PROJECT SPECIFICATIONS

For

Project PBXP262002
Repair HVAC B522
At

179 CYBERSPACE WING
OHIO AIR NATIONAL GUARD
1947 HARRINGTON MEMORIAL ROAD
MANSFIELD LAHM AIRPORT, OHIO

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SECTION 01 11 00
SUMMARY OF WORK

PART 1. GENERAL

1.1. WORK COVERED BY CONTRACT DOCUMENTS

1.1.1. The work included in this project consists of furnishing all plant, labor, materials, and equipment required to accomplish the project in strict accordance with these Specifications and the Drawings. The principal items of work include, but are not limited to:

1.1.1.1. Demolition and Removal; work locations shall be as shown on the Drawings. Perform such work required at each location with due care, including shoring, bracing, and so on.

1.1.1.2. Manufactured Articles, Materials, and Equipment; shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.

1.2. WORK RESTRICTIONS

1.2.1. Access to Site

1.2.1.1. Location of the work to be performed is at the 179 Cyberspace Wing, Ohio Air National Guard Base, 1947 Harrington Memorial Road, Mansfield, Ohio 44903-8049, Building #412. See attached Site Plan for the location of the existing site where the work locations are to take place at and for the other various areas on base pertinent to the job.

1.2.2. Coordination with Site Occupants

1.2.2.1. Work Schedule; shall be performed Monday through Friday, excluding Federal Holidays, unless otherwise directed or permitted by the Contracting Officer. Work shall be performed from 7:30 AM to 4:30 PM, unless otherwise directed or permitted by the Contracting Officer.

1.3. OCCUPANCY OF PREMISES

1.3.1. Building(s) will be occupied during performance of work under this Contract. Before work is started, arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

1.3.2. Contractor Use of Site

1.3.2.1. During the construction period, Contractor shall have full use of the premises within the project limits as shown on the Drawings for execution of the work. Use of premises is limited only by Owner’s right to perform duties and functions as stated in the GENERAL CONDITIONS and in this section.

1.3.2.2. The Contractor, before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the existing facilities, will notify the Contracting Officer's Representative 72 hours in advance and obtain approval in writing before proceeding with this phase of the work.

1.4. EXISTING WORK

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

1.4.2. 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 must be in a condition equal to or better than that which existed before new work started.

1.5. GOVERNMENT FURNISHED MATERIAL AND EQUIPMENT:

1.5.1. The Government will furnish the following materials and equipment for installation by the Contractor:

1.5.1.1. NONE

1.6. SUBMITTALS: NONE

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION 01 11 00

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1. GENERAL (SUBSTITUTION PROCEDURES)

1.1. PRODUCT SUBSTITUTION PROCEDURES

1.1.1. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract. No substitutions will be evaluated during bidding.

1.1.2. Acceptable manufacturers listed in the Contract Documents are not intended to exclude manufacturers not listed. Products of equal performance will be considered.

1.1.3. Related work specified elsewhere in these Contract Documents:

1.1.3.1. Requirements for submitting Contractor's Construction Progress schedule and the Submittal schedule: SECTION 01 33 00.

1.1.3.2. Requirements governing Contractor's selection of products: SECTION 01 60 00.

1.1.4. Definitions: Substitutions are changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions.

1.1.4.1. The following are not considered to be requests for substitutions; revisions to the Contract Documents requested by Owner or Engineer, and specified options of products and construction methods included in the Contract Documents.

1.1.5. Substitution of products will be considered after award of contract only under one of the following conditions:

1.1.5.1. When the specified product is not available, a proposed substitution will not be considered unless proof is submitted that firm orders were placed within 30 days after commencement of the work and reviewed by the Contracting Officer's Representative in which the items unavailability is due to a strike, lockout, bankruptcy, discontinuance of the manufacture of a product, or natural disasters.

1.1.5.2. When a guarantee of performance is required and, in the judgment of the Contractor, the specified product or process will not produce the desired results.

1.1.6. Submit in writing, 3 copies of each request for substitution, to the Contracting Officer's Representative within the 30 days after commencement of the work. After that date, if the Contractor ascertains he cannot obtain the material or equipment specified, or the performance cannot be guaranteed it may be considered or rejected at the discretion of the Engineer.

1.1.6.1. Requests for substitutions shall not be submitted in the form of a Request for Information (RFI).

1.1.6.2. Submit requests for substitutions in the form and according to procedures required for Change Order proposals.

1.1.6.3. The Contractor shall accompany any request for substitution with such drawings, specifications, samples, manufacturer's literature, performance data, and other information necessary to describe and evaluate the proposed substitution completely. The burden of proof shall be on the Contractor.

1.1.6.4. Permission to make any substitution after award of contract shall be effected by a Change Order. It shall not relieve the Contractor, any subcontractor, manufacturer, fabricator, or supplier from responsibility for any deficiency that may exist in the substituted product or for any departures or deviations from the requirements of the Contract Documents as modified by such Change Order. Except as otherwise expressly specified by the Contractor in his request for substitution and expressly approved in such Change Order, the Contractor shall be deemed to warrant by his request proposed substitute product will satisfy all standards and requirements satisfied by the originally specified product and the Change Order shall not be deemed to modify the Contract Documents with respect thereto.

1.1.6.5. If any substitution will affect a correlated function, adjacent construction, or the work of other trades or contractors, the necessary changes and modifications to the affected work shall be considered as an essential part of the proposed substitution, to be accomplished by the Contractor without additional expense to the Government if and when accepted.

1.2. SUBMITTALS: NONE

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION 01 20 00

SECTION 01 30 00
ADMINISTRATION REQUIREMENTS

PART 1. GENERAL

1.1. PROJECT MANAGEMENT AND COORDINATION

1.1.1. Project Coordination

1.1.1.1. Coordination between various trades and sections with reference to scheduling items of work shall be the responsibility of the Contractor. To this end the Contractor shall require that the subcontractors examine and familiarize themselves with the Specifications and Drawings and they frequently consult with each other and all other trades so that the work can be properly coordinated. The Contractor shall carefully check the work of his subcontractors in order to deliver to the Government the Contract work, complete and properly installed in conformance with the Contract requirements.

1.1.2. Project Meetings

1.1.2.1. The Contractor and any subcontractors, material men, or vendors whose presence is necessary or requested must attend meetings when called by the Contracting Officer or his Representative for the purpose of discussing the execution of the work. Each of such meetings will be held at the time and place designated by the Contracting Officer or his Representative. All decisions, instructions, and interpretations given by the Contracting Officer or his Representative at these meetings shall be binding and conclusive on the Contractor. The proceedings of these meetings will be recorded, and the Contractor will be furnished a reasonable number of copies for his use and for distribution to the various subcontractors, material men, and vendors involved.

1.1.2.2. Progress meetings may also be called by the General Construction Contractor for the purpose of coordinating, expediting, and scheduling the work of all contracts. Other contractors and their subcontractors, material men, or vendors whose presence is necessary or requested are required to attend.

1.1.3. Requests for Information (RFI)

1.1.3.1. Promptly on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI to the Contracting Officer with the content specified.

1.1.3.1.1. RFIs shall originate with the Contractor. RFIs submitted by entities other than Contractor will be returned with no response.

1.1.3.1.2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

1.1.3.2. Content of the RFI shall include a detailed, legible description of the item(s) needing interpretation, RFI numbered sequentially, reference to Drawing and detail, Specification section and paragraphs, field conditions, Contractor's suggested solution and statement of impact to Contract times or price, and any attachments necessary to fully describe item needing interpretation.

1.1.3.3. The COR will review each RFI, determine action required, and return it to the Contractor. Allow seven working days for COR response for each RFI.

1.1.3.4. The following RFIs will be returned without action; request for approval of submittals, substitutions, coordination information already indicated in the Contract

Documents, adjustments in the Contract times or price, interpretation of COR actions on Submittals, and incomplete RFIs or RFIs with numerous errors.

1.1.3.5. Multiple RFIs addressing similar or identical issues may be addressed by COR with single broad response.

1.1.3.6. COR action may include a request for additional information, in which case COR time for response will start again upon Contractor response and resubmittal.

1.1.3.7. If Contractor believes the RFI response warrants change in the Contract time or the price, notify Contracting Officer in writing within seven working days of receipt of the RFI response.

1.1.3.8. on receipt of COR action, update the RFI log and promptly distribute the RFI response to affected parties. Review response and notify COR within seven working days if Contractor disagrees with response.

1.1.3.9. Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log once every two weeks.

1.2. SUBMITTALS FOR THIS SECTION:

1.2.1. Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or “S” classification are for information only. Submit the following in accordance with Section 01 33 00 SUPPLEMENTAL SUBMITTAL PROCEDURES:

1.2.1.1. SD-01 Preconstruction Submittals

1.2.1.1.1. Construction Progress Schedule; G

1.2.1.1.2. Construction Progress Reports (Frequency determined by Contracting Officer)

1.2.1.1.3. Daily Construction Reports

1.2.1.2. SD-07 Certificates

1.2.1.2.1. Hazardous Materials Manifests; G

1.3. CONSTRUCTION PROGRESS DOCUMENTATION

1.3.1. Construction Progress Schedule: [**SD-01]** Before commencing any work the Contractor shall submit, for review and approval by the Contracting Officer's Representative, a schedule showing the commencement, the order, and the completion dates for the various parts of this work.

1.4. SURVEY AND LAYOUT DATA

1.4.1. The Contractor is responsible for properly laying out the work, and for lines and measurements for the work executed under the Contract Documents.

1.4.1.1. The Contractor, NOT the Government, is responsible to field verify all existing underground utilities within the excavation limits and/or as shown on the Drawings, before laying out the work. The Contractor is to report errors or inaccuracies in writing to the Contracting Officer's Representative before commencing work.

1.4.1.2. The Contracting Officer or his Representative will in no case assume the responsibility for any layout of the work or damages to existing underground utilities while performance of work is underway.

1.4.2. Establish necessary reference lines and permanent bench marks. Engage a registered land surveyor for this purpose to lay out the work. Establish not less than two such bench marks in widely separated locations. Be responsible for the proper location and level of the work and for the maintenance of the reference lines and bench marks.

1.4.3. Furnish certification from a registered land surveyor who shall verify periodically that portions of the work are located in accordance with the Drawings and at the required elevations.

1.5. CONSTRUCTION PROGRESS REPORTING

1.5.1. Reports

1.5.1.1. **[SD-01]** Construction Progress Reports consisting of the revised construction progress schedule and a narrative report consisting of comparison of actual progress with planned progress, summaries of activities completed since previous report, planned activities for next report period, value analysis for month, identification of problem areas, description of current and anticipated delaying factors with impact, and proposed corrective actions

1.5.1.2. **[SD-01]** Daily Construction Reports prepared daily for recording information concerning events at the work site to include subcontractors at the site, count of working personnel at the site, equipment at the site, material deliveries, weather conditions, accidents at the site, stoppages, delays, shortages, losses, and emergency procedures.

1.5.1.3. Other reports may be used but not limited to Equipment and Material Location Reports, Field Condition Reports, and Special Reports for unusual events.

1.5.1.4. Inspection reports shall be recorded and submitted daily on approved forms certifying items correctly installed and items found to be defective with a statement on corrective measures taken.

1.6. SUBMITTAL PROCEDURES

1.6.1. Shop Drawings, Product Data, and Samples: Shop Drawings, Product Data, and Samples are technical submittals prepared by Contractor, subcontractor, manufacturer, or supplier and submitted by the Contractor to the COR as a basis for approval of the use of equipment and materials proposed for incorporation in the work or needed to describe installation, operation, maintenance, or technical properties, as specified in each Division of the Specifications.

1.6.1.1. Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.

1.6.1.2. Product Data includes standard printed information on materials, products, and systems not custom-prepared for this project, other than the designation of selections from available choices.

1.6.1.3. Samples include both fabricated and unfabricated physical examples of materials, products, and work; both as complete units and as smaller portions of units of work; either for limited visual inspection or for more detailed testing and analysis. Mock-ups are a special form of Samples which are too large to be handled in the specified manner for transmittal of Sample submittals.

1.6.2. Informational Submittals are those technical reports, administrative submittals, certificates, and guarantees not defined as Shop Drawings, Product Data, or Samples.

1.6.3. Quality Requirements

1.6.3.1. Submittals such as Shop Drawings and Product Data shall be of suitable quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings such as reproducible shall be useable for further reproduction to yield legible hard copy.

1.6.3.2. Documents submitted to the COR that do not conform to specified requirements shall be subject to rejection by the COR, and upon request by the COR, Contractor shall resubmit conforming documents. If conforming submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. Contractor's failure to initially satisfy the legibility quality requirements will not relieve Contractor from meeting the required schedule for submittals.

1.6.4. Submittal Completeness

1.6.4.1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable COR to review the information effectively.

1.6.4.2. Where standard drawings are furnished which cover a number of variations of the general class of equipment, each drawing shall be annotated to indicate exactly which parts of the drawing apply to the equipment being furnished. Use hatch marks to indicate variations that do not apply to the submittal. The use of "highlighting markers" will not be an acceptable means of annotating submittals. Annotation shall also include proper identification of the submittal permanently attached to the drawing.

1.6.4.3. Reproductions or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. Contractor may use a reproduction of Contract Drawings for erection drawings to indicate information on erection or to identify detail drawing references. Whenever the drawings are revised to show this additional Contractor information, Engineer's title block shall be replaced with Contractor's title block, and Engineer's professional seal shall be removed from the drawing. Contractor shall revise these erection drawings for subsequent Engineer revisions to the Contract Drawings.

1.6.5. Resubmission: Resubmittal procedure shall follow the same procedure as the initial submittal.

1.6.6. Contracting Officer's Action on Transmittal Form:

1.6.6.1. Incomplete or erroneous transmittals will be returned without action.

1.6.6.2. The remainder of the transmittal will be filled out by the Contracting Officer's Representative.

1.6.7. Submittal Procedures by Contractor:

1.6.7.1. Civil/Site items as follows:

1.6.7.1.1. (4) prints of shop drawings with transmittal forms.

1.6.7.1.2. (1) samples with transmittal forms.

1.6.7.1.3. (4) copies of brochures with transmittal forms.

1.6.8. Contracting Officer's Review:

1.6.8.1. Contracting Officer's Representative will process the submission and indicate the appropriate action on the submission and the transmittal.

1.7. SPECIAL PROCEDURES

1.7.1. Environmental Procedures:

1.7.1.1. Contractor shall dispose of all hazardous materials and hazardous wastes created by the project at an off installation location, certified for the disposal of the particular wastes, in accordance with all Federal, State, Local and Installation laws, rules, and regulations.

1.7.1.1.1. Accumulation, packaging, transportation, and disposal will be in accordance with 40 CFR, Parts 20-23, and Ohio EPA Regulations for hazardous waste. Coordinate with the Contracting Officer’s Representative (COR) for the installation’s EPA Identification Number.

1.7.1.1.2. Coordinate with the Installation Environmental Management Office when preparing hazardous materials manifests.

1.7.1.1.3. **[SD-07]** Provide a copy of all manifests to the COR on the day items are shipped, when comeback copy is received, and when disposal copy is received.

1.7.2. Security Procedures

1.7.2.1. Materials or items designated to become the property of the Government shall be as shown on the Drawings. Remove such items with care and store them in a location at the site to be designated by the Contracting Officer's Representative.

1.7.2.2. Materials or items designated to be reinstalled shall be as shown on the Drawings. Remove such items with care under the supervision of the trade responsible for reinstallation; protect and store until required. Replace material or items damaged in its removal with similar new material.

1.7.2.3. Materials or items demolished and not designated to become the property of the Government or to be reinstalled shall become the property of the Contractor and shall be removed from the Government's property.

1.7.2.4. The Contractor is responsible for any damage that may be caused by work to any part or parts of existing facilities or items designated for reuse.

PART 2. MATERIALS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION 01 30 00

SECTION 01 33 00
SUPPLEMENTAL SUBMITTAL PROCEDURES

PART 1. GENERAL

1.1. DEFINITIONS

1.1.1. Submittal Descriptions (SD): Submittal requirements are specified in the technical sections. Examples and descriptions of submittals identified by the Submittal Description (SD) numbers and titles follow:

1.1.1.1. SD-01 Preconstruction Submittals: For Government approved division 01 preconstruction submittals that are required prior to or commencing with the start of work must be submitted within 30 calendar days of contract award unless specified elsewhere in the specifications. Preconstruction Submittals include schedules and a tabular list of locations, features, and other pertinent information regarding products, materials, equipment, or components to be used in the work.

1.1.1.1.1. Certificates Of Insurance Surety Bonds

1.1.1.1.2. List Of Proposed Subcontractors List Of Proposed Products

1.1.1.1.3. Baseline Network Analysis Schedule (NAS) Submittal Register

1.1.1.1.4. Schedule Of Prices Or Earned Value Report

1.1.1.1.5. Work Plan

1.1.1.1.6. Quality Control (QC) plan

1.1.1.1.7. Environmental Protection Plan

1.1.1.2. SD-02 Shop Drawings: Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work

1.1.1.3. SD-03 Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

1.1.1.4. SD-04 Samples

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

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

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

1.1.1.5. SD-05 Design Data: Design calculations, mix designs, analyses or other data pertaining to a part of work.

1.1.1.6. SD-06 Test Reports

1.1.1.6.1. 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. Unless specified in another section, testing must have been within three years of date of contract award for the project.

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

1.1.1.6.3. Report that 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.

1.1.1.6.4. nvestigation reports Daily logs and checklists

1.1.1.6.5. Final acceptance test and operational test procedure

1.1.1.7. SD-07 Certificates

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

1.1.1.7.2. Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

1.1.1.7.3. Confined space entry permits

1.1.1.7.4. Waste manifests documenting the orderly and safe transfer, shipping and disposal of regulated wastes in accordance with all Federal, State, Local, and Installation laws, rules, and regulations.

