall not exceed 5 feet. Secure connections by applying adhesive for 2 inches over rigid duct, apply flexible duct 2 inches over rigid duct, apply metal clamp, and provide minimum of three No. 8 sheet metal screws through clamp and rigid duct.

a. Inner duct core: Flexible core shall be interlocking spiral or helically corrugated and constructed of zinc-coated steel, aluminum, or stainless steel; or shall be constructed of inner liner of continuous galvanized spring steel wire helix fused to continuous, fire-retardant, flexible vapor barrier film, inner duct core.

b. Insulation: Inner duct core shall be insulated with mineral fiber blanket type flexible insulation, minimum of one inch thick. Insulation shall be covered on exterior with manufacturer's standard fire retardant vapor barrier jacket for flexible round duct.
2.2.8 Self-Contained Humidifiers


c. Manifold: ASTM A 666, Type 304 stainless-steel tube extending across entire width of duct or plenum and equipped with mounting brackets on ends.

d. Cabinet: Sheet metal enclosure for housing heater cylinder, electrical wiring, components, controls, and control panel. Enclosure shall include baked-enamel finish, hinged or removable access door, and threaded outlet in bottom of cabinet for drain piping.

e. Control Panel:
   1. Factory-wired disconnect switch.
   2. Liquid-crystal display.
   3. Programmable keyboard.
   4. Set-point adjustment.
   5. Warning signal indicating end of replaceable cylinder or ionic bed insert life.
   7. Diagnostic, maintenance, alarm, and status features.
   8. High-water float to prevent overfilling.

f. Controls:
   1. Microprocessor-based control system for modulating or cycling control, and start/stop and status monitoring for interface to central HVAC instrumentation and controls.
   2. Solenoid-fill and automatic drain valves to maintain water level and temper hot drain water.
   3. Field-adjustable timer to control drain cycle for flush duration and interval.
   4. Controls shall drain tanks if no demand for humidification for more than 72 hours.
   5. Conductivity-type level controls.

g. Accessories:
   1. Humidistat: Wall-mounting, solid-state, electronic-sensor controller capable of full modulation or cycling control.
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/ANSI B31.5, NFPA 70, and in accordance with the manufacturer's recommendations.

3.1.2 Connections to Existing Systems

Notify the Contracting Officer in writing at least 15 calendar days prior to the date the connections are required. Obtain approval before interrupting service. Furnish materials required to make connections into existing systems and perform excavating, backfilling, compacting, and other incidental labor as required. Furnish labor and tools for making actual connections to existing systems.

3.2 ADJUSTMENTS

Adjust controls and equipment so as to give satisfactory operation. Air duct systems shall be adjusted and balanced so that air quantities at outlets are as indicated and so that distribution from supply outlets is free from drafts and has uniform velocity over the face of each outlet.

3.3 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 steam, fuel, water, electricity, instruments, connecting devices, and personnel for tests. Clean equipment, ducts, and filters.

3.3.1 Air Ducts

Obtain approval before applying insulation.

3.3.2 Equipment

3.3.2.1 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.

3.3.3 Additional Field Testing

Provide testing, adjusting, and balancing (TAB) of ducts, piping, and
3.3.4 Testing and Balancing

Balance airflow in accordance with SMACNA and flows indicated. Submit written certificate to report the following:

a. Air-handling unit and condensing unit nameplate data, and actual voltage and ampere consumption.
b. Supply and return terminal airflow, and equipment used to measure airflow.
c. Air-handling unit in and out cfm and temperatures, rpm of fan if belt driven.
d. Ambient outside air temperature, date, and person testing, balancing, and reporting.

3.3.5 Testing EMCS Equipment

a. All EMCS equipment shall be given an operation test.
b. Items not operating properly shall be repaired or replaced and retested.

3.3.6 Humidifier

3.3.6.1 Installation

a. Install humidifiers with required clearance for service and maintenance. Maintain path, downstream from humidifiers, clear of obstructions as required by ASHRAE 62.1.
b. Seal humidifier manifold duct or plenum penetrations with flange.
c. Install humidifier manifolds in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
d. Install stainless-steel drain pan under each manifold mounted in duct.
   1. Construct drain pans with connection for drain; insulated and complying with ASHRAE 62.1.
   2. Connect to condensate trap and drainage piping.
   3. Extend drain pan upstream and downstream from manifold a minimum distance recommended by manufacturer but not less than required by ASHRAE 62.1.
e. Install manifold supply piping pitched to drain condensate back to humidifier.
f. Install drip leg upstream from steam trap a minimum of 12 inches tall for proper operation of trap.
g. Equipment Mounting:

1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration Controls for HVAC and Plumbing Piping and Equipment."

h. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

1. Install piping adjacent to humidifiers to allow service and maintenance.

2. Install shutoff valve, strainer, backflow preventer, and union in humidifier makeup line.

i. Install electrical devices and piping specialties furnished by manufacturer but not factory mounted.

j. Install piping from safety relief valves to nearest floor drain.

k. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

l. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3.6.2 Field Quality Control

a. Perform tests and inspections and prepare test reports.

b. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

c. Remove and replace malfunctioning units and retest as specified above.
**TABLE 15701-1**

**EQUIPMENT MINIMUM EFFICIENCY REQUIREMENTS**

Equipment must meet each rating listed

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Efficiency</th>
<th>Rating Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air to Air Unitary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Conditioner (Packaged and Split)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65 Mbtu/hr</td>
<td>12.0 SEER</td>
<td></td>
</tr>
<tr>
<td>65-135 Mbtu/hr</td>
<td>11.0 EER</td>
<td></td>
</tr>
<tr>
<td>136-240 Mbtu/hr</td>
<td>10.8 EER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.2 IPLV</td>
<td></td>
</tr>
<tr>
<td>Air to Air Unitary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Pump (Packaged and Split)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65 Mbtu/hr</td>
<td>12.0 SEER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.7 HSPF</td>
<td></td>
</tr>
<tr>
<td>65-135 Mbtu/hr</td>
<td>10.1 EER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.4 IPLV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2 COP</td>
<td></td>
</tr>
<tr>
<td>136-240 Mbtu/hr</td>
<td>9.3 EER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.5 IPLV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.1 COP</td>
<td></td>
</tr>
<tr>
<td>Air Cooled</td>
<td>1.23</td>
<td>Full Load kW/ton ARI 550/590-98</td>
</tr>
<tr>
<td>Water Chiller</td>
<td>.90</td>
<td>IPLV kW/ton ARI 550/590-98</td>
</tr>
<tr>
<td>Air Cooled</td>
<td>12.0 SEER</td>
<td></td>
</tr>
<tr>
<td>Condensing Units</td>
<td>11.0 EER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.4 IPLV</td>
<td></td>
</tr>
<tr>
<td>Room Air Conditioner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Window, not thru the wall)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20,000 btu/hr</td>
<td>10.7 EER</td>
<td>DOE test procedure</td>
</tr>
<tr>
<td>=&gt;20,000 btu/hr</td>
<td>9.42 EER</td>
<td>DOE test procedure</td>
</tr>
<tr>
<td>Package Terminal</td>
<td>10-(.16xCap/1000)*EER</td>
<td>ARI 310/380 @ 95 F Outdoor</td>
</tr>
<tr>
<td>Air Conditioner</td>
<td>12.2-(.2xCap/1000)*EER</td>
<td>ARI 310/380 @ 82 F Outdoor</td>
</tr>
<tr>
<td>Package Terminal</td>
<td>10-(.16xCap/1000)*EER</td>
<td>ARI 310/380 @ 95 F Outdoor</td>
</tr>
<tr>
<td>Heat Pump</td>
<td>12.2-(.2xCap/1000)*EER</td>
<td>ARI 310/380 @ 82 F Outdoor</td>
</tr>
<tr>
<td></td>
<td>2.9-(.026xCap/1000)*COP</td>
<td>ARI 310/380 @ 47 F Outdoor</td>
</tr>
</tbody>
</table>