1.1.1.7.5. Text of posted operating instructions

1.1.1.8. SD-08 Manufacturer's Instructions: Preprinted material describing installation of a product, system or material, including special notices and (SDS) concerning impedances, hazards and safety precautions.

1.1.1.9. SD-09 Manufacturer's Field Reports

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

1.1.1.9.2. Factory test reports.

1.1.1.10. SD-10 Operation and Maintenance Data

1.1.1.10.1. Data provided by the manufacturer, or the system provider, including manufacturer's help and product line documentation, necessary to maintain and install equipment, for operating and maintenance use by facility personnel.

1.1.1.10.2. Data required by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

1.1.1.10.3. Data incorporated in an operations and maintenance manual or control system.

1.1.1.11. SD-11 Closeout Submittals

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

1.1.1.11.2. Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

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

1.1.2. Approving Authority: Office or designated person authorized to approve the submittal.

1.1.3. Work: As used in this section, on-site and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction. In exception, excludes work to produce SD-01 submittals.

1.2. SUBMITTALS FOR THIS SECTION: NONE

1.3. SUBMITTAL CLASSIFICATION

1.3.1. Government Approved (G): Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, submittals are considered to be "shop drawings."

1.3.2. For Information Only: Submittals not requiring Government approval will be for information only. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are not considered to be "shop drawings."

1.3.3. Sustainability Reporting Submittals (S): NOT USED

1.4. PREPARATION

1.4.1. Transmittal Form: Use Air Force Form 3000 for the transmittal of submittals. Ensure all information is included on the form. Attach the form to all submittals.

1.4.2. Submittal Format

1.4.2.1. Format of SD-01 Preconstruction Submittals: When the submittal includes a document that is to be used in the project, or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document. Provide data in the unit of measure used in the contract documents.

1.4.2.2. Format for SD-02 Shop Drawings

1.4.2.2.1. Provide shop drawings not less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full-size patterns or templates. Prepare drawings to accurate size,

with scale indicated, unless another form is required. Ensure drawings are suitable for reproduction and of a quality to produce clear, distinct lines and letters, with dark lines on a white background.

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

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

1.4.2.2.4. Present shop drawings sized 8 1/2 by 11 inches as part of the bound volume for submittals. Present larger drawings in sets. Submit an electronic copy of drawings in PDF format.

1.4.2.2.5. Drawing Identification: Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

1.4.2.2.6. Number drawings in a logical sequence. Each drawing is to bear the number of the submittal in a uniform location next to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

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

1.4.2.3. Format of SD-03 Product Data

1.4.2.3.1. Present product data submittals for each section as specified in the technical sections. Include a cover sheet (or table of contents for bound volume submittals), listing the page and catalog item numbers for product data.

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

1.4.2.3.3. Product Information:

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

1.4.2.3.3.2. Provide product data in units used in the Contract documents. Where product data are included in preprinted catalogs with another unit, submit the dimensions in contract document units, on a separate sheet.

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

test methods and that the item complies with the specified organization's reference standard.

1.4.2.3.5. Data Submission: Collect required data submittals for each specific material, product, unit of work, or system into a single submittal that is marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted, unless approved by the Contracting Officer on a case-by-case basis, for expedition of the construction effort.

1.4.2.3.6. Submit the manufacturer's instructions before installation.

1.4.2.4. Format of SD-04 Samples

1.4.2.4.1. Sample Characteristics

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

1.4.2.4.1.1.1. Sample of Equipment or Device: Full size.

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

1.4.2.4.1.1.3. 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.

1.4.2.4.1.1.4. Sample of Linear Devices or Materials (such as conduit or handrails): 10 inch length or length of device to be supplied, if less than 10 inches.

1.4.2.4.1.1.5. Sample Volume of Nonsolid Materials (such as sand or paint): Pint

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

1.4.2.4.1.1.7. Sample Panel: 4 by 4 feet.

1.4.2.4.1.1.8. Sample Installation: 100 square feet.

1.4.2.4.2. Sample Incorporation

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

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

1.4.2.4.3. Comparison Sample

1.4.2.4.3.1. Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of

samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

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

1.4.2.5. Format of SD-05 Design Data: Provide design data and certificates on 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.4.2.6. Format of SD-06 Test Reports: Provide reports on 8 1/2 by 11 inch paper in a complete bound volume. By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.4.2.7. Format of SD-07 Certificates: Provide design data and certificates on 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.4.2.8. Format of SD-08 Manufacturer's Instructions

1.4.2.8.1. Present manufacturer's instructions submittals for each section as a complete, bound volume. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry, and technical-society publication references. If supplemental information is needed to clarify the manufacturer's data, submit it as specified for SD-07 Certificates.

1.4.2.8.2. Submit the manufacturer's instructions before installation.

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

1.4.2.9. Format of SD-09 Manufacturer's Field Reports: Provide reports on 8 1/2 by 11 inch paper in a complete bound volume. By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.4.2.10. Format of SD-10 Operation and Maintenance Data (O&M): Provide all manufacturers' recommended operations and maintenance data. Ensure a complete package is delivered in bound volumes.

1.4.2.11. 11. Format of SD-11 Closeout Submittals

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

1.4.2.11.2. Provide data in the unit of measure used in the contract documents.

1.4.3. Source Drawings for Shop Drawings: The entire set of source drawing files (DWG) will not be provided to the Contractor. Request the specific Drawing Number for the preparation of shop drawings. Only those drawings requested to prepare shop drawings will be provided. These drawings are provided only after award.

1.4.3.1. Terms and Conditions

1.4.3.1.1. Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim, and waives to the fullest extent permitted by law any claim or cause of action of any nature against the Government, its agents, or its subconsultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities, or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

1.4.3.1.2. These electronic source drawing files are not construction documents. Differences may exist between the source drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic source drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. The Contractor is responsible for determining if any conflict exists. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished source drawing files, the signed and sealed construction documents govern. Use of these source drawing files does not relieve the Contractor of the duty to fully comply with the contract documents, including and without limitation the need to check, confirm and coordinate the work of all contractors for the project.If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indication of ownership (seals, logos, signatures, initials and dates).

1.4.4. Electronic File Format

1.4.4.1. Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. [In addition to the electronic submittal, provide three hard copies of the submittals.]

1.4.4.2. Compile the submittal file as a single, complete document, to include the Transmittal Form described within.

1.4.4.3. Name the electronic submittal file specifically according to its contents, and coordinate the file naming convention with the Contracting Officer.

1.4.4.4. Electronic files must be of sufficient quality that all information is legible.

1.4.4.5. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer.

1.4.4.6. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is searchable and can be copied. If documents are scanned, optical character resolution (OCR) routines are required.

1.4.4.7. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file.

1.4.4.8. When required, the electronic file must include a valid electronic signature or a scan of a signature.

1.5. QUANTITY OF SUBMITTALS

1.5.1. Number of SD-01 Preconstruction Submittal Copies: Unless otherwise specified, submit three sets of administrative submittals.

1.5.2. Number of SD-02 Shop Drawing Copies: Submit four copies of submittals of shop drawings requiring review and approval by a QC organization. Submit four copies of shop drawings requiring review and approval by the Contracting Officer.

1.5.3. Number of SD-03 Product Data Copies: Submit in compliance with quantity requirements specified for shop drawings.

1.5.4. Number of SD-04 Samples

1.5.4.1. Submit three samples, or three sets of samples showing the range of variation, of each required item. Two approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.

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

1.5.4.3. Submit one sample installation, where directed.

1.5.4.4. Submit one sample of nonsolid materials.

1.5.5. Number of SD-05 Design Data Copies: Submit in compliance with quantity requirements specified for shop drawings.

1.5.6. Number of SD-06 Test Report Copies: Submit in compliance with quantity and quality requirements specified for shop drawings, other than field test results that will be submitted with QC reports.

1.5.7. Number of SD-07 Certificate Copies: Submit in compliance with quantity requirements specified for shop drawings.

1.5.8. Number of SD-08 Manufacturer's Instructions Copies: Submit in compliance with quantity requirements specified for shop drawings.

1.5.9. Number of SD-09 Manufacturer's Field Report Copies: Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.5.10. Number of SD-10 Operation and Maintenance Data Copies: Submit four copies of O&M data to the Contracting Officer for review and approval.

1.5.11. Number of SD-11 Closeout Submittals Copies: Unless otherwise specified, submit four sets of administrative submittals.

1.6. INFORMATION ONLY SUBMITTALS

1.6.1. Submittals without a "G" designation must be certified by the QC manager and submitted to the Contracting Officer for information-only. Provide information-only submittals to the

Contracting Officer a minimum of 14 calendar days prior to the Preparatory Meeting for the associated Definable Feature of Work (DFOW).

1.6.2. Approval of the Contracting Officer is not required on information only submittals.

1.6.3. The Contracting Officer will mark "receipt acknowledged" on submittals for information and will return only the transmittal cover sheet to the Contractor.

1.6.4. Normally, submittals for information only will not be returned. However, the Government reserves the right to return unsatisfactory submittals and require the Contractor to resubmit any item found not to comply with the contract.

1.6.5. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.7. PROJECT SUBMITTAL REGISTER

1.7.1. A Project Submittal Register showing items of equipment and materials for when submittals are required by the specifications can be provided upon request.

1.7.2. Submittal Management: Prepare and maintain a submittal register, as the work progresses. Do not change data that is delivered by Government; retain data that is output as approved.

1.7.3. Delivery of Copies: Submit an updated electronic copy of the submittal register to the Contracting Officer with each invoice request. Provide an updated Submittal Register monthly regardless of whether an invoice is submitted.

1.8. VARIATIONS

1.8.1. Variations from contract requirements require Contracting Officer approval pursuant to contract Clause FAR 52.236-21 Specifications and Drawings for Construction, and will be considered where advantageous to the Government.

1.8.2. Considering Variations

1.8.2.1. Discussion of variations with the Contracting Officer before submission of a variation submittal will help ensure that functional and quality requirements are met and minimize rejections and resubmittals.

1.8.2.2. For variations that include design changes or some material or product substitutions, the Government may require an evaluation and analysis by a licensed professional engineer hired by the contractor.

1.8.2.3. Specifically point out variations from contract requirements in a variation submittal. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.8.3. Proposing Variations

1.8.3.1. When proposing variation, deliver a submittal, clearly marked as a "VARIATION" to the Contracting Officer, with documentation illustrating the nature and features of the variation including any necessary technical submittals and why the variation is desirable and

beneficial to Government. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.8.3.2. The Contracting Officer will indicate an approval or disapproval of the variation request; and if not approved as submitted, will indicate the Government's reasons therefore. Any work done before such approval is received is performed at the Contractor's risk."

1.8.3.3. Specifically point out variations from contract requirements in a variation submittal. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

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

1.8.5. Review Schedule Extension: In addition to the normal submittal review period, a period of 14 days will be allowed for the Government to consider submittals with variations.

1.9. SCHEDULING

1.9.1. Schedule and submit concurrently product data and shop drawings covering component items forming a system or items that are interrelated. Submit pertinent certifications at the same time.

1.9.2. No delay damages or time extensions will be allowed for time lost in late submittals. Allow an additional ten days for review and approval of submittals for food service equipment and refrigeration and HVAC control systems.

1.9.3. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. The Contractor is responsible for additional time required for Government reviews resulting from required resubmittals. The review period for each resubmittal is the same as for the initial submittal.

1.9.4. Submittals required by the contract documents are listed on the submittal register.

1.9.4.1. If a submittal is listed in the submittal register but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation.

1.9.4.2. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but that have been omitted from the register or marked "N/A."

1.9.5. Resubmit the submittal register and annotate it monthly with actual submission and approval dates. When all items on the register have been fully approved, no further resubmittal is required.

1.9.6. Contracting Officer review will be completed within 14 days after the date of submission.

1.10. GOVERNMENT APPROVING AUTHORITY

1.10.1. When the approving authority is the Contracting Officer, the Government will:

1.10.1.1. Note the date on which the submittal was received.

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

1.10.1.3. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with comments and markings appropriate for the action indicated.

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

1.10.2. Two copies of the submittal will be retained by the Contracting Officer and two copies of the submittal will be returned to the Contractor.

1.10.3. Review Notations: Submittals will be returned to the Contractor with the following notations:

1.10.3.1. Submittals marked "approved" or "accepted" authorize proceeding with the work covered.

1.10.3.2. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize proceeding with the work covered provided that the Contractor takes no exception to the corrections.

1.10.3.3. Submittals marked "not approved," "disapproved," or "revise and resubmit" indicate incomplete submittal or noncompliance with the contract requirements or design concept.

1.10.3.3.1. Resubmit with appropriate changes. Do not proceed with work for this item until the resubmittal is approved.

1.10.3.4. Submittals marked "not reviewed" indicate that the 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.

1.10.3.4.1. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed.

1.10.3.4.1.1. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.10.3.5. Submittals marked "receipt acknowledged" indicate that submittals have been received by the Government. This applies only to "information-only submittals" as previously defined.

1.11. DISAPPROVED SUBMITTALS

1.11.1. Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications, give notice to the Contracting Officer as required under the FAR clause titled CHANGES.

1.11.2. The Contractor is responsible for the dimensions and design of connection details and the construction of work. Failure to point out variations may cause the Government to require rejection and removal of such work at the Contractor's expense.

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

1.12. APPROVED SUBMITTALS

1.12.1. The Contracting Officer's approval of submittals is not to be construed as a complete check, and indicates only that Approval or acceptance by the Government for a submittal does not relieve the Contractor of the responsibility for meeting the contract requirements or for any error that may exist, because under the Quality Control (QC) requirements of this contract, the Contractor is responsible for ensuring information contained with in each submittal accurately conforms with the requirements of the contract documents.

1.12.2. After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.13. APPROVED SAMPLES

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

1.13.2. Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those that may be damaged in testing, will be returned to the Contractor, at its expense, upon completion of the contract. Unapproved samples will also be returned to the Contractor at its expense, if so requested.

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

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

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION 01 33 00

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1. GENERAL

1.1. ABBREVIATIONS AND ACRONYMS: Lists and explains abbreviations and symbols used in the Contract Documents.

1.1.1. Reference to a technical society, institution, association, or governmental authority is made in the Specifications.

1.1.1.1.	ACI	American Concrete Institute
1.1.1.2.	ANSI	American National Standards Institute
1.1.1.3.	ASTM	American Society for Testing and Materials
1.1.1.4.	AWWA	American Water Works Association
1.1.1.5.	CSI	Construction Specification Institute
1.1.1.6.	FS	Federal Specification
1.1.1.7.	MS	Military Specification
1.1.1.8.	MSTD	Military Standard
1.1.1.9.	NEC	National Electric Code
1.1.1.10.	NFC	National Fire Code
1.1.1.11.	UL	Underwriters' Laboratories

1.2. REFERENCE STANDARDS

1.2.1. Except as modified by governing codes and by this Specification, comply with the applicable provisions and recommendations of ANSI A10.2, Safety Code for Building Construction.

1.2.2. For any requirements throughout the Specifications and Drawings that item(s) bear the label of the Underwriters Laboratories Inc. or similar organizations, the Contractor shall submit proof that such item(s) he proposes to furnish conforms to the standard of the testing organization. The label of the proposed organization shall be accepted as conforming to this requirement.

1.3. SUBMITTALS: NONE

1.4. QUALITY ASSURANCE

1.4.1. Testing and Inspecting Agency Qualifications

1.4.1.1. Testing and Inspection Requirements

1.4.1.1.1. Where technical sections of the Specifications require inspection and testing by a testing laboratory, engage a reputable, recognized testing laboratory, experienced in the type of work to be performed.

1.4.1.1.2. The representative of the testing laboratory shall be on the work site as necessary for sampling, inspection, and testing in accordance with the contract provisions.

1.4.1.1.3. Submit written reports of results within (14) days after completion of tests.

1.4.2. Testing and Inspection Devices

1.4.2.1. Either the Contractor or his testing laboratory shall provide and maintain all measuring and testing devices, laboratory equipment, instruments, and supplies necessary to accomplish the required testing and inspection.

1.4.2.2. All measuring and testing devices shall be calibrated periodically against certified standards.

1.5. QUALITY CONTROL

1.5.1. Field Quality Control Procedures

1.5.1.1. The Contractor’s QC staff shall function completely independently of the Contractor's job-supervisory staff.

1.5.2. Contractor Quality Control

1.5.2.1. Provide and maintain an effective Contractor Quality Control (CQC) program and perform sufficient inspections and tests of all items of work, including those of subcontractors, to ensure compliance with Contract Documents.

1.5.2.2. Include surveillance and tests specified in the technical sections of the Specifications.

1.5.2.3. Furnish appropriate facilities, instruments, and testing devices required for performance of the quality control function.

1.5.2.4. Controls must be adequate to cover construction operations and be keyed to the construction sequence.

1.5.3. The Contractor's Quality Control system shall provide for procedures to ensure that the latest Contract Documents, shop drawings, and instructions required by the Contract are used for fabrication, testing, and inspection.

1.6. TESTING AND INSPECTING SERVICES

1.6.1. All tests shall be documented and certified.

1.6.2. All compliance inspections shall record both conforming and defective items with an explanation for the cause of rejection, proposed remedial action, and corrective action taken.

1.6.3. Individual daily reports will be required of each inspector and technician covering the feature which is assigned and a consolidated daily report signed by the person in charge of the quality control staff.

1.7. TESTING LABORATORY SERVICES: The Contractor may arrange for a testing laboratory to provide on-site services required in lieu of direct employment of personnel.

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION: (NOT USED)

END OF SECTION 01 40 00

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1. GENERAL

1.1. RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.1.2. Section 01 74 19 of this Specification: In case of conflicts between the requirements of Section 01 74 19 and this Section, the more restrictive requirements shall govern.

1.2. REFERENCES

1.2.1. 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.

1.2.1.1. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) and CFR

1.2.1.1.1. EPA SW-846 (Third Edition; Update VII) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

1.2.1.1.2. 40 CFR 50 National Primary and Secondary Ambient Air Quality Standards

1.2.1.1.3. 40 CFR 60 Standards of Performance for New Secondary Sources

1.2.1.1.4. 40 CFR 63 National Emission Standards for Hazardous Air Pollutants for Source Categories

1.2.1.1.5. 40 CFR 82 Protection of Stratospheric Ozone

1.2.1.1.6. 40 CFR 112 Oil Pollution Prevention

1.2.1.1.7. 40 CFR 122.26 Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)

1.2.1.1.8. 40 CFR 241 Guidelines for Disposal of Solid Waste

1.2.1.1.9. 40 CFR 243 Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste

1.2.1.1.10. 40 CFR 258 Subtitle D Landfill Requirements

1.2.1.1.11. 40 CFR 260 Hazardous Waste Management System: General

1.2.1.1.12. 40 CFR 261 Identification and Listing of Hazardous Waste

1.2.1.1.13. 40 CFR 261.7 Residues of Hazardous Waste in Empty Containers

1.2.1.1.14. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste

1.2.1.1.15. 40 CFR 262.31 Standards Applicable to Generators of Hazardous Waste-Labeling

1.2.1.1.16. 40 CFR 262.34 Standards Applicable to Generators of Hazardous Waste-Accumulation Time

1.2.1.1.17. 40 CFR 263 Standards Applicable to Transporters of Hazardous Waste

1.2.1.1.18. 40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

1.2.1.1.19. 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

1.2.1.1.20. 40 CFR 266 Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities

1.2.1.1.21. 40 CFR 268 Land Disposal Restrictions

1.2.1.1.22. 40 CFR 273 Standards for Universal Waste Management

1.2.1.1.23. 40 CFR 273.2 Standards for Universal Waste Management – Batteries

1.2.1.1.24. 40 CFR 273.3 Standards for Universal Waste Management – Pesticides

1.2.1.1.25. 40 CFR 273.4 Standards for Universal Waste Management - Mercury Containing Equipment

1.2.1.1.26. 40 CFR 273.5 Standards for Universal Waste Management – Lamps

1.2.1.1.27. 40 CFR 279 Standards for the Management of Used Oil

1.2.1.1.28. 40 CFR 300 National Oil and Hazardous Substances Pollution Contingency Plan

1.2.1.1.29. 40 CFR 300.125 National Oil and Hazardous Substances Pollution Contingency Plan – Notification and Communications

1.2.1.1.30. 40 CFR 355 Emergency Planning and Notification

1.2.1.1.31. 40 CFR 403 General Pretreatment Regulations for Existing and New Sources of Pollution

1.2.1.1.32. 49 CFR 171 General Information, Regulations, and Definitions

1.2.1.2. STATE OF OHIO

1.2.1.2.1. ORC 3704 Air Pollution Control

1.2.1.2.2. ORC 3710 Asbestos Abatement

1.2.1.2.3. ORC 3714 Construction and Demolition Debris

1.2.1.2.4. ORC 3734 Solid and Hazardous Wastes

1.2.1.2.5. ORC 3736 Recycling, Waste Reduction, Litter Prevention

1.2.1.2.6. ORC 3741 Gasoline, Oils, Paints

1.2.1.2.7. OAC 3745 Ohio Environmental Protection Agency (related sections based on environmental media)

1.2.1.3. UNITED STATES AIR FORCE

1.2.1.3.1. AFPD 32-70 Environmental Considerations in Air Force programs and Activities

1.2.1.3.2. AFI 32-7001 Environmental Management

1.2.1.3.3. AFMAN 32-7002 Environmental Compliance and Pollution Prevention

1.2.1.3.4. AFMAN 32-7003 Environmental Conservation

1.3. DEFINITIONS

1.3.1. Contractor Generated Hazardous Waste - Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e., methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, solid debris and waste solvents.

1.3.2. Electronics Waste - Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.3.3. Environmental Pollution and Damage - Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

1.3.4. Environmental Protection - Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during contract activities. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.3.5. Hazardous Materials - Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172: Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

1.3.6. Hazardous Waste - Hazardous Waste is any material that meets the definition of a solid waste and exhibits a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

1.3.7. Universal Waste - The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found in 40 CFR 273.

1.3.8. Land Application - Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

1.3.9. National Pollutant Discharge Elimination System (NPDES) - The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.3.10. Oily Waste - Oily wastes are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from the POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements. This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal.

1.3.11. Regulated Waste - Regulated wastes are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

1.3.12. Sediment - Sediment is soil and other debris that have eroded and have been transported by

runoff water or wind.

1.3.13. Solid Waste - Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

1.3.14. Debris - Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.3.15. Green Waste - Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

1.3.16. Non-Hazardous Waste - Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 263.

1.3.17. Recyclables - Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, wiring, insulated/non-insulated copper wire cable, wire rope, and structural components. It also includes commercial-grade refrigeration equipment with the refrigerant removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.3.18. Surplus Soil - Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with paragraph 3.4, HAZARDOUS WASTE MANAGEMENT.

1.3.19. Scrap Metal - This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.3.20. Wood - Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

1.3.21. Material not regulated as solid waste - Material not regulated as solid waste is suspended or dissolved materials in domestic sewage effluent or irrigation return flows, other regulated point source discharges, and regulated air emissions.

1.3.22. Surface Discharge - Surface discharge means discharge of water into drainage ditches,

storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.3.23. Wastewater - Wastewater is the used water and solids from a community that flow to a treatment plant.

1.3.24. Stormwater - Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

1.3.25. Waters of the United States - Waters of the United States means federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.3.26. Wetlands - Wetlands are those 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.

1.4. SUBMITTALS: Government approval is required for submittals with a (G) designation. Submittals not marked are for Contractor quality control and for recordkeeping in the Environmental Management Office (CEV). Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1.4.1. PRECONSTRUCTION SUBMITTALS: Preconstruction submittals requiring Government approval must be approved prior to commencement of work:

1.4.1.1. Preconstrucion Survey

1.4.1.2. Regulatory Notifications, (G)

1.4.1.3. Stormwater Notice of Intent, General Construction Permit (NPDES) and Stormwater Pollution Prevention Plan (SWPPP), (G)

1.4.1.4. Solid Waste Management Permit, (G)

1.4.1.5. Environmental Point of Contact (POC) Appointment

1.4.1.6. Environmental POC Qualifications

1.4.1.7. Erosion and Sediment Control Inspector Qualifications

1.4.1.8. Environmental Protection Plan, (G)

1.4.1.9. Contractor Hazardous Materials Inventory, (G)

1.4.1.10. Safety Data Sheets, (G)

1.4.2. PERIODIC SUMBITTALS: Submitted during construction at frequency specified

1.4.2.1.1. Waste Determination Report, As potential hazardous wastes are identified. (G)

1.4.2.1.2. Laboratory Analysis, As needed for waste determination. (G)

1.4.2.1.3. Copies of Hazardous Waste Manifests, When transporting hazardous wastes. (G)

1.4.2.1.4. Copies of Universal Waste Manifests and/or Bills of Lading, When transporting universal wastes. (G)

1.4.2.1.5. Sales Documentation for Recycled Materials, Monthly

1.4.2.1.6. Solid Waste Management Report, Monthly

1.4.2.1.7. Construction and Demolition Debris Reporting Form, Quarterly

1.4.2.1.8. SWPPP Reports, As required by permit

1.4.3. CLOSEOUT SUBMITTALS

1.4.3.1. Assembled Employee Training Records, (G)

1.4.3.2. Copies of all PERIODIC SUBMITTALS, (G)

1.4.3.3. HVAC Data

1.4.3.4. Stormwater Permit Notice of Termination, (G)

1.4.3.5. As Built Topographic Survey

1.5. ENVIRONMENTAL COMPLIANCE REQUIREMENTS

1.5.1. Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during performance of the contract. Plan for and provide environmental protective measures required to correct conditions developing during contract performance which may have a negative effect on the natural and cultural environment. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including air, cultural and natural resources, hazardous materials, solid waste, hazardous waste, noise, pesticides, toxic substances, and water quality.

1.5.2. FACILITY HAZARDOUS WASTE GENERATOR STATUS: Mansfield Lahm Air National Guard Base is a Small Quantity Hazardous Waste Generator. Meet the regulatory requirements of this generator designation for any work conducted within the boundaries of the Installation. Comply with provisions of federal, state, and local regulatory requirements applicable to this generator status regarding storage, handling, and disposal of construction derived wastes and training of employees.

1.5.3. Tests and procedures assessing whether construction operations comply with applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

1.5.4. LICENSES AND PERMITS: Obtain licenses and permits required for the construction of the project and in accordance with FAR 52.236-7 Permits and Responsibilities. Notify the Government of all general use permitted equipment the Contractor plans to use on site. This paragraph supplements the Contractor's responsibility under FAR 52.236-7 Permits and Responsibilities.

1.6. CONFORMANCE WITH THE ENVIRONMENTAL MANAGEMENT SYSTEM

1.6.1. Perform work under this contract consistent with the policy and objectives identified in the installation's Environmental Management System (EMS). Perform work in a manner that

conforms to objectives and targets of the environmental programs and operational controls identified by the EMS. Support Government personnel when environmental compliance and EMS audits are conducted by escorting auditors at the Project site, answering questions, and providing proof of records being maintained. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the installation EMS and of how these EMS roles and responsibilities affect work performed under the contract.

1.6.2. Coordinate with the Installation Environmental Management Office to identify training needs associated with environmental aspects and the EMS and arrange training or take other action to meet these needs. Provide training documentation to the Contracting Officer. Make EMS Awareness training completion certificates available to Government auditors during EMS audits and include the certificates in the Employee Training Records. See paragraph EMPLOYEE TRAINING RECORDS. The Installation Environmental Management Office will retain copies of associated environmental compliance records.

1.7. PRECONSTRUCTION SURVEY AND PROTECTION OF FEATURES: This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, perform a Preconstruction Survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the Contracting Officer will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

1.8. REGULATORY NOTIFICATIONS: Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer at the Preconstruction Meeting. Typically, regulatory notifications must be provided for the following (this listing is not all- inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.9. STORMWATER NOTICE OF INTENT FOR CONSTRUCTION ACTIVITIES: Submit the approved NOI and appropriate permit fees to the Ohio EPA for permit issuance. Provide a copy of the General Construction Permit to the Contracting Officer prior to commencement of work. No land disturbing activities may commence without permit coverage.

1.9.1. STORMWATER POLLUTION PREVENTION PLAN (SWPPP): Submit a project-specific SWPPP to the Contracting Officer for approval at the Preconstruction Meeting and prior to the commencement of work. The SWPPP must meet the requirements of 40 CFR 122.26 and the EPA General Permit for stormwater discharges from construction sites. Prepare the SWPPP in accordance with EPA requirements. Use the EPA guide located at http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Pollution- Prevention- Plans-for-Construction-Activities.cfm to prepare the SWPPP. Select applicable Best Management Practices (BMPs) from EPA Fact Sheets located at http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-StormWater- Run-Off- Control.cfm. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

1.10. SOLID WASTE MANAGEMENT PERMIT: Provide the Contracting Officer with written notification of the quantity of anticipated or estimated solid waste or debris generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan at the Preconstruction Meeting and before transporting wastes off Government property.

1.11. ENVIRONMENTAL POINT OF CONTACT (POC): Appoint in writing an Environmental POC for the project site and provide documentation at the Preconstruction Meeting. The Environmental POC is directly responsible for ensuring contractor compliance with federal, state, local, and installation requirements. The Environmental POC must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCBs). Include in this letter the Environmental POC's authority to direct the removal and replacement of non-conforming work. This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain all environmental records and required documentation, including environmental permits compliance and close-out.

1.12. QUALIFICATIONS: Submit Environmental POC and Erosion and Sediment Control Inspector Qualifications as defined by EPA to the Contracting Officer at the Preconstruction Meeting. Maintain any training records, certificates and qualifications on site.

1.13. ENVIRONMENTAL PROTECTION PLAN: The purpose of the EPP is to present an overview of known or potential environmental issues and preventive measures and Best management Practices (BMPs) to be implemented during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken for environmental compliance. Meet with the Contracting Officer Representative and the Environmental management Office to discuss the EPP and develop a mutual understanding relative to the details for environmental compliance and conformance. Submit the EPP at the Preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications which change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite. Send all updates to the Contracting Officer for the Installation Environmental Management Office.

1.13.1. The EPP includes, but is not limited to, the following elements:

1.13.1.1. GENERAL OVERVIEW AND PURPOSE

1.13.1.1.1. DESCRIPTIONS: A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, wastewater management plan, etc.

1.13.1.1.2. DUTIES: The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site

(if applicable), and who is responsible for training the Contractor's environmental protection personnel.

1.13.1.1.3. PROCEDURES: A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site. Include the following:

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

1.13.1.1.4. COMMUNICATIONS: Communication and training procedures used to convey environmental management requirements to Contractor employees and subcontractors.

1.13.1.1.5. CONTACT INFORMATION: Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

1.13.1.2. GENERAL SITE INFORMATION

1.13.1.2.1. DRAWINGS: Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, jurisdictional wetlands, material storage areas, structures, sanitary facilities, storm drains and conveyances, and stockpiles of excess soil.

1.13.1.2.2. WORK AREA: Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.13.1.3. REGULATORY NOTIFICATION AND PERMITS: List what notifications and permit applications must be made. Demonstrate the permits have been obtained. The EPP will not be approved until the permits have been obtained.

1.13.1.4. PROTECTION OF HISTORICAL AND ARCHAEOLOGICAL RESOURCES

1.13.1.4.1. Objectives

1.13.1.4.2. Methods

1.13.1.5. PROTECTION OF THE ENVIRONMENT FROM WASTE DERIVED FROM CONTRACTOR OPERATIONS: This item consists of the management procedures for hazardous and non-hazardous solid waste to be generated. The elements of those procedures will coincide with the Installation Hazardous Waste Management Plan. The Contracting Officer or Contracting Officer Representative will provide a copy of the Installation Hazardous Waste Management Plan. As a minimum, include the following:

1.13.1.5.1. List of the types of non-hazardous solid wastes expected to be generated

1.13.1.5.2. Plans for the disposal of non-hazardous solid wastes and procedures for reduction of wastes, separation, recycling, and recordkeeping of disposal.

1.13.1.5.3. List of the types of hazardous wastes expected to be generated.

1.13.1.5.4. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated.

1.13.1.5.5. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications.

1.13.1.5.6. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks or containers).

1.13.1.5.7. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed).

1.13.1.5.8. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268).

1.13.1.5.9. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar.

1.13.1.5.10. Used oil management procedures in accordance with 40 CFR 279; Hazardous waste minimization procedures.

1.13.1.5.11. Procedures to be employed to ensure required employee training records are maintained.

1.13.1.6. MANAGEMENT OF NATURAL RESOURCES

1.13.1.6.1. Land resources

1.13.1.6.2. Tree protection

1.13.1.6.3. Replacement of damaged landscape features

1.13.1.6.4. Temporary construction

1.13.1.6.5. Stream crossings

1.13.1.6.6. Fish and wildlife resources

1.13.1.6.7. Wetland areas

1.13.1.7. STORMWATER MANAGEMENT AND CONTROL: A completed SWPPP satisfies this requirement.

1.13.1.8. PREVENTION OF RELEASES TO THE ENVIRONMENT: Procedures to prevent releases to the environment and notifications in the event of a release to the environment.

1.14. HAZARDOUS MATERIALS DOCUMENTATION:

1.14.1. CONTRACTOR HAZARDOUS MATERIAL INVENTORY: Submit the Government provided Contractor Hazardous Material Inventory, which provides information required by EPCRA Sections 312 and 313, to the Contracting Officer at the start and at the end of construction (30 days from final acceptance) and update no later than January 31 of each calendar year during the life of the contract. At the end of the project, provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used.

1.14.2. SAFETY DATA SHEETS: Submit the correct and current SDS each hazardous material to the Contracting Officer prior to bringing the material on the installation (See Paragraph 1.4.1). Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Keep copies of the SDSs onsite.

1.15. ENVIRONMENTAL BRIEF: Attend an environmental brief to be included in the preconstruction meeting. Discuss the results of the Preconstruction Survey at this time. Provide the preconstruction submittals detailed in Paragraph 1.4.1. Prior to initiating any work on site, meet with the Contracting Officer or Contracting Officer Representative and installation Environmental Management Office to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.15.1. The Environmental Management Office will provide information on local requirements and procedures and training materials for compliance with the installation EMS System.

1.15.2. Prior to commencing any work under the contract the contractor shall provide all submittals listed in Paragraph 1.4.1.

1.16. EMPLOYEE TRAINING RECORDS: Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Submit these Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

1.16.1. Train personnel to meet Ohio EPA requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda:

1.16.1.1. Methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards.

1.16.1.2. Installation and care of devices vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control.

1.16.1.3. Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area.

1.17. NON-COMPLIANCE NOTIFICATIONS: The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2. PART 2 PRODUCTS (NOT USED)

PART 3. PART 3 EXECUTION

3.1. AIR QUALITY COMPLIANCE:

3.1.1. EQUIPMENT USAGE: Equipment operation, activities, or processes will be in accordance with state air emission and performance laws and standards.

3.1.2. EPA CERTIFICATION REQUIREMENTS: Heating and air conditioning technicians must be certified through an EPA-approved program. Maintain copies of certifications at the employees' places of business; technicians must carry certification wallet cards, as provided by environmental law.