*Capacity is cooling capacity in btu/hr. Use 7,000 if cap is less than 7,000, use 15,000 if cap is greater than 15,000.*
### TABLE 15701-1
**EQUIPMENT MINIMUM EFFICIENCY REQUIREMENTS**
Equipment must meet each rating listed

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Efficiency</th>
<th>Rating Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Room</td>
<td>8.9 EER</td>
<td></td>
</tr>
<tr>
<td>Air Conditioner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Pump</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Loop</td>
<td>16.2 EER</td>
<td>@ 59 F EWT</td>
</tr>
<tr>
<td></td>
<td>3.6 COP</td>
<td>@ 50 F EWT</td>
</tr>
<tr>
<td>Closed Loop</td>
<td>14.1 EER</td>
<td>@ 77 F EWT</td>
</tr>
<tr>
<td></td>
<td>3.3 COP</td>
<td>@ 32 F EWT</td>
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<tr>
<td>Oil Fired</td>
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<td></td>
</tr>
<tr>
<td>Heating Boilers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>83% Et</td>
<td></td>
</tr>
<tr>
<td>Steam</td>
<td>83% Et</td>
<td></td>
</tr>
<tr>
<td>Natural Gas Fired</td>
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<td></td>
</tr>
<tr>
<td>Heating Boiler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>80% Et</td>
<td></td>
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<tr>
<td>Steam</td>
<td>&lt;2,500,000</td>
<td>79% Et</td>
</tr>
<tr>
<td></td>
<td>=&gt;2,500,000</td>
<td>80% Et</td>
</tr>
<tr>
<td>Direct Vent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas-Fired</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Furnaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;225,000 input</td>
<td>90%</td>
<td></td>
</tr>
</tbody>
</table>

-- End of Section --
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.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)


NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2014) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017) National Electrical Code

1.2 RELATED REQUIREMENTS

This section applies to certain sections of Division 02, EXISTING CONDITIONS. This section applies to all sections of Division 26 and 33, ELECTRICAL and UTILITIES, of this project specification unless specified otherwise in the individual sections. This section has been incorporated into, and thus, does not apply to, and is not referenced in the following sections.

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM
Section 26 51 00 INTERIOR LIGHTING

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.
1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be 480/277 volts, three phase, four wire and 208/120 volts, three phase, four wire.

1.5 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.5.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.6 QUALITY ASSURANCE

1.6.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.6.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.6.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
1.6.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.8 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

-- End of Section --
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.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)


NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)


NEMA 250   (2014) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA WD 1   (1999; R 2015) Standard for General Color Requirements for Wiring Devices

NEMA WD 6   (2016) Wiring Devices Dimensions Specifications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70   (2017) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-568-C.1   (2009; Add 2 2011; Add 1 2012) Commercial Building Telecommunications Cabling Standard

TIA-569   (2015d) Commercial Building Standard for Telecommunications Pathways and Spaces

TIA-607   (2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

UNDERWRITERS LABORATORIES (UL)

UL 1   (2005; Reprint Jul 2012) Standard for Flexible Metal Conduit

UL 20   (2010; Reprint Feb 2012) General-Use Snap Switches
1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE 100.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00.

SD-03 Product Data

    Receptacles

    Switches

SD-06 Test Reports

    600-volt wiring test

    Ground-fault receptacle test
1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "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. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.4.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and:

a. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening including applications of equipment and materials under similar circumstances and of similar size.

b. Have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.

c. Where two or more items of the same class of equipment are required, provide 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.

1.4.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable.

1.5 WARRANTY

Provide equipment items supported by service organizations that 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

As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.
2.2 CONDUIT AND FITTINGS

Conform to the following:

2.2.1 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797, ANSI C80.3.

2.2.2 Flexible Metal Conduit

UL 1.

2.2.3 Fittings for EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings: cadmium- or zinc-coated in accordance with UL 514B.

2.2.3.1 Fittings for EMT

Die Cast compression type.

2.3 OUTLET BOXES AND COVERS

UL 514A, cadmium- or zinc-coated, if ferrous metal. UL 514C, if nonmetallic.

2.3.1 Outlet Boxes for Telecommunications System

Provide the following:

a. Standard type 4 11/16 inches square by 2 1/8 inches deep.

b. Depth of boxes: large enough to allow manufacturers’ recommended conductor bend radii.

2.4 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.5 WIRES AND CABLES

Provide wires and cables in accordance applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Do not use wires and cables manufactured more than 12 months prior to date of delivery to site.

2.5.1 Conductors

Provide the following:

a. Conductor sizes and capacities shown are based on copper, unless indicated otherwise.

b. Conductors No. 8 AWG and larger diameter: stranded.

c. Conductors No. 10 AWG and smaller diameter: solid.

d. Conductors for remote control, alarm, and signal circuits, classes 1,
2, and 3: stranded unless specifically indicated otherwise.
e. All conductors: copper.

2.5.1.1 Minimum Conductor Sizes

Provide minimum conductor size in accordance with the following:
a. Branch circuits: No. 12 AWG.
b. Class 1 remote-control and signal circuits: No. 14 AWG.
c. Class 2 low-energy, remote-control and signal circuits: No. 16 AWG.
d. Class 3 low-energy, remote-control, alarm and signal circuits: No. 22 AWG.

2.5.2 Color Coding

Provide color coding for service, feeder, branch, control, and signaling circuit conductors.

2.5.2.1 Ground and Neutral Conductors

Provide color coding of ground and neutral conductors as follows:
a. Grounding conductors: Green.
c. Exception, where neutrals of more than one system are installed in same raceway or box, other neutrals color coding: white with a different colored (not green) stripe for each.

2.5.2.2 Ungrounded Conductors

Provide color coding of ungrounded conductors in different voltage systems as follows:
a. 208/120 volt, three-phase
   (1) Phase A - black
   (2) Phase B - red
   (3) Phase C - blue
b. 480/277 volt, three-phase
   (1) Phase A - brown
   (2) Phase B - orange
   (3) Phase C - yellow

2.5.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, provide power and lighting wires rated for 600-volts, Type THWN/THHN conforming to
UL 83 Type XHHW or RHW conforming to UL 44, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits: 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.