3.1.3. STATIONARY INTERNAL COMBUSTION ENGINES: Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records.

3.1.4. REFRIGERANTS: Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the Installation Environmental Management Office to determine the appropriate turn in location. Ensure data plates on all HVAC equipment are correctly and completely filled out. Provide the following information as a submittal to the Contracting Officer for the Installation Environmental Management Office’s records:

3.1.4.1. Manufacturer Name

3.1.4.2. Model Number

3.1.4.3. Serial Number

3.1.4.4. Type of Refrigerant

3.1.4.5. Type of Equipment (I.E. Air Conditioner, Chiller, Air System, Water Cooler, Etc)

3.1.4.6. Equipment Category (I.E. Commercial or Comfort cooling)

3.1.4.7. Total System Charge in Pounds and Ounces

3.1.4.8. Number of Circuits and the amount of refrigerant (in lbs.) in each circuit

3.1.4.9. A photo of the completed data plates for all installed equipment

3.1.5. RELEASE OF REFRIGERANTS: Accidental venting of a refrigerant is a release and must be reported immediately to the Contracting Officer Representative.

3.1.6. FUEL FIRED BOILERS AND FURNACES: Ensure data plates on all HVAC equipment are correctly and completely filled out. Provide product data and details for new, replacement, or relocated fuel fired boilers, heaters, or furnaces to the Contracting Officer for the Installation Environmental Management Office's records. Data to be reported include:

3.1.6.1. Manufacturer Name

3.1.6.2. Model Number

3.1.6.3. Serial Number

3.1.6.4. Type of Equipment (Water Heater, Building Heat, Process)

3.1.6.5. Fuel Type (oil, natural gas, etc.)

3.1.6.6. Size (MMBTU heat input).

3.1.6.7. A photo of the completed data plates for all installed equipment

3.1.7. DUST CONTROL: Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants: the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting or dustless masonry cutting equipment will be permitted for cutting concrete blocks, concrete, and bituminous concrete.

3.1.8. COMPLIANT MATERIALS: All hazardous materials proposed for use on site must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter or limit use of specific materials as needed to meet installation permit requirements for emissions.

3.1.9. BURNING: Burning is prohibited on the Installation.

3.2. CULTURAL RESOURCES PROTECTION:

3.2.1. ARCHAEOLOGICAL RESOURCES: If, during excavation or other construction activities, any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, activities that may damage or alter such resources will be suspended and the Contracting Officer or Contracting Officer Representative shall be immediately notified so the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Secure the area

and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological resources.

3.3. HAZARDOUS MATERIALS MANAGEMENT:

3.3.1. Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements.

3.3.2. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract.

3.3.3. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

3.3.4. The Contracting Officer may request documentation for any spills or releases, environmental reports, or off-site transfers.

3.4. HAZARDOUS WASTE MANAGEMENT:

3.4.1. Identify construction activities that will generate hazardous waste or debris. Provide a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

3.4.2. Provide the Contracting Officer or Contracting Officer Representative with a copy of a waste determination report for any solid waste streams having any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. As a minimum, provide a waste determination report for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials.

3.4.2.1. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g., scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Consult with the Installation Hazardous Waste Program Manager for guidance on specific requirements. Attach support documentation to the waste determination report.

3.4.2.1.1. Accomplish waste determination based on user knowledge of the processes and materials used, and analytical data when necessary.

3.4.2.1.1.1. SAMPLING AND ANALYSIS OF WASTE: Sample waste in accordance with EPA SW-846. Obtain a representative sample of the material generated for each job done to provide waste stream determination.

3.4.2.1.1.2. Clearly mark each sampled drum or container with the Contractor's identification number, and cross reference to the chemical analysis performed. For laboratory analysis, Follow the analytical procedure and methods in accordance with 40 CFR 261. Identify hazardous waste by analyzing for the following characteristics: ignitability, corrosivity, reactivity, or toxicity based on TCLP results. Provide analytical

results and reports performed to the Contracting Officer or Contracting Officer Representative.

3.4.3. Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government.

3.4.4. WASTE STORAGE/SATELLITE ACCUMULATION AREAS: Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262.34 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or 1 quart for acutely hazardous wastes). Barricade the designated area where waste is being stored and post a sign identifying as follows: "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.4.5. HAZARDOUS WASTE DISPOSAL: Provide service necessary for the disposal of hazardous waste in accordance with 40 CFR 260, local, and state, laws and regulations, and the terms and conditions of the Contract. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

3.4.5.1. PACKAGING: Packaging must be compatible with waste contents and drums must meet DOT requirements for transportation of materials in accordance with 49 CFR 173. Contact the Installation Environmental Management Office for guidance.

3.4.5.2. LABELING: Determine the Department of Transportation's (DOT's) proper shipping names for waste (each container requiring disposal) and demonstrate to the Contracting Officer how this determination is developed and supported by the sampling and analysis requirements contained herein. Label all containers of hazardous waste with the words "Hazardous Waste" or other words to describe the contents of the container in accordance with 40 CFR 262.31 and applicable state or local regulations.

3.4.5.3. DISPOSAL DOCUMENTATION FOR HAZARDOUS AND REGULATED WASTE: Contact the Contracting Officer or Contracting Officer Representative for the facility RCRA identification number that is to be used on each manifest. Submit a copy of the applicable EPA and or state permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Submit any waste manifests in the EPA’s eManifest system. The installation can no longer accept paper copies and must manage all waste manifests electronically. Provide a hazardous waste manifest to the Installation Environmental Management Office for review, approval, and signature prior to shipping waste off Government property. To obtain specific disposal instructions, coordinate with the Installation Environmental Management Office.

3.4.6. Do not bring hazardous waste onto Government property. Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property.

3.4.7. UNIVERSAL WASTE MANAGEMENT: Manage the following categories of universal waste in accordance with federal, state, and local requirements and installation instructions. Provide copies of manifest documents for the removal of universal waste to the Contracting Officer.

3.4.7.1. Batteries as described in 40 CFR 273.2.

3.4.7.2. Lamps as described in 40 CFR 273.5.

3.4.7.3. Mercury-containing equipment as described in 40 CFR 273.4.

3.4.7.3.1. Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

3.4.8. ELECTRONICS END-OF-LIFE MANAGEMENT Recycle or dispose of electronics waste, including, but not limited to, used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements, and installation instructions.

3.4.9. MILITARY MUNITIONS: In the event military munitions, as defined in 40 CFR 260, are discovered or uncovered, immediately stop work in that area and immediately inform the Installation Fire Department.

3.4.10. INADVERTENT DISCOVERY OF CONTAMINATED SOIL OR HAZARDOUS WASTES: If contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the Contracting Officer or Contracting Officer Representative. Do not disturb this material until authorized by the Contracting Officer.

3.5. NATURAL RESOURCES PROTECTION:

3.5.1. Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the Installation Environmental Management Office, regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

3.5.2. Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work that is consistent with the requirements of the Installation Environmental Management Office or as otherwise specified.

3.5.3. Confine construction activities to within the limits of the work indicated or specified. Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence.

3.5.4. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

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

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

attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

3.5.6.1. Tree removal is allowed only from 1 November to 31 March. Notify Contracting Officer of intent to remove trees. Only remove trees when permission is granted by the Contracting Officer.

3.5.7. Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the Contracting Officer or Contracting Officer Representative and the Installation Environmental Management Office to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.5.8. Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the federal, state, and local governments. Construction of stream crossing structures must be in compliance with any required permits including, but not limited to, Clean Water Act Section 404, and Section 401 Water Quality. The Contracting Officer's approval and appropriate permits are required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work and repair the area to its original condition unless otherwise required by the Contracting Officer.

3.5.9. PREVIOUSLY USED EQUIPMENT: Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.6. NOISE:

3.6.1. Maximize use of low-noise emission products, as certified by the EPA. Blasting or use of explosives are not permitted. Keep construction activities under surveillance and control to minimize environmental damage by noise. Comply with the provisions of the State of Ohio.

3.7. PESTICIDES:

3.7.1. Contractor personnel are not authorized to apply pesticides on the installation. Should pesticide use be necessary, coordinate with the Contracting Officer or Contracting Officer Representative.

3.8. SOLID WASTE MANAGEMENT:

3.8.1. WASTE MINIMIZATION: Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Integrated Solid Waste Management Plan for reference material when preparing this part of the EPP.

3.8.1.1. SALVAGE, REUSE AND RECYCLE: Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, or recycling.

3.8.1.1.1. QUALIFIED RECYCLING PROGRAM (QRP): In accordance with Air Force Manual 32-7002: “Environmental Compliance and Pollution Prevention”, Paragraph 6.6.3.5, the Contractor shall participate in the installation’s Qualified Recycling Program.

3.8.1.1.1.1. Segregate the following materials generated during construction or

demolition: ferrous and non-ferrous scrap metal, and scrap copper including cable and wire. Place items in separate containers apart from normal construction and demolition debris. Label containers to prevent non-QRP materials from being disposed of in the containers. Ensure security of the containers to prevent theft. Arrange for transport, or deliver QRP materials to a licensed recycler.

3.8.1.1.1.2. Obtain weight tickets, sales price, and sale amount for Environmental Management Office records.

3.8.1.1.1.3. The following forms of payment from the recycler are acceptable: Bank Drafts, Cashier's Checks and Certified Checks. Payment should be to the order of:

U.S. Treasury
Attn: 179th Environmental
1947 Harrington Memorial Rd.
Mansfield, Ohio 44903

3.8.1.1.2. Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.8.1.1.3. On a monthly basis' provide copies of the recycling facility's weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the recycled materials that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The sales documentation must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the SOLID WASTE DISPOSAL REPORT. Prices paid or received do not have to be reported to the Contracting Officer

3.8.2. WASTE DISPOSAL: Pick up solid wastes, and place in containers that 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. Employ segregation measures so no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

3.8.2.1. Segregate and separate treated wood components disposed at a lined landfill approved to accept this waste in accordance with local and state regulations.

3.8.2.2. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

3.8.2.3. SOLID WASTE DISPOSAL REPORT: Submit a monthly solid waste disposal report to the Contracting Officer or Contracting Officer Representative. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste. Provide copies of the waste handling facilities' weight tickets.

3.8.3. CONSTRUCTION AND DEMOLITION DEBRIS REPORTING FORM: Submit a monthly report to the Contracting Officer or Contracting Officer Representative detailing the amount

and disposition of construction and demolition debris. A form for this report will be provided by the Government.

3.9. PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING: POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, and mineral oil. Describe in the EPP how POL tanks and containers must be stored, managed, and inspected and what protections must be provided.

3.9.1. Store POL products, fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States.

3.9.2. USED OIL MANAGEMENT: Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

3.9.3. OIL STORAGE INCLUDING FUEL TANKS: Provide secondary containment and overfill protection for oil storage tanks or utilize double-walled tanks with overfill protection. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present. Provide a spill response kit with materials needed to respond to any minor spill or leak form the container or during product transfer. For the purposes of this section, a minor spill is defined as a spill not exceeding 5 gallons of product.

3.9.4. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover drip pans during inclement weather.

3.10. RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES:

3.10.1. RESPONSE AND NOTIFICATIONS: Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release.

3.10.2. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Installation Fire Department and the Contracting Officer or Contracting Officer Representative. Submit verbal and written notifications as required by 40 CFR 300.125 and 40 CFR 355, state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days.

3.10.3. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government. Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within

one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

3.11. WATER QUALITY COMPLIANCE:

3.11.1. STORM WATER:

3.11.1.1. Do not discharge storm water from construction sites to the sanitary sewer. If the water is noted or suspected of being contaminated, it cannot be released to the storm drain system.

3.11.1.2. Under the terms and conditions of the Construction General Permit: install, inspect, maintain BMPs, prepare storm water erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain construction operations in compliance with the terms and conditions of the general permit. Comply with terms of the EPA general permit for storm water discharges from construction activities. Submit Inspection Reports to the Contracting Officer or Contracting Officer Representative in accordance with the Permit.

3.11.1.2.1. Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable. Erosion control inspection reports may be compiled as part of a storm water pollution prevention plan inspection reports. Prevent erosion by mulching, Compost Blankets, Geotextiles, or temporary slope drains. Stabilize slopes by sodding, seeding, or combination of these methods necessary for effective erosion control. Use of hay bales is prohibited.

3.11.1.2.2. Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment laden runoff. Include the following devices: silt fence, temporary diversion dikes, and storm drain inlet protection.

3.11.1.2.3. Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.11.1.3. STORM WATER NOTICE OF TERMINATION FOR CONSTRUCTION ACTIVITIES: submit the Notice of Termination to the appropriate state or federal agency once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Prepare as-built topographic survey information required by the permitting agency for certification of the stormwater management system. Submit the completed Notice of Termination to the Contracting Officer.

3.11.2. SURFACE AND GROUND WATER:

3.11.2.1. Construction operations for dewatering, removal of cofferdams, tailrace excavation, and tunnel closure must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body. Comply with the State of Ohio water quality standards and anti-degradation provisions and the Clean Water Act Section 404.

3.11.2.2. Do not discharge excavation ground water to the sanitary sewer, storm drains, or to surface waters. Discharge of hazardous substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

3.11.2.3. If the construction dewatering is noted or suspected of being contaminated, it cannot be released to the storm drain system. Discharge of hazardous substances will not be permitted under any circumstances.

3.11.2.4. Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States.

3.11.3. WASTE WATER:

3.11.3.1. Do not allow waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter water ways. Dispose of the construction- related waste water off-Government property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

3.11.4. SURFACE DISCHARGE: For discharge of ground water, obtain a state or federal permit specific for pumping and discharging ground water prior to surface discharging. Surface discharge in accordance with federal, state, and local laws and regulations.

3.11.5. LAND APPLICATION: Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing must be land-applied in accordance with federal, state, and local laws and regulations for land application or discharged into the sanitary sewer with prior approval and notification to the Wastewater Treatment Plant's Operator.

3.12. STORAGE CONTAINERS: Any containers with a capacity of 55 Gallons or more must be clearly and properly labelled with the container contents, any hazards associated with the product. and all labels, placards, and markings required by Federal and State regulations.

3.13. POST CONSTRUCTION CLEANUP: Clean up areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform to surrounding contours. Seed or sod areas where vegetation has been removed, cut, or trampled.

3.14. ENVIRONMENTAL RECORDS: Maintain environmental records on-site and submit at the completion of the project. Make separate parts that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

END OF SECTION 01 57 19

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 4. GENERAL

4.1. RELATED DOCUMENTS

4.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

4.1.2. Section 01 74 19 of this Specification: In case of conflicts between the requirements of Section 01 74 19 and this Section, the more restrictive requirements shall govern.

4.2. REFERENCES

4.2.1. 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.

4.2.1.1. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) and CFR

4.2.1.1.1. EPA SW-846 (Third Edition; Update VII) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

4.2.1.1.2. 40 CFR 50 National Primary and Secondary Ambient Air Quality Standards

4.2.1.1.3. 40 CFR 60 Standards of Performance for New Secondary Sources

4.2.1.1.4. 40 CFR 63 National Emission Standards for Hazardous Air Pollutants for Source Categories

4.2.1.1.5. 40 CFR 82 Protection of Stratospheric Ozone

4.2.1.1.6. 40 CFR 112 Oil Pollution Prevention

4.2.1.1.7. 40 CFR 122.26 Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)

4.2.1.1.8. 40 CFR 241 Guidelines for Disposal of Solid Waste

4.2.1.1.9. 40 CFR 243 Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste

4.2.1.1.10. 40 CFR 258 Subtitle D Landfill Requirements

4.2.1.1.11. 40 CFR 260 Hazardous Waste Management System: General

4.2.1.1.12. 40 CFR 261 Identification and Listing of Hazardous Waste

4.2.1.1.13. 40 CFR 261.7 Residues of Hazardous Waste in Empty Containers

4.2.1.1.14. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste

4.2.1.1.15. 40 CFR 262.31 Standards Applicable to Generators of Hazardous Waste-Labeling

4.2.1.1.16. 40 CFR 262.34 Standards Applicable to Generators of Hazardous Waste-Accumulation Time

4.2.1.1.17. 40 CFR 263 Standards Applicable to Transporters of Hazardous Waste

4.2.1.1.18. 40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

4.2.1.1.19. 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

4.2.1.1.20. 40 CFR 266 Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities

4.2.1.1.21. 40 CFR 268 Land Disposal Restrictions

4.2.1.1.22. 40 CFR 273 Standards for Universal Waste Management

4.2.1.1.23. 40 CFR 273.2 Standards for Universal Waste Management – Batteries

4.2.1.1.24. 40 CFR 273.3 Standards for Universal Waste Management – Pesticides

4.2.1.1.25. 40 CFR 273.4 Standards for Universal Waste Management - Mercury Containing Equipment

4.2.1.1.26. 40 CFR 273.5 Standards for Universal Waste Management – Lamps

4.2.1.1.27. 40 CFR 279 Standards for the Management of Used Oil

4.2.1.1.28. 40 CFR 300 National Oil and Hazardous Substances Pollution Contingency Plan

4.2.1.1.29. 40 CFR 300.125 National Oil and Hazardous Substances Pollution Contingency Plan – Notification and Communications

4.2.1.1.30. 40 CFR 355 Emergency Planning and Notification

4.2.1.1.31. 40 CFR 403 General Pretreatment Regulations for Existing and New Sources of Pollution

4.2.1.1.32. 49 CFR 171 General Information, Regulations, and Definitions

4.2.1.2. STATE OF OHIO

4.2.1.2.1. ORC 3704 Air Pollution Control

4.2.1.2.2. ORC 3710 Asbestos Abatement

4.2.1.2.3. ORC 3714 Construction and Demolition Debris

4.2.1.2.4. ORC 3734 Solid and Hazardous Wastes

4.2.1.2.5. ORC 3736 Recycling, Waste Reduction, Litter Prevention

4.2.1.2.6. ORC 3741 Gasoline, Oils, Paints

4.2.1.2.7. OAC 3745 Ohio Environmental Protection Agency (related sections based on environmental media)

4.2.1.3. UNITED STATES AIR FORCE

4.2.1.3.1. AFPD 32-70 Environmental Considerations in Air Force programs and Activities

4.2.1.3.2. AFI 32-7001 Environmental Management

4.2.1.3.3. AFMAN 32-7002 Environmental Compliance and Pollution Prevention

4.2.1.3.4. AFMAN 32-7003 Environmental Conservation

4.3. DEFINITIONS

4.3.1. Contractor Generated Hazardous Waste - Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e., methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, solid debris and waste solvents.