2.6 SPLICES AND TERMINATION COMPONENTS

UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires: insulated, pressure-type in accordance with UL 486A-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.7 DEVICE PLATES

Provide the following:

a. UL listed, one-piece device plates for outlets to suit the devices installed.

b. For metal outlet boxes, plates on unfinished walls: zinc-coated sheet steel or cast metal having round or beveled edges.

c. Plates on finished walls: satin finish stainless steel, minimum 0.03 inch thick.

d. Screws: machine-type with countersunk heads in color to match finish of plate.

e. Sectional type device plates are not be permitted.

f. Plates for devices on emergency circuits: red, stainless steel, minimum 0.03 inch thick.

2.8 SWITCHES

2.8.1 Toggle Switches

NEMA WD 1, UL 20, single pole, totally enclosed with bodies of thermoplastic or thermoset plastic and mounting strap with grounding screw. Include the following:

a. Handles: white thermoplastic.

b. Wiring terminals: screw-type, side-wired.

c. Contacts: silver-cadmium and contact arm - one-piece copper alloy.

d. Switches: rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.

2.9 RECEPTACLES

Provide the following:

a. UL 498, hospital grade, grounding-type.

b. Ratings and configurations: as indicated.
d. Face and body: thermoplastic supported on a metal mounting strap.
e. Dimensional requirements: per NEMA WD 6.
f. Screw-type, side-wired wiring terminals or of the solderless pressure type having suitable conductor-release arrangement.
g. Grounding pole connected to mounting strap.
h. The receptacle: containing triple-wipe power contacts and double or triple-wipe ground contacts.

2.9.1 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Provide device capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A ground-fault circuit interrupter devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

2.10 TELECOMMUNICATIONS SYSTEM

Provide system of telecommunications wire-supporting structures (pathway), including: outlet boxes, conduits with pull wires and other accessories for telecommunications outlets and pathway in accordance with TIA-569 and as specified herein.

2.11 FACTORY APPLIED FINISH

Provide factory-applied finish on electrical equipment in accordance with the following:

a. NEMA 250 corrosion-resistance test and the additional requirements as specified herein.

b. Interior and exterior steel surfaces of equipment enclosures: thoroughly cleaned followed by a rust-inhibitive phosphatizing or equivalent treatment prior to painting.

c. Exterior surfaces: free from holes, seams, dents, weld marks, loose scale or other imperfections.

d. Interior surfaces: receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice.

e. Exterior surfaces: primed, filled where necessary, and given not less than two coats baked enamel with semigloss finish.

f. Equipment located indoors: ANSI Light Gray.

g. Provide manufacturer's coatings for touch-up work and as specified in paragraph FIELD APPLIED PAINTING.
PART 3   EXECUTION

3.1   INSTALLATION

Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces: conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

3.1.1   Wiring Methods

Provide insulated conductors installed in EMT, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor: separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size: 1/2 inch in diameter for low voltage lighting and power circuits. Vertical distribution in multiple story buildings: made with metal conduit in fire-rated shafts, with metal conduit extending through shafts for minimum distance of 6 inches.

3.1.1.1   Pull Wire

Install pull wires in empty conduits. Pull wire: plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

3.1.2   Conduit Installation

Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches 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.

3.1.2.1   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.

g. Do not use when the enclosed conductors must be shielded from the effects of High-altitude Electromagnetic Pulse (HEMP).

3.1.2.2   Restrictions Applicable to Flexible Conduit

Use only as specified in paragraph FLEXIBLE CONNECTIONS. Do not use when the enclosed conductors must be shielded from the effects of High-altitude
Electromagnetic Pulse (HEMP).

3.1.2.3 Conduit Support

Support conduit by pipe straps, wall brackets, threaded rod conduit 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. Do not exceed one-fourth proof test load for load applied to fasteners. Provide vibration resistant and shock-resistant fasteners attached to concrete ceiling. Do not cut main reinforcing bars for any holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints. 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: supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Do not share supporting means between electrical raceways and mechanical piping or ducts. Coordinate installation 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 expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means.

3.1.2.4 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.2.5 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. Provide locknuts with sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.2.6 Flexible Connections

Provide flexible steel conduit between 3 and 6 feet in length for recessed and semi-recessed lighting fixtures. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size: 1/2 inch diameter. Provide separate ground conductor across flexible connections.

3.1.2.7 Telecommunications and Signal System Pathway

Install telecommunications pathway in accordance with TIA-569.

a. Horizontal Pathway: Telecommunications pathways from the work area to the telecommunications room: installed and cabling length requirements
in accordance with TIA-568-C.1. Size conduits in accordance with TIA-569 and as indicated.

3.1.3 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways: sheet steel, conduit system. Provide each box with volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures: minimum 4 inches 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: square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; provide readily removable fixtures 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 inches from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

3.1.3.1 Boxes

Boxes for use with raceway systems: minimum 1 1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets: minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet. Telecommunications outlets: a minimum of 4 11/16 inches square by 2 1/8 inches deep. Mount outlet boxes flush in finished walls.

3.1.3.2 Pull Boxes

Construct of at least minimum size required by NFPA 70, 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.

3.1.3.3 Extension Rings

Extension rings are not permitted for new construction. Use only on existing boxes in concealed conduit systems where wall is furred out for new finish.

3.1.4 Mounting Heights

Mount lighting switches 48 inches above finished floor. Mount receptacles and telecommunications outlets 18 inches above finished floor, unless otherwise indicated. Measure mounting heights of wiring devices and outlets to center of device or outlet.
3.1.5 Conductor Identification

Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, provide color coding by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, provide color coding by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves.

3.1.6 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.

3.1.7 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 inch. Use of sectional-type device plates are not permitted.

3.1.8 Grounding and Bonding

Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic raceways, telecommunications system grounds, and neutral conductor of wiring systems. In addition to the requirements specified herein, provide telecommunications grounding in accordance with TIA-607. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

3.1.9 Repair of Existing Work

Perform repair of existing work, demolition, and modification of existing electrical distribution systems as follows:

3.1.9.1 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.

3.1.9.2 Existing Concealed Wiring to be Removed

Disconnect existing concealed wiring to be removed from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.

3.1.9.3 Continuation of Service

Maintain continuity of existing circuits of equipment to remain. Maintain existing circuits of equipment energized. Restore circuits wiring and power which are to remain but were disturbed during demolition back to

SECTION 26 20 00 Page 11
original condition.

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

Operate each device subject to manual operation 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: 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.

-- End of Section --
PART 1  GENERAL

1.1  REFERENCES

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

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


ASTM INTERNATIONAL (ASTM)


ILLUMINATING ENGINEERING SOCIETY (IES)


IES RP-16 (2010; Addendum A 2008; Addenda B 2009; Addendum C 2016) Nomenclature and Definitions for Illuminating Engineering

IES TM-21 (2011; Addendum B 2015) Projecting Long Term Lumen Maintenance of LED Light Sources

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)


1.2 RELATED REQUIREMENTS

Materials not considered to be luminaires or luminaire accessories are specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, must be as defined in IEEE 100 and IES RP-16.
b. 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 IES LM-80.

c. For LED luminaires, "Luminaire Efficacy" (LE) is the appropriate measure of energy efficiency, measured in lumens/watt. This is gathered from LM-79 data for the luminaire, in which absolute photometry is used to measure the lumen output of the luminaire as one entity, not the source separately and then the source and housing together.

d. Total harmonic distortion (THD) is the root mean square (RMS) of all the harmonic components divided by the total fundamental current.

1.4 SUBMITTALS

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

SD-02 Shop Drawings
   Luminaire Drawings

SD-03 Product Data
   Luminaires
   Light Sources
   Drivers, Ballasts and Generators
   LED Luminaire Warranty
   Luminaire Design Data
   Dimming Controllers (Dimmers)

SD-06 Test Reports
   LED Luminaire - IES LM-79 Test Report
   LED Light Source - IES LM-80 Test Report
   LED Light Source - IES TM-21 Test Report
   Energy Efficiency

SD-07 Certificates
   Luminaire Useful Life Certificate
   LED Driver and Dimming Switch Compatibility Certificate
1.5 QUALITY CONTROL

1.5.1 Luminaire Drawings

Include dimensions, accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and computerized candlepower distribution data must accompany shop drawings.

1.5.2 LED Driver and Dimming Switch Compatibility Certificate

Submit certification from the luminaire, driver, or dimmer switch manufacturer that ensures compatibility and operability between devices.

1.5.3 Luminaire Design Data

a. Provide safety certification and file number for the luminaire family that must be listed, labeled, or identified per the NFPA 70 (NEC). Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratories).

b. Provide long term lumen maintenance projections for each LED luminaire in accordance with IES TM-21. Data used for projections must be obtained from testing in accordance with IES LM-80.

1.5.4 LED Luminaire - IES LM-79 Test Report

Submit test report on manufacturer's standard production model luminaire. Include all applicable and required data as outlined under "14.0 Test Report" in IES LM-79.

1.5.5 LED Light Source - IES LM-80 Test Report

Submit report on manufacturer's standard production LED light source (package, array, or module). Include all applicable and required data as outlined under "8.0 Test Report" in IES LM-80.

1.5.6 LED Light Source - IES TM-21 Test Report

Submit test report on manufacturer's standard production LED light source (package, array or module). Include all applicable and required data, as well as required interpolation information as outlined under "7.0 Report" in IES TM-21.

1.5.7 Test Laboratories

Test laboratories for the IES LM-79 and IES LM-80 test reports must 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 for both LM-79 and LM-80 testing.

b. One of the qualified labs listed on the Department of Energy - LED Lighting Facts Approved Testing Laboratories List at for LM-79 testing.
c. One of the EPA-Recognized Laboratories listed at for LM-80 testing.

1.5.8 Regulatory Requirements

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. Equipment, materials, installation, and workmanship must be in accordance with the mandatory and advisory provisions of NFPA 70, unless more stringent requirements are specified or indicated.

1.5.9 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 must have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the two-year period. Where two or more items of the same class of equipment are required, these items must 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.

1.5.9.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.5.9.2 Material and Equipment Manufacturing Date

Products manufactured more than six months prior to date of delivery to site must not be used, unless specified otherwise.

1.5.9.3 Energy Efficiency

Submit data indicating lumens per watt efficacy and color rendering index of light source.

1.6 WARRANTY

Support all equipment items 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.

1.6.1 LED Luminaire Warranty

a. Provide a written 5 year on-site replacement warranty for material, fixture finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.

(1) Include finish warranty to include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or
fading.

(2) Material warranty must include:

(a) All 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. Provide the Contracting Officer with signed warranty certificates prior to final payment.

1.6.1.1 Provide Luminaire Useful Life Certificate

Submit certification from the manufacturer indicating the expected useful life of the luminaires provided. The useful life must be directly correlated from the IES LM-80 test data using procedures outlined in IES TM-21. Thermal properties of the specific luminaire and local ambient operating temperature and conditions must be taken into consideration.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be luminaires, luminaire controls, or associated equipment are specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.2 LUMINAIRES

UL 1598, NEMA C82.77, and UL 8750. Provide luminaires as indicated in luminaire schedule and NL plates or details on project plans. Provide luminaires complete with light sources of quantity, type, and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver, ballast or generator and light source provided.

2.2.1 LED Luminaires

Provide luminaires complete with power supplies (drivers) and light sources. Provide design information including lumen output and design life in luminaire schedule on project plans for LED luminaires. LED luminaires must meet the minimum requirements in the following table:

<table>
<thead>
<tr>
<th>LUMINAIRE TYPE</th>
<th>MINIMUM LUMINAIRE EFFICACY (LE)</th>
<th>MINIMUM COLOR RENDERING INDEX (CRI)</th>
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<tbody>
<tr>
<td>LED TROFFER -</td>
<td></td>
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<tr>
<td>2 x 4</td>
<td>90 LPW</td>
<td>80</td>
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LED luminaires must also meet the following minimum requirements:

a. Luminaires must have a minimum 5 year manufacturer's warranty.

b. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.

c. Luminaire drive current value must be identical to that provided by test data for luminaire in question.

d. Luminaires must be tested to IES LM-79 and IES LM-80 standards, with the results provided as required in the Submittals paragraph of this specification.

e. Luminaires must be listed with the DesignLights Consortium 'Qualified Products List' when falling into category of "General Application" luminaires, i.e. Interior Directional, Display Case, Troffer, Linear Ambient, or Low/High Bay. Requirements are shown in the DesignLights Consortium "Technical Requirements Table" at https://data.energystar.gov/dataset/EPA-Recognized-Laboratories-For-Lighting-Product

f. Provide Department of Energy 'Lighting Facts' label for each luminaire.

2.3 DRIVERS, BALLASTS and GENERATORS

2.3.1 LED Drivers

NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:

a. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type to meet minimum luminaire efficacy (LE) value provided.

b. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.

c. Current draw Total Harmonic Distortion (THD) of less than 20 percent.

d. Class A sound rating.

e. Operable at input voltage of 120-277 volts at 60 hertz.

f. Minimum 5 year manufacturer's warranty.

g. RoHS compliant.

h. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.

i. UL listed for dry or damp locations typical of interior installations.

j. Fully-dimmable using 0-10V control as indicated in luminaire schedule.
2.4 LIGHT SOURCES

NEMA ANSI-LC C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.

2.4.1 LED Light Sources

a. Correlated Color Temperature (CCT) of 3500 degrees K.

b. Minimum Color Rendering Index (CRI) R9 value of 80.

c. High power, white light output utilizing phosphor conversion (PC) process.

d. RoHS compliant.

e. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.

2.5 LIGHTING CONTROLS

ASHRAE 90.1 - IP, ASHRAE 189.1. Provide network certification for all networked lighting control systems and devices per requirements of DOD 8500.01 and DOD 8510.01.