4.3.2. Electronics Waste - Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

4.3.3. Environmental Pollution and Damage - Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

4.3.4. Environmental Protection - Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during contract activities. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

4.3.5. Hazardous Materials - Hazardous materials as defined in 49 CFR 171 and listed in 49

CFR 172: Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

4.3.6. Hazardous Waste - Hazardous Waste is any material that meets the definition of a solid waste and exhibits a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

4.3.7. Universal Waste - The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs). The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found in 40 CFR 273.

4.3.8. Land Application - Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

4.3.9. National Pollutant Discharge Elimination System (NPDES) - The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

4.3.10. Oily Waste - Oily wastes are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from the POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements. This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal.

4.3.11. Regulated Waste - Regulated wastes are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

4.3.12. Sediment - Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

4.3.13. Solid Waste - Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

4.3.14. Debris - Debris is non-hazardous solid material generated during the construction,

demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

4.3.15. Green Waste - Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

4.3.16. Non-Hazardous Waste - Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 263.

4.3.17. Recyclables - Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, wiring, insulated/non-insulated copper wire cable, wire rope, and structural components. It also includes commercial-grade refrigeration equipment with the refrigerant removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

4.3.18. Surplus Soil - Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with paragraph 3.4, HAZARDOUS WASTE MANAGEMENT.

4.3.19. Scrap Metal - This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

4.3.20. Wood - Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

4.3.21. Material not regulated as solid waste - Material not regulated as solid waste is suspended or dissolved materials in domestic sewage effluent or irrigation return flows, other regulated point source discharges, and regulated air emissions.

4.3.22. Surface Discharge - Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

4.3.23. Wastewater - Wastewater is the used water and solids from a community that flow to a treatment plant.

4.3.24. Stormwater - Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

4.3.25. Waters of the United States - Waters of the United States means federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

4.3.26. Wetlands - Wetlands are those 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.

4.4. SUBMITTALS: Government approval is required for submittals with a (G) designation. Submittals not marked are for Contractor quality control and for recordkeeping in the Environmental Management Office (CEV). Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

4.4.1. PRECONSTRUCTION SUBMITTALS: Preconstruction submittals requiring Government approval must be approved prior to commencement of work:

4.4.1.1. Preconstrucion Survey

4.4.1.2. Regulatory Notifications, (G)

4.4.1.3. Stormwater Notice of Intent, General Construction Permit (NPDES) and Stormwater Pollution Prevention Plan (SWPPP), (G)

4.4.1.4. Solid Waste Management Permit, (G)

4.4.1.5. Environmental Point of Contact (POC) Appointment

4.4.1.6. Environmental POC Qualifications

4.4.1.7. Erosion and Sediment Control Inspector Qualifications

4.4.1.8. Environmental Protection Plan, (G)

4.4.1.9. Contractor Hazardous Materials Inventory, (G)

4.4.1.10. Safety Data Sheets, (G)

4.4.2. PERIODIC SUMBITTALS: Submitted during construction at frequency specified

4.4.2.1.1. Waste Determination Report, As potential hazardous wastes are identified. (G)

4.4.2.1.2. Laboratory Analysis, As needed for waste determination. (G)

4.4.2.1.3. Copies of Hazardous Waste Manifests, When transporting hazardous wastes. (G)

4.4.2.1.4. Copies of Universal Waste Manifests and/or Bills of Lading, When transporting universal wastes. (G)

4.4.2.1.5. Sales Documentation for Recycled Materials, Monthly

4.4.2.1.6. Solid Waste Management Report, Monthly

4.4.2.1.7. Construction and Demolition Debris Reporting Form, Quarterly

4.4.2.1.8. SWPPP Reports, As required by permit

4.4.3. CLOSEOUT SUBMITTALS

4.4.3.1. Assembled Employee Training Records, (G)

4.4.3.2. Copies of all PERIODIC SUBMITTALS, (G)

4.4.3.3. HVAC Data

4.4.3.4. Stormwater Permit Notice of Termination, (G)

4.4.3.5. As Built Topographic Survey

4.5. ENVIRONMENTAL COMPLIANCE REQUIREMENTS

4.5.1. Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during performance of the contract. Plan for and provide environmental protective measures required to correct conditions developing during contract performance which may have a negative effect on the natural and cultural environment. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including air, cultural and natural resources, hazardous materials, solid waste, hazardous waste, noise, pesticides, toxic substances, and water quality.

4.5.2. FACILITY HAZARDOUS WASTE GENERATOR STATUS: Mansfield Lahm Air National Guard Base is a Small Quantity Hazardous Waste Generator. Meet the regulatory requirements of this generator designation for any work conducted within the boundaries of the Installation. Comply with provisions of federal, state, and local regulatory requirements applicable to this generator status regarding storage, handling, and disposal of construction derived wastes and training of employees.

4.5.3. Tests and procedures assessing whether construction operations comply with applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

4.5.4. LICENSES AND PERMITS: Obtain licenses and permits required for the construction of the project and in accordance with FAR 52.236-7 Permits and Responsibilities. Notify the Government of all general use permitted equipment the Contractor plans to use on site. This paragraph supplements the Contractor's responsibility under FAR 52.236-7 Permits and Responsibilities.

4.6. CONFORMANCE WITH THE ENVIRONMENTAL MANAGEMENT SYSTEM

4.6.1. Perform work under this contract consistent with the policy and objectives identified in the installation's Environmental Management System (EMS). Perform work in a manner that conforms to objectives and targets of the environmental programs and operational controls identified by the EMS. Support Government personnel when environmental compliance and EMS audits are conducted by escorting auditors at the Project site, answering questions, and providing proof of records being maintained. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the installation EMS and of how these EMS roles and responsibilities affect

work performed under the contract.

4.6.2. Coordinate with the Installation Environmental Management Office to identify training needs associated with environmental aspects and the EMS and arrange training or take other action to meet these needs. Provide training documentation to the Contracting Officer. Make EMS Awareness training completion certificates available to Government auditors during EMS audits and include the certificates in the Employee Training Records. See paragraph EMPLOYEE TRAINING RECORDS. The Installation Environmental Management Office will retain copies of associated environmental compliance records.

4.7. PRECONSTRUCTION SURVEY AND PROTECTION OF FEATURES: This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, perform a Preconstruction Survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the Contracting Officer will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

4.8. REGULATORY NOTIFICATIONS: Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer at the Preconstruction Meeting. Typically, regulatory notifications must be provided for the following (this listing is not all- inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint).

4.9. STORMWATER NOTICE OF INTENT FOR CONSTRUCTION ACTIVITIES: Submit the approved NOI and appropriate permit fees to the Ohio EPA for permit issuance. Provide a copy of the General Construction Permit to the Contracting Officer prior to commencement of work. No land disturbing activities may commence without permit coverage.

4.9.1. STORMWATER POLLUTION PREVENTION PLAN (SWPPP): Submit a project-specific SWPPP to the Contracting Officer for approval at the Preconstruction Meeting and prior to the commencement of work. The SWPPP must meet the requirements of 40 CFR 122.26 and the EPA General Permit for stormwater discharges from construction sites. Prepare the SWPPP in accordance with EPA requirements. Use the EPA guide located at http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Pollution- Prevention- Plans-for-Construction-Activities.cfm to prepare the SWPPP. Select applicable Best Management Practices (BMPs) from EPA Fact Sheets located at http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-StormWater- Run-Off- Control.cfm. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

4.10. SOLID WASTE MANAGEMENT PERMIT: Provide the Contracting Officer with written notification of the quantity of anticipated or estimated solid waste or debris generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan at the Preconstruction Meeting and before transporting wastes off Government property.

4.11. ENVIRONMENTAL POINT OF CONTACT (POC): Appoint in writing an Environmental POC for the project site and provide documentation at the Preconstruction Meeting. The Environmental POC is directly responsible for ensuring contractor compliance with federal, state, local, and installation requirements. The Environmental POC must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCBs). Include in this letter the Environmental POC's authority to direct the removal and replacement of non-conforming work. This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain all environmental records and required documentation, including environmental permits compliance and close-out.

4.12. QUALIFICATIONS: Submit Environmental POC and Erosion and Sediment Control Inspector Qualifications as defined by EPA to the Contracting Officer at the Preconstruction Meeting. Maintain any training records, certificates and qualifications on site.

4.13. ENVIRONMENTAL PROTECTION PLAN: The purpose of the EPP is to present an overview of known or potential environmental issues and preventive measures and Best management Practices (BMPs) to be implemented during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken for environmental compliance. Meet with the Contracting Officer Representative and the Environmental management Office to discuss the EPP and develop a mutual understanding relative to the details for environmental compliance and conformance. Submit the EPP at the Preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications which change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite. Send all updates to the Contracting Officer for the Installation Environmental Management Office.

4.13.1. The EPP includes, but is not limited to, the following elements:

4.13.1.1. GENERAL OVERVIEW AND PURPOSE

4.13.1.1.1. DESCRIPTIONS: A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, wastewater management plan, etc.

4.13.1.1.2. DUTIES: The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site (if applicable), and who is responsible for training the Contractor's environmental protection personnel.

4.13.1.1.3. PROCEDURES: A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site. Include the following:

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

4.13.1.1.4. COMMUNICATIONS: Communication and training procedures used to convey environmental management requirements to Contractor employees and subcontractors.

4.13.1.1.5. CONTACT INFORMATION: Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

4.13.1.2. GENERAL SITE INFORMATION

4.13.1.2.1. DRAWINGS: Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, jurisdictional wetlands, material storage areas, structures, sanitary facilities, storm drains and conveyances, and stockpiles of excess soil.

4.13.1.2.2. WORK AREA: Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

4.13.1.3. REGULATORY NOTIFICATION AND PERMITS: List what notifications and permit applications must be made. Demonstrate the permits have been obtained. The EPP will not be approved until the permits have been obtained.

4.13.1.4. PROTECTION OF HISTORICAL AND ARCHAEOLOGICAL RESOURCES

4.13.1.4.1. Objectives

4.13.1.4.2. Methods

4.13.1.5. PROTECTION OF THE ENVIRONMENT FROM WASTE DERIVED FROM CONTRACTOR OPERATIONS: This item consists of the management procedures for hazardous and non-hazardous solid waste to be generated. The elements of those procedures will coincide with the Installation Hazardous Waste Management Plan. The Contracting Officer or Contracting Officer Representative will provide a copy of the Installation Hazardous Waste Management Plan. As a minimum, include the following:

4.13.1.5.1. List of the types of non-hazardous solid wastes expected to be generated

4.13.1.5.2. Plans for the disposal of non-hazardous solid wastes and procedures for reduction of wastes, separation, recycling, and recordkeeping of disposal.

4.13.1.5.3. List of the types of hazardous wastes expected to be generated.

4.13.1.5.4. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated.

4.13.1.5.5. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications.

4.13.1.5.6. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks or containers).

4.13.1.5.7. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed).

4.13.1.5.8. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268).

4.13.1.5.9. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar.

4.13.1.5.10. Used oil management procedures in accordance with 40 CFR 279; Hazardous waste minimization procedures.

4.13.1.5.11. Procedures to be employed to ensure required employee training records are maintained.

4.13.1.6. MANAGEMENT OF NATURAL RESOURCES

4.13.1.6.1. Land resources

4.13.1.6.2. Tree protection

4.13.1.6.3. Replacement of damaged landscape features

4.13.1.6.4. Temporary construction

4.13.1.6.5. Stream crossings

4.13.1.6.6. Fish and wildlife resources

4.13.1.6.7. Wetland areas

4.13.1.7. STORMWATER MANAGEMENT AND CONTROL: A completed SWPPP satisfies this requirement.

4.13.1.8. PREVENTION OF RELEASES TO THE ENVIRONMENT: Procedures to prevent releases to the environment and notifications in the event of a release to the environment.

4.14. HAZARDOUS MATERIALS DOCUMENTATION:

4.14.1. CONTRACTOR HAZARDOUS MATERIAL INVENTORY: Submit the Government provided Contractor Hazardous Material Inventory, which provides information required by EPCRA Sections 312 and 313, to the Contracting Officer at the start and at the end of construction (30 days from final acceptance) and update no later than January 31 of each calendar year during the life of the contract. At the end of the project, provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the

amount of each material that was used during the project, and how the material was used.

4.14.2. SAFETY DATA SHEETS: Submit the correct and current SDS each hazardous material to the Contracting Officer prior to bringing the material on the installation (See Paragraph 1.4.1). Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Keep copies of the SDSs onsite.

4.15. ENVIRONMENTAL BRIEF: Attend an environmental brief to be included in the preconstruction meeting. Discuss the results of the Preconstruction Survey at this time. Provide the preconstruction submittals detailed in Paragraph 1.4.1. Prior to initiating any work on site, meet with the Contracting Officer or Contracting Officer Representative and installation Environmental Management Office to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

4.15.1. The Environmental Management Office will provide information on local requirements and procedures and training materials for compliance with the installation EMS System.

4.15.2. Prior to commencing any work under the contract the contractor shall provide all submittals listed in Paragraph 1.4.1.

4.16. EMPLOYEE TRAINING RECORDS: Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Submit these Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

4.16.1. Train personnel to meet Ohio EPA requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda:

4.16.1.1. Methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards.

4.16.1.2. Installation and care of devices vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control.

4.16.1.3. Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area.

4.17. NON-COMPLIANCE NOTIFICATIONS: The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 5. PART 2 PRODUCTS (NOT USED)

PART 6. PART 3 EXECUTION

6.1. AIR QUALITY COMPLIANCE:

6.1.1. EQUIPMENT USAGE: Equipment operation, activities, or processes will be in accordance with state air emission and performance laws and standards.

6.1.2. EPA CERTIFICATION REQUIREMENTS: Heating and air conditioning technicians must be certified through an EPA-approved program. Maintain copies of certifications at the employees' places of business; technicians must carry certification wallet cards, as provided by environmental law.

6.1.3. STATIONARY INTERNAL COMBUSTION ENGINES: Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records.

6.1.4. REFRIGERANTS: Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the Installation Environmental Management Office to determine the appropriate turn in location. Ensure data plates on all HVAC equipment are correctly and completely filled out. Provide the following information as a submittal to the Contracting Officer for the Installation Environmental Management Office's records:

6.1.4.1. Manufacturer Name

6.1.4.2. Model Number

6.1.4.3. Serial Number

6.1.4.4. Type of Refrigerant

6.1.4.5. Type of Equipment (I.E. Air Conditioner, Chiller, Air System, Water Cooler, Etc)

6.1.4.6. Equipment Category (I.E. Commercial or Comfort cooling)

6.1.4.7. Total System Charge in Pounds and Ounces

6.1.4.8. Number of Circuits and the amount of refrigerant (in lbs.) in each circuit

6.1.4.9. A photo of the completed data plates for all installed equipment

6.1.5. RELEASE OF REFRIGERANTS: Accidental venting of a refrigerant is a release and must be reported immediately to the Contracting Officer Representative.

6.1.6. FUEL FIRED BOILERS AND FURNACES: Ensure data plates on all HVAC equipment are correctly and completely filled out. Provide product data and details for new, replacement, or relocated fuel fired boilers, heaters, or furnaces to the Contracting Officer for the Installation Environmental Management Office's records. Data to be reported include:

6.1.6.1. Manufacturer Name

6.1.6.2. Model Number

6.1.6.3. Serial Number

6.1.6.4. Type of Equipment (Water Heater, Building Heat, Process)

6.1.6.5. Fuel Type (oil, natural gas, etc.)

6.1.6.6. Size (MMBTU heat input).

6.1.6.7. A photo of the completed data plates for all installed equipment

6.1.7. DUST CONTROL: Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants: the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting or dustless masonry cutting equipment will be permitted for cutting concrete blocks, concrete, and bituminous concrete.

6.1.8. COMPLIANT MATERIALS: All hazardous materials proposed for use on site must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter or limit use of specific materials as needed to meet installation permit requirements for emissions.

6.1.9. BURNING: Burning is prohibited on the Installation.

6.2. CULTURAL RESOURCES PROTECTION:

6.2.1. ARCHAEOLOGICAL RESOURCES: If, during excavation or other construction activities, any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, activities that may damage or alter such resources will be suspended and the Contracting Officer or Contracting Officer Representative shall be immediately notified so the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological resources.

6.3. HAZARDOUS MATERIALS MANAGEMENT:

6.3.1. Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. Address procedures and proper

handling of hazardous materials, including the appropriate transportation requirements.

6.3.2. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract.

6.3.3. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

6.3.4. The Contracting Officer may request documentation for any spills or releases, environmental reports, or off-site transfers.

6.4. HAZARDOUS WASTE MANAGEMENT:

6.4.1. Identify construction activities that will generate hazardous waste or debris. Provide a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

6.4.2. Provide the Contracting Officer or Contracting Officer Representative with a copy of a waste determination report for any solid waste streams having any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. As a minimum, provide a waste determination report for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials.

6.4.2.1. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g., scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Consult with the Installation Hazardous Waste Program Manager for guidance on specific requirements. Attach support documentation to the waste determination report.

6.4.2.1.1. Accomplish waste determination based on user knowledge of the processes and materials used, and analytical data when necessary.

6.4.2.1.1.1. SAMPLING AND ANALYSIS OF WASTE: Sample waste in accordance with EPA SW-846. Obtain a representative sample of the material generated for each job done to provide waste stream determination.

6.4.2.1.1.2. Clearly mark each sampled drum or container with the Contractor's identification number, and cross reference to the chemical analysis performed. For laboratory analysis, Follow the analytical procedure and methods in accordance with 40 CFR 261. Identify hazardous waste by analyzing for the following characteristics: ignitability, corrosivity, reactivity, or toxicity based on TCLP results. Provide analytical results and reports performed to the Contracting Officer or Contracting Officer Representative.

6.4.3. Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government.

6.4.4. WASTE STORAGE/SATELLITE ACCUMULATION AREAS: Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262.34 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or 1 quart for acutely hazardous wastes). Barricade the designated area where waste is being stored and post a sign identifying as follows: "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

6.4.5. HAZARDOUS WASTE DISPOSAL: Provide service necessary for the disposal of hazardous waste in accordance with 40 CFR 260, local, and state, laws and regulations, and the terms and conditions of the Contract. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

6.4.5.1. PACKAGING: Packaging must be compatible with waste contents and drums must meet DOT requirements for transportation of materials in accordance with 49 CFR 173. Contact the Installation Environmental Management Office for guidance.

6.4.5.2. LABELING: Determine the Department of Transportation's (DOT's) proper shipping names for waste (each container requiring disposal) and demonstrate to the Contracting Officer how this determination is developed and supported by the sampling and analysis requirements contained herein. Label all containers of hazardous waste with the words "Hazardous Waste" or other words to describe the contents of the container in accordance with 40 CFR 262.31 and applicable state or local regulations.

6.4.5.3. DISPOSAL DOCUMENTATION FOR HAZARDOUS AND REGULATED WASTE: Contact the Contracting Officer or Contracting Officer Representative for the facility RCRA identification number that is to be used on each manifest. Submit a copy of the applicable EPA and or state permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Submit any waste manifests in the EPA's eManifest system. The installation can no longer accept paper copies and must manage all waste manifests electronically. Provide a hazardous waste manifest to the Installation Environmental Management Office for review, approval, and signature prior to shipping waste off Government property. To obtain specific disposal instructions, coordinate with the Installation Environmental Management Office.

6.4.6. Do not bring hazardous waste onto Government property. Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property.

6.4.7. UNIVERSAL WASTE MANAGEMENT: Manage the following categories of universal waste in accordance with federal, state, and local requirements and installation instructions. Provide copies of manifest documents for the removal of universal waste to the Contracting Officer.

6.4.7.1. Batteries as described in 40 CFR 273.2.

6.4.7.2. Lamps as described in 40 CFR 273.5.

6.4.7.3. Mercury-containing equipment as described in 40 CFR 273.4.

6.4.7.3.1. Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking,

pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

6.4.8. ELECTRONICS END-OF-LIFE MANAGEMENT Recycle or dispose of electronics waste, including, but not limited to, used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements, and installation instructions.

6.4.9. MILITARY MUNITIONS: In the event military munitions, as defined in 40 CFR 260, are discovered or uncovered, immediately stop work in that area and immediately inform the Installation Fire Department.

6.4.10. INADVERTENT DISCOVERY OF CONTAMINATED SOIL OR HAZARDOUS WASTES: If contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the Contracting Officer or Contracting Officer Representative. Do not disturb this material until authorized by the Contracting Officer.

6.5. NATURAL RESOURCES PROTECTION:

6.5.1. Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the Installation Environmental Management Office, regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

6.5.2. Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work that is consistent with the requirements of the Installation Environmental Management Office or as otherwise specified.

6.5.3. Confine construction activities to within the limits of the work indicated or specified. Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence.

6.5.4. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

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

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

6.5.6.1. Tree removal is allowed only from 1 November to 31 March. Notify Contracting Officer of intent to remove trees. Only remove trees when permission is granted by the Contracting Officer.

6.5.7. Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas.

Coordinate with the Contracting Officer or Contracting Officer Representative and the Installation Environmental Management Office to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

6.5.8. Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the federal, state, and local governments. Construction of stream crossing structures must be in compliance with any required permits including, but not limited to, Clean Water Act Section 404, and Section 401 Water Quality. The Contracting Officer's approval and appropriate permits are required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work and repair the area to its original condition unless otherwise required by the Contracting Officer.

6.5.9. PREVIOUSLY USED EQUIPMENT: Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

6.6. NOISE:

6.6.1. Maximize use of low-noise emission products, as certified by the EPA. Blasting or use of explosives are not permitted. Keep construction activities under surveillance and control to minimize environmental damage by noise. Comply with the provisions of the State of Ohio.

6.7. PESTICIDES:

6.7.1. Contractor personnel are not authorized to apply pesticides on the installation. Should pesticide use be necessary, coordinate with the Contracting Officer or Contracting Officer Representative.

6.8. SOLID WASTE MANAGEMENT:

6.8.1. WASTE MINIMIZATION: Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Integrated Solid Waste Management Plan for reference material when preparing this part of the EPP.

6.8.1.1. SALVAGE, REUSE AND RECYCLE: Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, or recycling.

6.8.1.1.1. QUALIFIED RECYCLING PROGRAM (QRP): In accordance with Air Force Manual 32-7002: “Environmental Compliance and Pollution Prevention”, Paragraph 6.6.3.5, the Contractor shall participate in the installation’s Qualified Recycling Program.

6.8.1.1.1.1. Segregate the following materials generated during construction or demolition: ferrous and non-ferrous scrap metal, and scrap copper including cable and wire. Place items in separate containers apart from normal construction and demolition debris. Label containers to prevent non-QRP materials from being disposed of in the containers. Ensure security of the containers to prevent theft. Arrange for transport, or deliver QRP materials to a licensed recycler.

6.8.1.1.1.2. Obtain weight tickets, sales price, and sale amount for Environmental Management Office records.

6.8.1.1.1.3. The following forms of payment from the recycler are acceptable: Bank Drafts, Cashier's Checks and Certified Checks. Payment should be to the order of:

U.S. Treasury
Attn: 179th Environmental
1947 Harrington Memorial Rd.
Mansfield, Ohio 44903

6.8.1.1.2. Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

6.8.1.1.3. On a monthly basis' provide copies of the recycling facility's weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the recycled materials that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The sales documentation must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the SOLID WASTE DISPOSAL REPORT. Prices paid or received do not have to be reported to the Contracting Officer

6.8.2. WASTE DISPOSAL: Pick up solid wastes, and place in containers that 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. Employ segregation measures so no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

6.8.2.1. Segregate and separate treated wood components disposed at a lined landfill approved to accept this waste in accordance with local and state regulations.

6.8.2.2. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

6.8.2.3. SOLID WASTE DISPOSAL REPORT: Submit a monthly solid waste disposal report to the Contracting Officer or Contracting Officer Representative. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste. Provide copies of the waste handling facilities' weight tickets.

6.8.3. CONSTRUCTION AND DEMOLITION DEBRIS REPORTING FORM: Submit a monthly report to the Contracting Officer or Contracting Officer Representative detailing the amount and disposition of construction and demolition debris. A form for this report will be provided by the Government.

6.9. PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING: POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, and mineral oil. Describe in the EPP how POL tanks and containers must be stored, managed, and inspected and what protections must be provided.

6.9.1. Store POL products, fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States.

6.9.2. USED OIL MANAGEMENT: Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

6.9.3. OIL STORAGE INCLUDING FUEL TANKS: Provide secondary containment and overfill protection for oil storage tanks or utilize double-walled tanks with overfill protection. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present. Provide a spill response kit with materials needed to respond to any minor spill or leak form the container or during product transfer. For the purposes of this section, a minor spill is defined as a spill not exceeding 5 gallons of product.

6.9.4. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover drip pans during inclement weather.

6.10. RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES:

6.10.1. RESPONSE AND NOTIFICATIONS: Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release.

6.10.2. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Installation Fire Department and the Contracting Officer or Contracting Officer Representative. Submit verbal and written notifications as required by 40 CFR 300.125 and 40 CFR 355, state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days.

6.10.3. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government. Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

6.11. WATER QUALITY COMPLIANCE:

6.11.1. STORM WATER:

6.11.1.1. Do not discharge storm water from construction sites to the sanitary sewer. If the water is noted or suspected of being contaminated, it cannot be released to the storm drain system.

6.11.1.2. Under the terms and conditions of the Construction General Permit: install, inspect, maintain BMPs, prepare storm water erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain construction operations in compliance with the terms and conditions of the general permit. Comply with terms of the EPA general permit for storm water discharges from construction activities. Submit Inspection Reports to the Contracting Officer or Contracting Officer Representative in accordance with the Permit.

6.11.1.2.1. Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable. Erosion control inspection reports may be compiled as part of a storm water pollution prevention plan inspection reports. Prevent erosion by mulching, Compost Blankets, Geotextiles, or temporary slope drains. Stabilize slopes by sodding, seeding, or combination of these methods necessary for effective erosion control. Use of hay bales is prohibited.

6.11.1.2.2. Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment laden runoff. Include the following devices: silt fence, temporary diversion dikes, and storm drain inlet protection.

6.11.1.2.3. Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

6.11.1.3. STORM WATER NOTICE OF TERMINATION FOR CONSTRUCTION ACTIVITIES: submit the Notice of Termination to the appropriate state or federal agency once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Prepare as-built topographic survey information required by the permitting agency for certification of the stormwater management system. Submit the completed Notice of Termination to the Contracting Officer.

6.11.2. SURFACE AND GROUND WATER:

6.11.2.1. Construction operations for dewatering, removal of cofferdams, tailrace excavation, and tunnel closure must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body. Comply with the State of Ohio water quality standards and anti-degradation provisions and the Clean Water Act Section 404.

6.11.2.2. Do not discharge excavation ground water to the sanitary sewer, storm drains, or to surface waters. Discharge of hazardous substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

6.11.2.3. If the construction dewatering is noted or suspected of being contaminated, it cannot be released to the storm drain system. Discharge of hazardous substances will not be permitted under any circumstances.

6.11.2.4. Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States.

6.11.3. WASTE WATER:

6.11.3.1. Do not allow waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter water ways. Dispose of the construction- related waste water off-Government property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

6.11.4. SURFACE DISCHARGE: For discharge of ground water, obtain a state or federal permit specific for pumping and discharging ground water prior to surface discharging. Surface discharge in accordance with federal, state, and local laws and regulations.

6.11.5. LAND APPLICATION: Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing must be land-applied in accordance with federal, state, and local laws and regulations for land application or discharged into the sanitary sewer with prior approval and notification to the Wastewater Treatment Plant's Operator.

6.12. STORAGE CONTAINERS: Any containers with a capacity of 55 Gallons or more must be clearly and properly labelled with the container contents, any hazards associated with the product. and all labels, placards, and markings required by Federal and State regulations.

6.13. POST CONSTRUCTION CLEANUP: Clean up areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform to surrounding contours. Seed or sod areas where vegetation has been removed, cut, or trampled.

6.14. ENVIRONMENTAL RECORDS: Maintain environmental records on-site and submit at the completion of the project. Make separate parts that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

END OF SECTION 01 57 19

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1. GENERAL

1.1. SUBMITTALS FOR THIS SECTION: NONE

1.2. COMMON PRODUCT REQUIREMENTS

1.2.1. Owner-Furnished Products: The following items are furnished by the Government and installed by the Contractor:

1.2.1.1. None

1.2.2. The following items are furnished and installed by Government:

1.2.2.1. None.

1.3. PRODUCT OPTIONS

1.3.1. Product Approval Standards

1.3.1.1. Definitions:

1.3.1.1.1. The term "product" shall include material, equipment, assembly methods, manufacturer, brand, trade name, or other description.

1.3.1.2. Proof of Compliance:

1.3.1.2.1. Whenever the Contract Documents require a product be in accordance with federal specification, ASTM designation, ANSI specification, or other association standard, the Contractor shall present an affidavit from the manufacturer certifying the product complies therewith. Where requested or specified, submit supporting test data to substantiate compliance.

1.3.1.3. Inclusion in Specifications of Non-specified Products Prior to Bid Date:

1.3.1.3.1. For inclusion of products other than those specified, Bidders shall submit a request in writing at least (7) days prior to bid date. Requests received after this time will not be reviewed or considered regardless of cause. Requests shall clearly define and describe the product for which inclusion is requested. Inclusion by the Contracting Officer's Representative will be in the form of an addendum to the Specifications issued to all contract bidders on record.

1.4. PRODUCT DELIVERY REQUIREMENTS

1.4.1. Product Delivery Requirements

1.4.1.1. Materials, products, and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and delivery.

1.4.1.2. More detailed requirements for transportation and delivery are specified under the technical sections.

1.5. PRODUCT STORAGE AND HANDLING REQUIREMENTS

1.5.1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.

1.5.2. Available storage space at the job site is limited to the site shown on the Drawings. Allocate such space for storage purposes. Any additional off-site space required is the responsibility of the Contractor.

1.5.3. Allocate the available storage areas and coordinate their use by the trades on the job. Maintain a current layout of all storage facilities.

1.5.4. Store and protect materials delivered at the site from damage. Do not use damaged material on the work.

1.5.5. Do not store or place materials in passageways, stairs, or other means of egress.

1.5.6. Where existing equipment and/or fixtures are indicated to be reused, repair such equipment and/or fixtures and refinish to put in perfect working order. Refinish as directed.

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1. GENERAL

1.1. SUBMITTALS REQUIRED FOR THIS SECTION

1.1.1. Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or “S” classification are for information only. Submit the following in accordance with Section 01 33 00 SUPPLEMENTAL SUBMITTAL PROCEDURES

1.1.1.1. SD-11 Closeout Submittals

1.1.1.1.1. Operations and Maintenance Data

1.1.1.1.2. Warranties

1.1.1.1.3. Project Record Documents

1.1.1.1.4. Real Property Cost Information

1.2. EXAMINATION AND PREPARATION

1.2.1. Acceptance of Conditions

1.2.1.1. The contractor shall not exceed the scope of work without prior approval from the Contracting Officer.

1.2.1.2. The Contracting Officer or his Representative will in no case assume the responsibility for any layout of the work or damages to existing underground utilities while performance of work is underway.

1.2.2. Protection of Adjacent Construction

1.2.2.1. The contractor shall protect all government property from damage. Any damages incurred in pursuance of this project shall be replaced and/or restored to original condition.

1.3. FIELD ENGINEERING

1.3.1. Construction Layout

1.3.1.1. The Contractor is responsible for properly laying out the work, and for lines and measurements for the work executed under the Contract Documents.

1.3.2. Construction Survey

1.3.2.1. The Contractor, NOT the Government, is responsible to field verify all existing underground utilities within the excavation limits and/or as shown on the Drawings and the conditions of the work site, before laying out the work. The Contractor is to report errors or inaccuracies in writing to the Contracting Officer's Representative before commencing work.

1.4. CLEANING AND WASTE MANAGEMENT

1.4.1. Progress Cleaning

1.4.1.1. The premises and job site shall be maintained in a reasonably neat and orderly condition, kept free from accumulations of waste materials and rubbish during entire construction period. Remove crates, cartons, other flammable waste materials, and trash from these areas as the work progresses, upon completion of each trades work, or at the end of each working day.

1.4.1.2. All trash, waste, and construction debris generated from this project shall become property of the contractor and shall be removed from the base. The disposal of these materials shall follow the appropriate Federal and State laws. This includes the disposal or recycling of hazardous materials

1.5. SITE MAINTENANCE

1.5.1. Care shall be taken by workmen not to mark, soil, or otherwise deface adjacent existing surfaces and/or new finished surfaces. In the event that existing surfaces and/or new finished surfaces become defaced, clean the surfaces from dirt, grease, loose paint, and so on, and restore surfaces to their original or finished condition.

1.6. FINAL CLEANING

1.6.1. Upon completion of the work, remove temporary buildings and structures, fences, scaffolding, surplus materials, and rubbish of every kind from the site of the work.

1.7. STARTING AND ADJUSTING

1.7.1. Checkout Procedures

1.7.1.1. Specific requirements and procedures for starting systems; testing, adjusting, and balancing; and demonstration of systems should be included in the division where the system is specified.

1.8. CLOSEOUT PROCEDURES

1.8.1. Final Closeout Review

1.8.1.1. Although any item found to be faulty may be rejected before it is used, final acceptance of an item by the Government is based on its satisfactory incorporation into the work and acceptance of the completed project.

1.9. CLOSEOUT SUBMITTALS

1.9.1. **[SD-11]** Operation and Maintenance Data: Prior to final payment in accordance with provisions of the General Conditions and before issuance of final certificate for payment, file the following papers with the Contracting Officer's Representative.

1.9.1.1. Operation and Maintenance Manuals:

1.9.1.1.1. Furnish (2) complete sets of manuals containing manufacturer's instructions for maintenance and operation of each item of equipment and apparatus furnished under the Contract and any additional data specifically required under various sections of the Specifications.

1.9.1.1.2. Arrange manuals in proper order, indexed and suitably bound.

1.9.1.1.3. Certify by endorsement thereon, each manual, as complete and accurate.

1.9.1.1.4. Assemble these manuals for all divisions of work, review for completeness, and submit them to the Contracting Officer's Representative.

1.9.1.1.5. Provide suitable transfer cases and deliver manuals therein, indexed and marked, for each division of work.

1.9.2. **[SD-11]** Warranties: Prior to final payment in accordance with provisions of the General Conditions and before issuance of final certificate for payment, file the following papers with the Contracting Officer's Representative.

1.9.2.1. Warranties: Required warranty and any other extended warranties stated in the technical sections of the Specifications.

1.9.2.2. Release or Waiver of Liens: As required.

1.9.3. **[SD-11]** Project Record Documents: Prior to final payment in accordance with provisions of the General Conditions and before issuance of final certificate for payment, file the following papers with the Contracting Officer’s Representative.

1.9.3.1. Project Record Documents:

1.9.3.1.1. As the work progresses keep a complete and accurate record of changes or deviations from the Contract Documents and shop drawings, indicating work as actually installed.

1.9.3.1.2. Changes shall be neatly and correctly shown on the respective portion of the affected document, using prints of the Drawings affected, or the Specifications, with appropriate supplementary notes.

1.9.3.1.2.1. This record set Drawings, shop drawings, and Specifications shall be kept at the job site for inspection by the Contracting Officer’s Representative.

1.9.3.1.2.2. These records shall be arranged in order, in accordance with the various sections of the Specifications, and properly indexed.

1.9.3.1.2.3. At the completion of work, certify by endorsement thereof, each revised print of the Drawings and Specifications as complete and accurate.