2.5.1 Dimming Controllers (Dimmers)

UL 1472, UL 20, IEEE C62.41, NEMA SSL 7A. 0-10 V dimmers must provide flicker-free, continuously variable light output throughout the dimming range. Provide radio frequency interference suppression integral to device. Provide device with a vertical slider, or toggle (with adjacent vertical slider) type control, with finish to match switches and outlets in same area. Provide back box in wall with sufficient depth to accommodate body of switch and wiring. Devices must be capable of operating at their full rated capacity regardless of being single or ganged-mounted. Dimmers must be capable of controlling 0-10 volt LED drivers. Ensure compatibility of dimmer with separate power packs when utilized for lighting control. Dimmers and the ballasts or drivers they control, must be provided from the same manufacturer, or tested and certified as compatible for use together. Provide NEMA SSL 7A-compliant devices.

2.6 LUMINAIRE SUPPORT HARDWARE

2.6.1 Wire

ASTM A641/A641M; Galvanized, soft tempered steel, minimum 0.11 inches in diameter, or galvanized, braided steel, minimum 0.08 inches in diameter.

2.7 EQUIPMENT IDENTIFICATION

2.7.1 Manufacturer's Namplate

Each item of equipment must 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.
2.7.2 Labels

Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires must be clearly marked for operation of specific light sources and ballasts, generators or drivers. Note the following light source characteristics in the format "Use Only _____":

a. Light source type, wattage, envelope type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.

b. ANSI ballast type (M98, M57, etc.) for HID luminaires.

c. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. Ballasts, generators or drivers must have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.8 FACTORY APPLIED FINISH

Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum, meets requirements of NEMA 250 corrosion-resistance test.

2.9 RECESS- AND FLUSH-MOUNTED LUMINAIRES

Provide access to lamp and ballast from bottom of luminaire. Provide trim and lenses for the exposed surface of flush-mounted luminaires as indicated on project drawings and specifications.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations must conform to IEEE C2, NFPA 70, and to the requirements specified herein. Install luminaires and lighting controls to meet the requirements of ASHRAE 90.1 - IP and ASHRAE 189.1. To encourage consistancy and uniformity, install luminaires of the same manufacture and model number when residing in the same facility or building.

3.1.1 Light Sources

When light sources are not provided as an integral part of the luminaire, deliver light sources of the type, wattage, lumen output, color temperature, color rendering index, and voltage rating indicated to the project site and install just prior to project completion, if not already installed in the luminaires from the factory.

3.1.2 Luminaires

Set luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires and secure in accordance with manufacturers' directions and approved drawings. Installation must meet requirements of NFPA 70. Mounting heights specified or indicated must be to the bottom of the luminaire for ceiling-mounted luminaires and to center of luminaire for wall-mounted luminaires. Obtain approval of the exact
mounting height 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 luminaires must be independently supported from the building structure by a minimum of four wires per luminaire and located near each corner of the luminaire. Ceiling grid clips are not allowed as an alternative to independently supported luminaires. Round luminaires or luminaires smaller in size than the ceiling grid must be independently supported from the building structure by a minimum of four wires, straps or rods per luminaire, spaced approximately equidistant around. Do not support luminaires by acoustical tile ceiling panels. Where luminaires of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support each independently and provide at least two \(3/4\) inch metal channels spanning, and secured to, the ceiling tees for centering and aligning the luminaire. Provide wires for luminaire support in this section. Luminaires installed in suspended ceilings must also comply with the requirements of Section 09 51 00 ACOUSTICAL CEILINGS.

3.1.3 Ballasts, Generators and Power Supplies

Typically, provide ballasts, generators, and power supplies (drivers) integral to luminaire as constructed by the manufacturer.

3.2 FIELD APPLIED PAINTING

Paint lighting equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Provide painting as specified in Section 09 90 00 PAINTS AND COATINGS.

-- End of Section --
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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
# List of Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACM</td>
<td>Asbestos-Containing Material</td>
</tr>
<tr>
<td>AHERA</td>
<td>Asbestos Hazard and Emergency Response Act</td>
</tr>
<tr>
<td>AHPA</td>
<td>Archaeological and Historic Preservation Act</td>
</tr>
<tr>
<td>ARPA</td>
<td>Archeological Resource Protection Act</td>
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<td>Asbestos School Hazard Abatement Reauthorization Act</td>
</tr>
<tr>
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<tr>
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<td>BMP</td>
<td>Best Management Practice</td>
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<tr>
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<td>Base Order</td>
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<td>Construction and Demolition</td>
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<td>Clean Air Act</td>
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<td>CAMA</td>
<td>Coastal Area Management Act</td>
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<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability</td>
</tr>
<tr>
<td>CETEP</td>
<td>Comprehensive Environmental Training and Education Program</td>
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<td>Chlorofluorocarbon</td>
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<td>DLADS</td>
<td>Defense Logistics Agency Disposition Services</td>
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<tr>
<td>DM</td>
<td>Decision Memorandum</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>DMM</td>
<td>Discarded Military Munitions</td>
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<td>Department of Navy</td>
</tr>
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<td>DOT</td>
<td>Department of Transportation</td>
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<tr>
<td>DRMS</td>
<td>Defense Reutilization and Marketing Service</td>
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<tr>
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<td>Environmental Assessment</td>
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<tr>
<td>EAD</td>
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<td>EISA</td>
<td>Energy Independence and Security Act</td>
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<tr>
<td>EHS</td>
<td>Extremely Hazardous Substances</td>
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<td>ELLAP</td>
<td>Environmental Lead Laboratory Accreditation Program</td>
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<td>Explosives and Ordnance Disposal</td>
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<td>Electronic Product Environmental Assessment Tool</td>
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<td>FAR</td>
<td>Federal Acquisition Regulation</td>
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<td>HAP</td>
<td>Hazardous Air Pollutants</td>
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<td>HCFC</td>
<td>Hydrochlorofluorocarbon</td>
</tr>
<tr>
<td>HCS</td>
<td>Hazard Communication Standard</td>
</tr>
<tr>
<td>HHCU</td>
<td>Health Hazards Control Unit (North Carolina)</td>
</tr>
<tr>
<td>HM</td>
<td>Hazardous Material</td>
</tr>
<tr>
<td>HMTA</td>
<td>Hazardous Materials Transportation Act</td>
</tr>
<tr>
<td>HQMC</td>
<td>Headquarters Marine Corps</td>
</tr>
<tr>
<td>HQW</td>
<td>High Quality Water</td>
</tr>
<tr>
<td>HVAC</td>
<td>Heating, Ventilation, and Air Conditioning</td>
</tr>
<tr>
<td>HW</td>
<td>Hazardous Waste</td>
</tr>
<tr>
<td>HWMP</td>
<td>Hazardous Waste Management Plan</td>
</tr>
<tr>
<td>IGI&amp;S</td>
<td>Installation Geospatial Information &amp; Services</td>
</tr>
<tr>
<td>INRMP</td>
<td>Integrated Natural Resources Management Plan</td>
</tr>
<tr>
<td>IRP</td>
<td>Installation Restoration Program</td>
</tr>
<tr>
<td>LBP</td>
<td>Lead-Based Paint</td>
</tr>
<tr>
<td>LDA</td>
<td>Land-Disturbing Activities</td>
</tr>
<tr>
<td>LQG</td>
<td>Large Quantity Generator</td>
</tr>
<tr>
<td>MAG</td>
<td>Marine Aircraft Group</td>
</tr>
<tr>
<td>MCAS</td>
<td>Marine Corps Air Station</td>
</tr>
<tr>
<td>MCB</td>
<td>Marine Corps Base</td>
</tr>
<tr>
<td>MCM</td>
<td>Minimum Control Measure</td>
</tr>
<tr>
<td>MCIEAST</td>
<td>Marine Corps Installations East</td>
</tr>
<tr>
<td>MCO</td>
<td>Marine Corps Order</td>
</tr>
<tr>
<td>MEC</td>
<td>Munitions and Explosives of Concern</td>
</tr>
<tr>
<td>MEF</td>
<td>Marine Expeditionary Force</td>
</tr>
<tr>
<td>MRF</td>
<td>Materials Recovery Facility</td>
</tr>
<tr>
<td>MS4</td>
<td>Municipal Separate Storm Sewer Systems</td>
</tr>
<tr>
<td>MSW</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>NAPL</td>
<td>Non-Aqueous Phase Liquid</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>NC</td>
<td>North Carolina</td>
</tr>
<tr>
<td>NCAC</td>
<td>North Carolina Administrative Code</td>
</tr>
<tr>
<td>NCDAQ</td>
<td>North Carolina Department of Air Quality</td>
</tr>
<tr>
<td>NCDCM</td>
<td>North Carolina Division of Coastal Management</td>
</tr>
<tr>
<td>NCDEQ</td>
<td>North Carolina Department of Environmental Quality</td>
</tr>
<tr>
<td>NCDFR</td>
<td>North Carolina Division of Forest Resources</td>
</tr>
<tr>
<td>NCDMS</td>
<td>North Carolina Division of Mitigation Services</td>
</tr>
<tr>
<td>NCDWR</td>
<td>North Carolina Division of Water Resources</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NESHAP</td>
<td>National Emission Standards for Hazardous Air Pollutants</td>
</tr>
<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>NPL</td>
<td>National Priorities List</td>
</tr>
<tr>
<td>NRC</td>
<td>National Response Center</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>ODS</td>
<td>Ozone-Depleting Substance</td>
</tr>
<tr>
<td>OPA</td>
<td>Oil Pollution Act</td>
</tr>
<tr>
<td>ORW</td>
<td>Outstanding Resource Water</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>OWS</td>
<td>Oil-Water Separator</td>
</tr>
<tr>
<td>P2</td>
<td>Pollution Prevention</td>
</tr>
<tr>
<td>PACM</td>
<td>Presumed Asbestos-Containing Material</td>
</tr>
<tr>
<td>PCB</td>
<td>Polychlorinated biphenyl</td>
</tr>
<tr>
<td>POC</td>
<td>Point of Contact</td>
</tr>
<tr>
<td>POL</td>
<td>Petroleum, Oil, and Lubricant</td>
</tr>
<tr>
<td>PPA</td>
<td>Pollution Prevention Act</td>
</tr>
<tr>
<td>ppm</td>
<td>Parts Per Million</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
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<tr>
<td>PPV</td>
<td>Public-Private Venture</td>
</tr>
<tr>
<td>PWD</td>
<td>Public Works Division</td>
</tr>
<tr>
<td>QRP</td>
<td>Qualified Recycling Program</td>
</tr>
<tr>
<td>RACM</td>
<td>Regulated Asbestos-Containing Material</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>RCRS</td>
<td>Resource Conservation and Recovery Section</td>
</tr>
<tr>
<td>ROICC</td>
<td>Resident Officer in Charge of Construction</td>
</tr>
<tr>
<td>RRP</td>
<td>Renovation, Repair, and Painting</td>
</tr>
<tr>
<td>SAA</td>
<td>Satellite Accumulation Area</td>
</tr>
<tr>
<td>SARA</td>
<td>Superfund Amendments &amp; Reauthorization Act</td>
</tr>
<tr>
<td>SDS</td>
<td>Safety Data Sheet</td>
</tr>
<tr>
<td>SHPO</td>
<td>State Historic Preservation Officer</td>
</tr>
<tr>
<td>SPCC</td>
<td>Spill Prevention Control and Countermeasures</td>
</tr>
<tr>
<td>SSPPP</td>
<td>Strategic Sustainability Performance Plan</td>
</tr>
<tr>
<td>SWDA</td>
<td>Solid Waste Disposal Act</td>
</tr>
<tr>
<td>SWPPP</td>
<td>Stormwater Pollution Prevention Plan (Also referred to as SPPP in NC)</td>
</tr>
<tr>
<td>T&amp;P</td>
<td>Treatment and Processing</td>
</tr>
<tr>
<td>TCLP</td>
<td>Toxic Characteristic Leaching Procedure</td>
</tr>
<tr>
<td>TSD</td>
<td>Treatment, Storage, and Disposal</td>
</tr>
<tr>
<td>TSI</td>
<td>Thermal System Insulation</td>
</tr>
<tr>
<td>ULCP</td>
<td>Unit Level Contingency Plan</td>
</tr>
<tr>
<td>USC</td>
<td>United States Code</td>
</tr>
<tr>
<td>USACE</td>
<td>United States Army Corps of Engineers</td>
</tr>
<tr>
<td>USMC</td>
<td>United States Marine Corps</td>
</tr>
<tr>
<td>UW</td>
<td>Universal Waste</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>UXO</td>
<td>Unexploded Ordnance</td>
</tr>
<tr>
<td>XRF</td>
<td>X-Ray Fluorescence</td>
</tr>
</tbody>
</table>
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
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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.

**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.
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.

**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.
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. 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.

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

<table>
<thead>
<tr>
<th>For spills of:</th>
<th>Call:</th>
<th>Follow-up:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous waste</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Unknown materials</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Material on a permeable surface</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Any amount of a POL or Hazardous Material</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Material that reaches stormwater inlets or waterways</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td>Nonhazardous waste</td>
<td>(910) 451-1482</td>
<td>911</td>
</tr>
</tbody>
</table>

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
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.

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:

- 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

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<thead>
<tr>
<th>MCB Camp Lejeune 2015 Practices</th>
<th>Env. Emergency Response/Spill Response, Section 5.0</th>
<th>Potential Discovery of Undocumented Contaminated Sites, Section 13.0</th>
<th>Asbestos, Section 8.0</th>
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<th>Cultural Resources, Section 6.0</th>
<th>Permits, Section 14.0</th>
<th>Air Quality, Section 4.0</th>
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- **Applicable to All Practices Conducted Aboard MCB Camp Lejeune:**
  - Paint booth
  - Paint gun cleaning
  - Paint removal
  - Painting
  - Parts replacement
  - Pesticide/herbicide management
  - Polishing
  - Pumping station
  - 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

- **Other Sections:**
  - Environmental Emergency Response/Spill Response, Section 5.0
  - HM/W, 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
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  - Natural Resources, Section 10.0
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<td>Vehicle parking</td>
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- Applicable to All Practices Conducted Aboard MCB Camp Lejeune

- Applicable to All Practices Conducted
Attachment 2-1

MCB Camp Lejeune’s Environmental Policy Statement
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
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.