1.9.3.1.2.4. Prior to application for final payment, and as a condition to its approval by the Contracting Officer’s Representative, deliver record Drawings and Specifications, arranged in proper order, indexed, and endorsed as hereinbefore specified.

1.9.3.1.2.5. Provide suitable transfer cases and deliver the records therein, indexed and marked for each division of the work.

1.9.3.1.2.6. No review or receipt of such records by the Contracting Officer’s Representative shall be a waiver of any deviation from the Contract Documents or shop drawings or in any way relieve the Contractor from his responsibility to perform work in accordance with the Contract Documents and shop drawings to the extent they are in accordance with the Contract Documents.

1.9.4. **[SD-11]** Real Property Cost Information:

1.9.4.1. Submit information on costs of various components of the project to be used to complete ANG Real Property documents.

1.9.4.2. The format for the information will be provided by the Contracting Officer.

1.10. EXTRA STOCK MATERIALS

1.10.1. Any residual materials furnished by the Government or by the Contractor shall be returned into the Base Civil Engineer upon contract completion, except hazardous materials and hazardous waste. These items must be disposed of by the Contractor.

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION 01 70 00

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1. GENERAL

1.1. RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.1.2. Section 01 57 19 of this Specification: In case of conflicts between the requirements of Section 01 57 19 and this Section, the more restrictive requirements shall govern.

1.2. REFERENCES

1.2.1. 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.

1.2.1.1. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

1.2.1.1.1. EPA SW-846 (Third Edition; Update IV) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

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

1.2.1.2.1. 40 CFR 241 Guidelines for Disposal of Solid Waste

1.2.1.2.2. 40 CFR 243 Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste

1.2.1.2.3. 40 CFR 258 Subtitle D Landfill Requirements

1.2.1.2.4. 40 CFR 273 Standards for Universal Waste Management

1.2.1.2.5. 40 CFR 273.2 Standards for Universal Waste Management – Batteries

1.2.1.2.6. 40 CFR 273.3 Standards for Universal Waste Management – Pesticides

1.2.1.2.7. 40 CFR 273.4 Standards for Universal Waste Management - Mercury Containing Equipment

1.2.1.2.8. 49 CFR 173 Shippers - General Requirements for Shipments and Packagings

1.2.1.2.9. 49 CFR 178 Specifications for Packagings

1.2.1.3. UNITED STATES AIR FORCE

1.2.1.3.1. AFMAN 32-7002 Environmental Compliance and Pollution Prevention

1.3. DEFINITIONS

1.3.1. Co-mingle -The practice of placing unrelated materials together in a single container, usually for benefits of convenience and speed.

1.3.2. Construction Waste - Waste generated by construction activities, such as scrap materials, damaged or spoiled materials, temporary and expendable construction materials, and other waste generated by the workforce during construction activities.

1.3.3. Demolition Debris/Waste - Waste generated from demolition activities, including minor incidental demolition waste materials generated as a result of Intentional dismantling of all or portions of a building, to include clearing of building contents that have been destroyed or damaged.

1.3.4. Diversion - The practice of diverting waste from disposal in a landfill, by means of eliminating or minimizing waste, or recycling/reuse of materials.

1.3.5. Final Construction Waste Diversion Report - A written assertion by a material recovery facility operator identifying constituent materials diverted from disposal, usually including summary tabulations of materials, weight in short-ton.

1.3.6. Landfill - Depositing waste in a solid waste disposal facility, usually a managed landfill, regulated in the US under the Resource Conservation and Recovery Act (RCRA).

1.3.7. Recycling - The series of activities, including collection, separation, and processing, by which products or other materials are diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products sold or distributed in commerce, or the reuse of such materials as substitutes for goods made of virgin materials, other than fuel.

1.3.8. Reuse - The use of a product or materials again for the same purpose, in its original form or with little enhancement or change.

1.3.9. Salvage - Usable, salable items derived from buildings undergoing demolition or deconstruction, parts from vehicles, machinery, other equipment, or other components.

1.3.10. Source Separation - The practice of administering and implementing a management strategy to identify and segregate unrelated waste at the first opportunity.

1.4. SUBMITTALS: Government approval is required for submittals with a (G) designation. Submittals not marked are for Contractor quality control and for recordkeeping in the Environmental Management Office (CEV). Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1.4.1. PRECONSTRUCTION SUBMITTALS

1.4.1.1. Construction Waste Management Plan In accordance with the Environmental Protection Plan. Refer to Section 01 57 19, (G)

1.4.2. PERIODIC SUMBITTALS: Submitted during construction at frequency specified

1.4.2.1. Construction and Demolition Debris Reporting Form, Quarterly

1.5. CONSTRUCTION WASTE MANAGEMENT: Implement a construction waste management program for the project. Take a pro-active, responsible role in the management of construction waste, recycling process, disposal of demolition debris/waste, and require all subcontractors, vendors, and suppliers to participate in the construction waste management program. Establish a process for clear tracking, and documentation of construction waste and demolition debris/waste.

1.5.1. Construction waste and demolition debris/waste materials include un-used construction materials not incorporated in the final work, as well as demolition debris/waste materials from demolition activities or deconstruction activities. In the management of waste,

consider the availability of viable markets, the condition of materials, the ability to provide material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates.

1.5.2. Develop and document how the construction waste management program will be implemented in a Construction Waste Management Plan as part of the Environmental Protection Plan (see SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS). The Construction Waste Management Plan will be approved by the Contracting Officer in accordance with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. include the following in the plan:

1.5.3. Identify solid waste diversion goals for the project. At least 60% by weight of the project construction waste and demolition debris/waste shall be diverted from landfills.

1.5.4. Identify the names of individuals responsible for waste management and waste management tracking, along with roles and responsibilities on the project.

1.5.5. Delineate waste streams and characterization, including estimated material types and quantities of waste, in the plan. Manage all waste streams associated with the project. Typical waste streams are listed below. Include additional waste steams not listed:

1.5.5.1. Land Clearing Debris

1.5.5.2. Asphalt

1.5.5.3. Masonry and CMU Concrete

1.5.5.4. Metals (e.g., banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze, etc.)

1.5.5.5. Wood (nails and staples allowed)

1.5.5.6. Glass

1.5.5.7. Paper

1.5.5.8. Plastics (PET, HDPE, PVC, LDPE, PP, PS, Other)

1.5.5.9. Gypsum

1.5.5.10. Non-hazardous paint and paint cans

1.5.5.11. Carpet

1.5.5.12. Ceiling Tiles

1.5.5.13. Insulation

1.5.5.14. Beverage Containers

1.5.6. List actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

1.5.7. List each supplier who will deliver construction materials, in bulk, or package products in returnable containers or returnable packaging, or have take-back programs. List each program and the applicable material to actively monitor and track to assist in meeting waste diversion requirements on the project.

1.5.8. List of specific materials, by type and quantity that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled.

1.5.9. Identify the recycling facilities by name, address, and phone number and a description of the means of transportation of the recyclable materials. Ensure firms and facilities used for recycling, reuse, and disposal are permitted for the intended use to the extent required by federal, state, and local regulations. Facilities or subcontractors offering construction waste transport on-site or off-site must ensure that proper shipping orders, bill of lading, manifests, or other shipping documents containing waste diversion information meet requirements of 40 CFR 273 Universal Waste Management, 49 CFR 173 Shippers - General Requirements for Shipments and Packagings, and 49 CFR 178 Specifications for Packaging. Individuals signing manifests or other shipping documents should meet the minimum training requirements.

1.5.10. QUALIFIED RECYCLING PROGRAM (QRP): In accordance with Air Force Manual 32-7002: “Environmental Compliance and Pollution Prevention”, Paragraph 6.6.3.5, the Contractor shall participate in the installation’s Qualified Recycling Program.

1.5.10.1. Segregate the following materials generated during construction or demolition: ferrous and non-ferrous scrap metal, and scrap copper including cable and wire. Place items in separate containers apart from normal construction and demolition debris. Label containers to prevent non-QRP materials from being disposed of in the containers. Ensure security of the containers to prevent theft. Arrange for transport, or deliver QRP materials to a licensed recycler.

1.5.10.2. Obtain weight tickets, sales price, and sale amount for Environmental Management Office records.

1.5.10.3. The following forms of payment from the recycler are acceptable: Bank Drafts, Cashier’s Checks and Certified Checks. Payment should be to the order of:

U.S. Treasury
Attn: 179th Environmental
1947 Harrington Memorial Rd.
Mansfield, Ohio 44903

1.5.11. Identification of local and regional re-use programs, including non-profit organizations such as schools, local housing agencies, and organization that accept used materials such as material exchange networks and resale stores. Include the name, location, phone number for each re-use facility identified, and provide a copy of the permit or license for each facility.

1.5.12. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of materials. Provide information on the means by which any solid waste materials, whether for disposal or recycling will be protected from contamination and whether materials will be site-separated and self- hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site

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

1.5.14. Provide the name of the landfill to be used and identify any local jurisdiction requirements for waste management. Include those requirements, points of contact, etc.

1.5.15. Copy of training plan for subcontractors and other services to prevent contamination by co-mingling materials identified for diversion and waste materials.

1.5.16. Description of the regular meetings to be held to address waste management.

1.5.17. An approved construction waste management plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement.

1.5.18. Ensure all subcontractors, and the Quality Control Manager, Environmental POC, and the Contracting Officer receive a copy of the approved Construction Waste Management Plan. The plan demonstrates how to meet the project waste diversion requirement.

1.6. MEETINGS: Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer or Contracting Officer Representative to discuss the proposed Construction Waste Management Plan (in conjunction with the Environmental Protection Plan) and to develop a mutual understanding relative to the management of the construction waste management program and how waste diversion requirements will be met. At a minimum, discuss and document waste management goals at the Preconstruction Meeting, Regular Quality Control meetings. And the Work Safety Meeting (if applicable).

1.7. OVERSIGHT: The Environmental POC, as specified in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project.

1.8. RECORDS (DOCUMENTATION): Maintain records to document the types and quantities of waste generated and diverted though re-use, recycling and/or sale to third parties; or through disposal to a landfill or incinerator facility. Report monthly utilizing the Construction Demolition and Debris Reporting Form provided by the Government (See Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS) Provide explanations for any materials not recycled, reused or sold. Collect and retain manifests, weight tickets, sales receipts, and invoices specifically identifying diverted project waste materials or disposed materials.

1.9. FINAL CONSTRUCTION WASTE DIVERSION REPORT: A Final Construction Waste Diversion Report is required at the end of the project. Provide Final Construction Waste Diversion Report 60 days prior to the Beneficial Occupancy Date (BOD). The final Construction Waste Diversion Report must be included in the Sustainability eNotebook in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

PART 2. PART 2 PRODUCTS (NOT USED)

PART 3. PART 3 EXECUTION

3.1. Execute demolition or deconstruction activities in accordance with Section 02 41 00 DEMOLITION. Manage demolition debris/waste or deconstruction materials in accordance with the approved construction waste management plan.

3.2. CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE) Divert a minimum of 60 percent by weight of the project construction waste and demolition debris/waste from landfills. Follow applicable industry standards in the management of waste. Apply sound environmental principles in the management of waste. (1) Practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction waste and demolition debris/waste from landfills and incinerators and to facilitate the recycling or reuse of excess construction materials.

3.2.1. Provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the projects. Train subcontractors and other service providers to either separate waste streams or use the co-mingling method as described in the Construction Waste Management Plan.

3.3. COLLECTION: Collect, store, protect, and handle reusable and recyclable materials at the site in a manner which prevents contamination, and provides protection from the elements to preserve their usefulness and monetary value. Provide receptacles and storage areas designated specifically for recyclable and reusable materials and label them clearly and appropriately to prevent contamination from other waste materials. Keep receptacles or storage areas neat and clean.

3.3.1. Separate materials by one of the following methods described herein:

3.3.1.1. SOURCE SEPARATION METHOD: Separate waste products and materials that are recyclable from trash and sort as described below into appropriately marked separate containers and then transport to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the category types as defined in the Construction Waste Management Plan.

3.3.1.2. CO-MINGLED METHOD: Place waste products and recyclable materials into a single container and then transport to an authorized recycling facility, which meets all applicable requirements to accept and dispose of recyclable materials in accordance with all applicable local, state and federal regulations. The Co-mingled materials must be sorted and processed in accordance with the approved Construction Waste management Plan.

3.4. DISPOSAL: Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the specifications, dispose of waste in the priority listed:

3.4.1. REUSE: Give first consideration to reusing construction and demolition materials as a disposition strategy. Recover for reuse materials, products, and components as described in the approved Construction Waste Management Plan. Coordinate with the Contracting Officer or Contracting Officer Representative to identify onsite reuse opportunities or material sales or donation available through Government resale or donation programs. Sale of recovered materials is not allowed on the Installation.

3.4.2. RECYCLE: Recycle non-hazardous construction and demolition/debris materials that are not suitable for reuse. Track rejection of contaminated recyclable materials by the recycling facility. Rejected recyclables materials will not be counted as a percentage of diversion calculation. Recycle all fluorescent lamps, HID lamps, mercury (Hg) -containing thermostats and ampoules, and PCBs-containing ballasts and electrical components as directed by the Contracting Officer. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements.

3.4.2.1. QUALIFIED RECYCLING PROGRAM (QRP): In accordance with Air Force Manual 32-7002: “Environmental Compliance and Pollution Prevention”, Paragraph 6.6.3.5, the Contractor shall participate in the installation’s Qualified Recycling Program.

3.4.2.1.1. Segregate the following materials generated during construction or demolition: ferrous and non-ferrous scrap metal, and scrap copper including cable and wire. Place items in separate containers apart from normal construction and demolition debris. Label containers to prevent non-QRP materials from being disposed of in the containers. Ensure security of the containers to prevent theft. Arrange for transport, or deliver QRP materials to a licensed recycler.

3.4.2.1.2. Obtain weight tickets, sales price, and sale amount for Environmental Management Office records.

3.4.2.1.3. The following forms of payment from the recycler are acceptable: Bank Drafts, Cashier's Checks and Certified Checks. Payment should be to the order of:

U.S. Treasury
Attn: 179th Environmental
1947 Harrington Memorial Rd.
Mansfield, Ohio 44903

3.4.3. COMPOST: Richland County, Ohio manages a composting facility South of the installation. Composting on the installation is not allowed. Compostable materials include plant materials and sawdust. Composting as a strategy must be explicitly addressed in the Construction Waste Management Plan to ensure it is feasible.

3.4.4. LANDFILL: Dispose by landfill only those waste materials with no practical use, economic benefit, or recycling opportunity.

3.5. HAZARDOUS MATERIALS/HAZARDOUS WASTE: Handle hazardous materials and hazardous waste in accordance with applicable regulations and coordinate with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

END OF SECTION 01 74 19

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.1.2. Testing, adjusting, and balancing (TAB) of heating, ventilating and air conditioning (HVAC) systems. TAB includes the following:

1.1.2.1. Planning systematic TAB procedures.

1.1.2.2. Design Review Report.

1.1.2.3. Systems Inspection Report.

1.1.2.4. Duct Air Leakage Test Report.

1.1.2.5. Systems Readiness Report.

1.1.2.6. Balancing air and water distribution systems; adjustment of total system to provide design performance; and testing performance of equipment and automatic controls.

1.1.2.7. Vibration and sound measurements.

1.1.2.8. Recording and reporting results.

1.1.2.9. Document critical paths of flow on reports.

1.1.3. Definitions:

1.1.3.1. Basic TAB used in this Section: Chapter 39, "Testing, Adjusting and Balancing" of ASHRAE Handbook "HVAC Applications".

1.1.3.2. TAB: Testing, Adjusting and Balancing; the process of checking and adjusting HVAC systems to meet design objectives.

1.1.3.3. AABC: Associated Air Balance Council.

1.1.3.4. NEBB: National Environmental Balancing Bureau.

1.1.3.5. TABB: Testing Adjusting and Balancing Bureau.

1.1.3.6. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.1.3.7. Hydronic Systems: Includes chilled water, condenser water, heating hot water, and glycol-water systems.

1.1.3.8. Air Systems: Includes all outside air, supply air, return air, exhaust air and relief air systems.

1.1.3.9. Flow Rate Tolerance: The allowable percentage variation, minus to plus, of actual flow rate from values (design) in the contract documents.

1.2. RELATED WORK

Section 01 00 00, GENERAL REQUIREMENTS.
Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.
Section 23 07 11, HVAC AND BOILER PLANT INSULATION.
Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
Section 23 31 00, HVAC DUCTS AND CASINGS.
Section 23 36 00, AIR TERMINAL UNITS.
Section 23 64 00, PACKAGED WATER CHILLERS.

1.3. APPLICABLE PUBLICATIONS: The following publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the ANG standards will govern.

1.3.1. AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS, INC. (ASHRAE)

1.3.1.1. //2019// ASHRAE Handbook – HVAC Applications, Chapter 39, Testing, Adjusting, and Balancing and Chapter 49, Noise and Vibration Control

1.3.2. ASSOCIATED AIR BALANCE COUNCIL (AABC)

1.3.2.1. //2016// National Standards for Total System Balance, 7th Edition

1.3.3. NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

1.3.3.1. //2019// Procedural Standard for Testing, Adjusting, and Balancing of Environmental Systems, 9th Edition

1.3.3.2. //2015// Procedural Standard for the Measurement of Sound and Vibration, 2nd Edition

1.3.3.3. S110-//2019// Whole Building Technical Commissioning of New Construction, 2nd Edition

1.3.4. SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)

1.3.4.1. //2002// HVAC Systems Testing, Adjusting and Balancing, 3rd Edition

1.3.4.2. //2003// TAB Procedural Guide 1st Edition

1.4. SUBMITTALS

1.4.1. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.4.2. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC”, with applicable paragraph identification.

1.4.3. Submit names and qualifications of TAB agency and TAB Specialists within 60 days after the notice to proceed. Submit information on three recently completed projects and a list of proposed test equipment.