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
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.
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.

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:

- 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

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.

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 5.0 of this guide. If an environmental emergency is identified, contact 911 immediately. Additional inquiries should be directed to the ROICC or Contract Representative.

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.
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

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<tr>
<th>For spills of:</th>
<th>Call:</th>
<th>Follow-up:</th>
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<tbody>
<tr>
<td>Hazardous waste</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Unknown materials</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Material on a permeable surface</td>
<td>911</td>
<td>Spill Report</td>
</tr>
</tbody>
</table>
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.

<table>
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<tr>
<th>For spills of:</th>
<th>Call:</th>
<th>Follow-up:</th>
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<tbody>
<tr>
<td>Any amount of a POL or Hazardous Material</td>
<td>911</td>
<td>Spill Report</td>
</tr>
<tr>
<td>Material that reaches stormwater inlets or waterways</td>
<td>911</td>
<td>911</td>
</tr>
<tr>
<td>Nonhazardous waste</td>
<td>(910) 451-1482</td>
<td>911</td>
</tr>
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</table>
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.

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.
Attachment 5-1

Spill Reporting Form
# Marine Corps Installations East
## Marine Corps Base Camp Lejeune
### Unit Level Spill Form

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<th>Spill Date:</th>
<th>Spill Time:</th>
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### Responders

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<th>Response Initiator:</th>
<th>Major Command:</th>
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<tr>
<th>Phone Number:</th>
<th>Unit Name:</th>
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<tr>
<th>Fire Department Response:</th>
<th>Responder Name:</th>
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<th>EMD Resc:</th>
<th>Responder Name:</th>
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<th>GPS Coordinates: X:</th>
<th>Y:</th>
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### Spill Identification

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<th>Spilled Substance:</th>
<th>State:</th>
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<table>
<thead>
<tr>
<th>Source (Vehicle, drum, etc.):</th>
<th>Building:</th>
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<tr>
<th>Estimated Amount:</th>
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<tr>
<th>Cause of Spill:</th>
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<table>
<thead>
<tr>
<th>Containment/Clean-up Action Taken:</th>
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<thead>
<tr>
<th>Parties Performing Spill Clean-up/Removal (EMD Turn-in Date):</th>
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<table>
<thead>
<tr>
<th>Additional Assistance Required:</th>
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### Report Certification

<table>
<thead>
<tr>
<th>Printed Name/Rank:</th>
<th>Signature:</th>
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<th>E-mail:</th>
<th>Date:</th>
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All releases must be reported to the Base Fire Department by calling 911. The Environmental Management Division can be reached by calling (910) 451-1462. Units are required to maintain a copy of all completed spill forms preferably in their ESOP Binder.
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.

6.1.1. Key Definitions

- **Archaeological Resource.** Defined by the [Archaeological Resources Protection Act (ARPA)](https://www.archaeology.org/learn/legislation/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.

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,
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.
**HEALTH HAZARD**

4 **EXTREME** - Highly toxic - May be fatal on short-term exposure.
3 **SERIOUS** - Toxic - Full protective suit and breathing apparatus should be worn.
2 **MODERATE** - Breathing apparatus and face mask must be worn.
1 **SLIGHT** - Breathing apparatus may be worn.
0 **MINIMAL** - No precautions necessary.

**FLAMMABILITY HAZARD**

4 **EXTREME** - Extremely flammable gas or liquid. Flash Point below 73°F.
3 **SERIOUS** - Flammable. Flash Point 73°F to 100°F.
2 **MODERATE** - Combustible. Requires moderate heating to ignite. Flash Point below 200°F.
1 **SLIGHT** - Slightly combustible. Requires strong heating to ignite.
0 **MINIMAL** - Will not burn under normal conditions.

**SPECIFIC HAZARD**

- Oxidizer: **OXY**
- Acid: **ACID**
- Alkali: **ALK**
- Corrosive: **COR**
- Use NO WATER: **W**
- Radiation: **^**

**INSTABILITY HAZARD**

4 **EXTREME** - Explosive at room temperature.
3 **SERIOUS** - May detonate if shocked or heated under confinement or mixed with water.
2 **MODERATE** - Unstable. May react with water.
1 **SLIGHT** - May react if heated or mixed with water.
0 **MINIMAL** - Normally stable. Does not react with water.

*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 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.

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Contractors may be required to submit a Hazardous Waste Management Plan to the ROICC or the Contract Representative prior to beginning work.
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:
  - **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.

• 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.

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 ROICCC 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 ROICCC or Contract Representative.

- The generating contractor must monitor the level of waste in the SAA container and contact the ROICCC 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
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: ___________________

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>YES</th>
<th>NO</th>
<th>Location of Discrepancy and Proposed Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is housekeeping maintained in acceptable manner?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Is any HW present at the site?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3. Are HW containers properly marked?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Are HW containers in serviceable condition?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Are container bungs, caps, and openings properly secured?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6. Is a unit spill plan/activation prominently posted?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Is 911 spill response sign posted?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Are &quot;Danger-Unauthorized Personnel Keep Out&quot; signs posted so they may be seen from any approach?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Are &quot;No Smoking&quot; signs posted?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QUESTION</td>
<td>YES</td>
<td>NO</td>
<td>Location of Discrepancy and Proposed Corrective Action</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>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 &quot;Two-Man Rule in Effect&quot;?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Are properly charged fire extinguishers, as well as eye wash stations, present and inspected at least monthly?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Is the proper spill response equipment readily available?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Are all HWs properly segregated and stored in the designated site?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Are any hazardous materials being stored in the Satellite Accumulation Area or &lt; 90-day storage site?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Attachment 7-2

Weekly Hazardous Waste (HW) Site Inspection Form
MCAS New River
# Weekly Hazardous Waste Storage Area Inspection Form

**Squadron:** __________  
**Inspector:** ________________  
**Date:** __________  
**Signature:** ________________

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Corrective Actions or N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the HW container located at or near the point of generation?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Is the HW container DOT approved?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Is the HW container marked correctly with the words “Hazardous Waste,” correct noun name of contents, NSN’S and unit designator?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Is the HW container closed and wrench tight when no one is adding to the container?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. If a funnel is left in place, does that funnel have a plug or ball valve to be considered closed or secured?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Is the Spill Contingency Plan posted and in plain view?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Is the SAA Site approval letter from EAD posted at the SAA site?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Is the SAA Site limited to Authorized Personnel only?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
<td>Corrective Actions or N/A</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>--------------------------</td>
</tr>
<tr>
<td>10. Is the HW container below the proper ullage for a liquid to expand? (4 inches from the top)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. (90-Day Site only) Are all HW containers turned in prior to the 90th day after the ASD?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Are adequate spill response supplies readily available for use in case of spill or leakage?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Is there a means of emergency communication between storage facilities and working spaces?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Is the SAA site or 90-Day Site in a good state of police?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### NavoshenvTracen Compatibility Chart

<table>
<thead>
<tr>
<th>HMC Group</th>
<th>Group Name</th>
<th>Examples</th>
<th>Incompatible Materials</th>
<th>Examples</th>
<th>Reaction if Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 01, 02, 03</td>
<td>Acids</td>
<td>Hydrofluoric Acid, Nitric Acid</td>
<td>Flammable/Explosives</td>
<td>Oxygen, Acetylene, Water</td>
<td>Heat Violent Reaction</td>
</tr>
<tr>
<td>2 04, 05, 06</td>
<td>Adhesives</td>
<td>Hot Water</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>3 07, 08, 09</td>
<td>Alkaline Biodegradable Compounds</td>
<td>Sodium Hydroxide, Ammonia</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>4 10, 11, 12</td>
<td>Oleoglycolic Fluids</td>
<td>Oil, Grease</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>5 13, 14, 15</td>
<td>Corrosive Materials</td>
<td>Cyclic Ethylene Glycol</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>6 16, 17, 18</td>
<td>Corrosive Materials</td>
<td>Chloric Acid, perchloric acid</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>7 19, 20, 21</td>
<td>Corrosive Materials</td>
<td>Hydrochloric Acid, Nitric Acid</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>8 22, 23, 24</td>
<td>Corrosive Materials</td>
<td>Sulfuric Acid, Hydrofluoric Acid</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>9 25, 26, 27</td>
<td>Corrosive Materials</td>
<td>Acetic Acid, Hydrochloric Acid</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>10 28, 29, 30</td>
<td>Corrosive Materials</td>
<td>Hydrocyanic Acid, Acetaldehyde</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>11 31, 32, 33</td>
<td>Corrosive Materials</td>
<td>Cyanogen, Acetaldehyde</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>12 34, 35, 36</td>
<td>Corrosive Materials</td>
<td>Hydrogen Peroxide, Hydrogen Sulfide</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>13 37, 38, 39</td>
<td>Corrosive Materials</td>
<td>Hydrogen Chloride, Hydrogen Sulfide</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>14 40, 41, 42</td>
<td>Corrosive Materials</td>
<td>Hydrogen Sulfide, Hydrogen Chloride</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
<tr>
<td>15 43, 44, 45</td>
<td>Corrosive Materials</td>
<td>Hydrogen Sulfide, Hydrogen Chloride</td>
<td>Oxygen, Hydrogen</td>
<td>Explosion Hazard</td>
<td></td>
</tr>
</tbody>
</table>

1. This chart is to be used as a guide only.
2. Compare the desired HMC Group/HMC in the left column with the incompatible Material(s) of that Group in the center column on the same row. Mixing of the HMC Group/HMC with the Incompatible Material(s) may result in the reaction(s) listed in the right column.
3. Not all applicable HMCs are listed; only the most frequently encountered HMCs (except NT) are listed.

For more information, visit [www.safetycenter.navy.mil/training](http://www.safetycenter.navy.mil/training)

REV 09-03
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

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.


- **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.

8.3.1. Identification of ACM and PACM

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 Form DHHS 3768 must be posted onsite during all permitted projects.

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.
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.

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.
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

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, 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
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.
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

The following key definitions and concepts are associated with natural resources management. If you have any questions or concerns

Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.
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.

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:

- 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

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

Contractors must incorporate avoidance and minimization measures to comply with the national policy to permit no overall net loss of wetlands.
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). 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, 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.

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

Please consult the ROICC or Contract Representative with any questions or concerns about the information in this section.
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.

  o Identify critical areas
  o Limit exposure areas
  o Limit time of exposure
  o 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.

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.

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

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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
12.0 SOLID WASTE, RECYCLING, AND POLLUTION PREVENTION (P2)

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.
### Table 12-1. Base Landfill Requirements

<table>
<thead>
<tr>
<th>Landfill Operating Hours</th>
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<tr>
<td>0700-1500 Monday – Thursday</td>
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<tr>
<td>0700-1400 Friday</td>
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**Wood Products**

The following products may be mixed together and delivered to the landfill:
- Scrap lumber (unpainted)
- Embark boxes (broken down)
- Pallets (broken/untreated)

The following products must be separated and delivered to the landfill:
- Trees (cut to 10 feet or less and free of soil)
- Leaves and scrubs
- Serviceable pallets

**Lead Based Painted Wood Products**

- Delivered before 1400 Monday – Thursday
- Not accepted on Friday
- Cut in less than 8-foot lengths
  - Wrapped in 6-millimeter plastic bags/sealed

**Asbestos (all types)**

- Appointment needed (910-451-5011 / 2946)
- Delivered by 1000 (Mon – Thurs.)
- Not accepted on Friday
- Double wrapped in 6-millimeter plastic bags
- Sealed with duct tape  
  Labeled and manifested prior to delivery

### Organic Products
- Leaves, pine straw, grass, and shrub clippings  
- No bags or containers allowed  
- No twigs or limbs over 2 inches in diameter  
- Less than 6-foot lengths

### Concrete
- Delivered separately from other items  
- Wire and rebar must be cut off flush with exposed surfaces  
- Concrete and culverts  
- Bricks and blocks  
- Mortar products

### Soil
Non-contaminated soil accepted

### Recyclable Products
(Must be separated and dropped off at a designated recycling drop-off point or at a Recycling Center)
- Wood pallets (delivered separately)  
- White paper (mixed flat or shredded)  
- Newspaper  
- Magazines  
- Military publications (binders removed)  
- Phone books  
- Plastic and glass (containers or bottles)  
- Toner cartridges  
- Cardboard (delivered separately if in bulk)
- Vinyl siding (delivered separately, in less than 6-foot lengths)
- Asphalt shingles (delivered separately)

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)
- Landfill Manager 451-4998
- Recycling Manager 451-4214
- Landfill Fax 451-9935
- Landfill Clerk 451-2946
- EMD 451-5837
- EOD 451-0558
Unacceptable Items

- Hazardous Waste
- Liquid Waste
- Useable Appliances
- Paint and Paint Cans
- Appliances
- Electronics
- Computer Equipment
- Batteries
- Wire (Communication/Barbed/ Concertina)
- Oyster Shells
- Contaminated Soil
- Tires
- 55-Gallon Drums
- Oil Filters
- Petroleum Containers
- Regulated Medical Waste
- PCBs or PCB containers
- Demilitarized Waste
- 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 PROCUREMENT

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.

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.

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.** 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).

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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.


For other emergency response procedures, please refer to Section 5.0 of this guide.
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.

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:
  
  o Boilers
  
  o Generators
  
  o Engine test stands
  
  o Surface coating/painting operations
  
  o Refrigerant recovery and recycling operations for other ozone-depleting substances, such as industrial chillers, refrigerators, air conditioning compressors, or cleaning agents.
  
  o Chemical or mechanical paint removal, abrasive blasting, grinding, or other surface preparation activities
  
  o Fuel storage and fuel dispensing
  
  o 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.