1.4.4. For use by the COR staff, submit one complete set of applicable AABC, NEBB or TABB publications that will be the basis of TAB work.

1.4.5. Submit the following for review and approval:

1.4.5.1. Design Review Report //within 90 days for conventional design projects// //within 60 days for design-build projects// after the system layout on air and water side is completed by the Contractor.

1.4.5.2. Systems inspection report on equipment and installation for conformance with design.

1.4.5.3. Duct Air Leakage Test Report.

1.4.5.4. Systems Readiness Report.

1.4.5.5. Intermediate and Final TAB reports covering flow balance and adjustments, performance tests, vibration tests and sound tests.

1.4.5.6. Include in final reports uncorrected installation deficiencies noted during TAB and applicable explanatory comments on test results that differ from design requirements.

1.4.5.7. Include in each report the critical path for each balanced branch (air and hydronic). Every branch shall have at least one terminal device damper 100 percent open.

1.4.6. Prior to request for Final or Partial Final inspection, submit completed Test and Balance report for the area with noted critical paths.

1.5. QUALITY ASSURANCE

1.5.1. Refer to paragraphs QUALITY ASSURANCE and SUBMITTALS, in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.5.2. Qualifications:

1.5.2.1. TAB Agency: The TAB agency shall be a subcontractor of the General Contractor and shall report to and be paid by the General Contractor.

1.5.2.2. The TAB agency shall be either a certified member of AABC, NEBB, or TABB to perform TAB service for HVAC, water balancing and vibrations and sound testing of equipment. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the agency loses subject certification during this period, the General Contractor shall immediately notify the COR and submit another qualified TAB firm for approval. Any agency that has been the subject of disciplinary action by either the AABC, TABB or NEBB within the five (5) years preceding Contract Award shall not be eligible to perform any work related to the TAB. All work performed in this Section and in other related Sections by the TAB agency shall be considered invalid if the TAB agency loses its certification prior to Contract completion, and the successor agency's review shows unsatisfactory work performed by the predecessor agency.

1.5.2.3. TAB Specialist: The TAB Specialist shall be either a member of AABC or TABB or an experienced technician of the Agency certified by NEBB. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the Specialist loses subject certification during this period, the General Contractor shall immediately notify the COR and submit another TAB Specialist for approval. Any individual that has been the subject of disciplinary action by either the AABC or the NEBB within the five (5) years preceding Contract Award shall not be eligible to perform any duties related to the HVAC systems, including TAB. All work specified in this Section and in other related Sections performed by the TAB Specialist shall

be considered invalid if the TAB Specialist loses its certification prior to Contract completion and shall be performed by an approved successor.

1.5.2.4. TAB Specialist shall be identified by the General Contractor within sixty (60) days after the Notice to Proceed. The TAB Specialist will be coordinating, scheduling, and reporting all TAB work and related activities and will provide necessary information as required by the COR. The responsibilities shall specifically include:

1.5.2.4.1. Directly supervising all TAB work.

1.5.2.4.2. Sign the TAB reports that bear the seal of the TAB standard. The reports shall be accompanied by report forms and schematic drawings required by the TAB standard, AABC, TABB or NEBB.

1.5.2.4.3. Following all TAB work through its satisfactory completion.

1.5.2.4.4. Providing final markings of settings of all HVAC adjustment devices.

1.5.2.4.5. Permanently mark location of duct test ports.

1.5.2.4.6. Documenting critical paths from the fan or pump. These critical paths are ones in which are 100 percent open from the fan or pump to the terminal device. This will show the least amount of restriction is being imposed on the system by the TAB firm.

1.5.2.4.7. All TAB technicians performing actual TAB work shall be experienced and shall have done satisfactory work on a minimum of three (3) projects comparable in size and complexity to this project. Qualifications shall be certified by the TAB agency in writing. The lead technician shall be certified by AABC, TABB or NEBB.

1.5.3. Test Equipment Criteria: The instrumentation shall meet the accuracy/calibration requirements established by AABC National Standards, TABB/SMACNA International Standards, or by NEBB Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems and instrument manufacturer. Provide calibration history of the instruments to be used for test and balance purpose. All equipment shall remain in calibration, or be re-calibrated if certification expires, during the TAB procedures.

1.5.4. TAB Criteria:

1.5.4.1. One or more of the applicable AABC, NEBB, TABB or SMACNA publications, supplemented by Chapter 39, "Testing, Adjusting and Balancing" of ASHRAE Handbook "HVAC Applications" and requirements stated herein shall be the basis for planning, procedures, and reports.

1.5.4.2. Flow Rate Tolerance: Following tolerances are allowed. For tolerances not mentioned herein follow Chapter 39, "Testing, Adjusting and Balancing" of ASHRAE Handbook "HVAC Applications" as a guideline. Air Filter resistance during tests, artificially imposed, if necessary, shall be at least 100 percent of manufacturer recommended change over pressure drop values for pre-filters and after-filters.

1.5.4.2.1. Air handling unit and all other fans, cubic meters/min (cubic feet per minute): Minus 5 percent to plus l0 percent.

1.5.4.2.2. Air Terminal Units (maximum values): Minus 5 percent to plus l0 percent

1.5.4.2.3. Exhaust Hoods/Cabinets: 0 percent to plus l0 percent.

1.5.4.2.4. Minimum Outside Air: 0 percent to plus 10 percent.

1.5.4.2.5. Individual room air outlets and inlets, and air flow rates not mentioned above: Minus 5 percent to plus l0 percent except if the air to air space is 100 CFM or less the tolerance will be minus 5 to plus 5 percent.

1.5.4.2.6. Heating Hot Water Pumps and Hot Water Coils: Minus 5 percent to plus 5 percent.

1.5.4.2.7. Chilled Water and Condenser Water Pumps: Minus 5 percent to plus 5 percent.

1.5.4.2.8. Chilled Water Coils: Minus 5 percent to plus 5 percent.

1.5.4.3. Systems shall be adjusted for energy efficient operation as described in PART 3.

1.5.4.4. Typical TAB procedures and critical path results shall be demonstrated to the COR for one air distribution system (including all fans, 3 terminal units, 3 rooms randomly selected by the COR, one of which shall be a critical path) and 1 hydronic system (pumps and 3 coils) as follows:

1.5.4.4.1. When field TAB work begins.

1.5.4.4.2. During each partial final inspection and the final inspection for the project if requested by VA.

PART 2. PRODUCTS

2.1. PLUGS

2.1.1. Provide plastic plugs to seal holes drilled in ductwork for test purposes.

2.2. INSULATION REPAIR MATERIAL

2.2.1. See Section 23 07 11, HVAC and BOILER PLANT INSULATION. Provide for repair of insulation removed or damaged for TAB work.

PART 3. EXECUTION

3.1. GENERAL

3.1.1. Refer to TAB Criteria in Paragraph QUALITY ASSURANCE.

3.1.2. Obtain applicable contract documents and copies of approved submittals for HVAC equipment and automatic control systems.

3.2. DESIGN REVIEW REPORT

3.2.1. The TAB Specialist shall review the contract documents and advise the COR of any design deficiencies that would prevent the HVAC systems from effectively operating in accordance with the sequence of operation specified or prevent the effective and accurate TAB of the system. The TAB Specialist shall provide a report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation.

3.3. SYSTEMS INSPECTION REPORT

3.3.1. Inspect equipment and installation for conformance with design.

3.3.2. The inspection and report shall be done after air distribution //and hydronic// equipment is onsite and duct //and piping// installation has begun, but well in advance of performance testing and balancing work. The purpose of the inspection is to identify and report deviations from design and ensure that systems will be ready for TAB at the appropriate time.

3.3.3. Reports: Follow checklist format developed by AABC, NEBB or SMACNA (TABB), supplemented by narrative comments, with emphasis on air-handling units and fans. Check for conformance with submittals. Verify that diffuser and register sizes are correct. Check air terminal unit installation including their duct sizes and routing.

3.4. DUCT AIR LEAKAGE TEST REPORT

3.4.1. TAB Agency shall perform the leakage test as outlined in "Duct Leakage Tests and Repairs" in Section 23 31 00, HVAC DUCTS and CASINGS for TAB agency's role and responsibilities in witnessing, recording and reporting of deficiencies.

3.5. SYSTEM READINESS REPORT

3.5.1. The TAB Contractor shall measure existing air and water flow rates associated with existing systems utilized to serve renovated areas as indicated in the contract documents. Submit report of findings to COR.

3.5.2. Inspect each system to ensure that it is complete including installation and operation of controls. Submit report to COR in standard format and forms prepared and/or approved by the CxA.

3.5.3. Verify that all items such as ductwork piping, dampers, valves, ports, terminals, connectors, etc., that are required for TAB are installed. Provide a report to the COR.

3.6. TAB REPORTS

3.6.1. Submit an intermediate report for //25 percent// //50 percent// of systems and equipment tested and balanced to establish satisfactory test results.

3.6.2. The TAB Contractor shall provide raw data immediately in writing to the COR if there is a problem in achieving intended results before submitting a formal report.

3.6.3. If over 20 percent of readings in the intermediate report fall outside the acceptable range, the TAB report shall be considered invalid and all contract TAB work shall be repeated after engineering and construction have been evaluated and re-submitted for approval at no additional cost to the owner.

3.6.3.1. Do not proceed with the remaining systems until intermediate report is approved by the COR.

3.7. TAB PROCEDURES

3.7.1. TAB shall be performed in accordance with the requirement of the Standard under which TAB agency is certified by either AABC, TABB or NEBB. Balancing shall be done proportionally to all applicable systems.

3.7.1.1. At least 1 trunk damper shall be 100 percent open.

3.7.1.2. At least 1 branch damper shall be 100 percent open per trunk.

3.7.1.3. At least 1 terminal device duct be 100 percent open per branch.

3.7.1.4. At least one hydronic balancing valve shall be 100 percent open per hydronic system.

3.7.2. General: During TAB all related system components shall be in full operation. Fan and pump rotation, motor loads and equipment vibration shall be checked and corrected as necessary before proceeding with TAB. Set controls and/or block off parts of distribution systems to simulate design operation of variable volume air or water systems for test and balance work.

3.7.3. Coordinate TAB procedures with existing systems and any phased construction completion requirements for the project. Provide TAB reports for each phase of the project prior to partial final inspections of each phase of the project.

3.7.4. Allow seven (7) days' time in construction schedule for TAB and submission of all reports for an organized and timely correction of deficiencies.

3.7.5. Air Balance and Equipment Test: Include air-handling units, fans, terminal units, fan coil units, room diffusers/outlets/inlets, computer room AC units, and laboratory fume hoods and biological safety cabinets.

3.7.5.1. Artificially load air filters by partial blanking to produce static air pressure drop of manufacturer's recommended pressure drop.

3.7.5.2. Adjust fan speeds to provide design air flow. V-belt drives, including fixed pitch pulley requirements, are specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC. Provide new drive sets as required to adjust fan speeds.

3.7.5.3. Test and balance systems in all specified modes of operation, including variable volume, economizer, and fire emergency modes. Verify that dampers and other HVAC controls function properly.

3.7.5.4. Variable Air Volume (VAV) Systems:

3.7.5.4.1. Coordinate TAB, including system volumetric controls, with Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

3.7.5.4.2. Section 23 36 00, AIR TERMINAL UNITS, specifies that maximum and minimum flow rates for air terminal units (ATU) be factory set. Check and readjust ATU flow rates if necessary to meet design criteria. Balance air distribution from ATU on full cooling maximum scheduled cubic meters per minute (cubic feet per minute). Reset room thermostats and check ATU operation from maximum to minimum cooling, to the heating mode, and back to cooling. Record and report the heating coil leaving air temperature when the ATU is in the maximum heating mode. Record and report outdoor air flow rates under all operating conditions (The test shall demonstrate that the minimum outdoor air ventilation rate shall remain constant under all operating conditions).

3.7.5.4.3. Adjust operating pressure control setpoint to maintain the design flow to each space with the lowest setpoint. Confirm static pressure reset is operational and functioning properly, if SP reset is included in the HVAC control strategy.

3.7.5.5. Record final measurements for air handling equipment performance data sheets.

3.7.5.6. Record final damper settings for all manual volume dampers.

3.7.6. Water Balance and Equipment Test: Include circulating pumps, convertors, coils, coolers and condensers:

3.7.6.1. Coordinate water chiller flow balancing with Section 23 64 00, PACKAGED WATER CHILLERS.

3.7.6.2. Adjust flow rates for equipment. Set coils and evaporator to values on equipment submittals, if different from values in the contract documents.

3.7.6.3. Primary-Secondary (variable volume) Systems: Coordinate TAB with Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC. Balance systems at design water flow and then verify that variable flow controls function as designed.

3.7.6.4. Record final measurements for hydronic equipment on performance data sheets. Include entering and leaving water temperatures for heating and cooling coils, and for convertors. Include entering and leaving air temperatures (DB/WB for cooling coils) for air-handling units and reheat coils. Make air and water temperature measurements at the same time.

3.7.6.5. On coils with automatic flow limiting valves (automatic balancing valves) measure and report Delta P across valve and measure Delta P across 100 percent open temperature control valve and using control valve CV calculate and report gpm.

3.7.6.6. Record final valve setting for all balancing valves.

3.8. VIBRATION TESTING

3.8.1. Furnish instruments and perform vibration measurements as specified in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT. Field vibration balancing is specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC. Provide measurements for all rotating HVAC equipment of 373 watts (1/2 horsepower) and larger, including centrifugal/screw compressors, cooling towers, pumps, fans and motors.

3.8.2. Record initial measurements for each unit of equipment on test forms and submit a report to the COR. Where vibration readings exceed the allowable tolerance Contractor shall be directed to correct the problem. The TAB agency shall verify that the corrections are done and submit a final report to the COR.

3.9. SOUND TESTING

3.9.1. Perform and record required sound measurements in accordance with paragraph QUALITY ASSURANCE in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.

3.9.1.1. Take readings in rooms, approximately ten (10) percent of all rooms. The COR may designate the specific rooms to be tested.

3.9.1.2. Provide chiller and cooling tower sound measurements if such equipment is installed in this project. Refer to Section 23 64 00, PACKAGED WATER CHILLERS and Section 23 65 00, COOLING TOWERS.

3.9.2. Take measurements with a calibrated sound level meter and octave band analyzer of the accuracy required by AABC, TABB or NEBB.

3.9.3. Sound reference levels, formulas and coefficients shall be according to ASHRAE Handbook "HVAC Applications", Chapter 49, “Noise and Vibration Control”.

3.9.4. Determine compliance with contract documents as follows:

3.9.4.1. When sound pressure levels are specified, including the NC Criteria in Section 23 05 41, NOISE and VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT:

3.9.4.1.1. Reduce the background noise as much as possible by shutting off unrelated audible equipment.

3.9.4.1.2. Measure octave band sound pressure levels with specified equipment "off."

3.9.4.1.3. Measure octave band sound pressure levels with specified equipment "on."

3.9.4.1.4. Use the DIFFERENCE in corresponding readings to determine the sound pressure due to equipment.

DIFFERENCE:	0	1	2	3	4	5 to 9	10 or More
FACTOR:	10	7	4	3	2	1	0

Sound pressure level due to equipment equals sound pressure level with equipment "on" minus FACTOR.

3.9.4.1.5. Plot octave bands of sound pressure level due to equipment for typical rooms on a graph which also shows noise criteria (NC) curves.

3.9.4.2. When sound power levels are specified:

3.9.4.2.1. Perform steps 1.a. through 1.d., as specified above.

3.9.4.2.2. For Indoor Equipment: Determine room attenuating effect, i.e., difference between sound power level and sound pressure level. Determined sound power level will be the sum of sound pressure level due to equipment plus the room attenuating effect.

3.9.4.2.3. For Outdoor Equipment: Use directivity factor and distance from noise source to determine distance factor, i.e., difference between sound power level and sound pressure level. Measured sound power level will be the sum of sound pressure level due to equipment plus the distance factor. Use //9 meters (30 feet)// //12 meters (40 feet)// //15 meters (50 feet)// for sound level location.

3.9.4.3. Where sound pressure levels are specified in terms of dB(A) measure sound levels using the "A" scale of meter. Single value readings will be used instead of octave band analysis.

3.9.5. Where measured sound levels exceed specified level, the installing contractor or equipment manufacturer shall take remedial action approved by the COR and the necessary sound tests shall be repeated.

3.9.6. Test readings for sound testing could go higher than 15 percent if determination is made by the COR based on the recorded sound data.

3.10. MARKING OF SETTINGS

3.10.1. Following approval of TAB Final Report, the setting of all HVAC adjustment devices including valves, splitters and dampers shall be permanently marked by the TAB Specialist so that adjustment can be restored if disturbed at any time. Style and colors used for markings shall be coordinated with the COR.

3.11. IDENTIFICATION OF TEST PORTS

3.11.1. The TAB Specialist shall permanently and legibly identify the location points of duct test ports. If the ductwork has exterior insulation, the identification shall be made on the exterior side of the insulation. All penetrations through ductwork and ductwork insulation shall be sealed to prevent air leaks and maintain integrity of vapor barrier.

3.12. PHASING

3.12.1. Phased Projects: Testing and Balancing Work to follow project with areas shall be completed per the project phasing. Upon completion of the project all areas shall have been tested and balanced per the contract documents.

3.12.2. Existing Areas: Systems that serve areas outside of the project scope shall not be adversely affected. Measure existing parameters where shown to document system capacity.

3.13. CRITICAL FLOW PATH

3.13.1. Provide a documented critical path for all fluid flows. There shall be at least one (1) terminal device that can be traced back to the fan or pump where there is no damper or valves that are less than 100 percent open.

3.14. COMMISSION: Components provided under this section of the specification will be tested as part of a larger system.

END OF SECTION 23 05 93

SECTION 23 23 00
REFRIGERANT PIPING

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. Field refrigerant piping for direct expansion HVAC systems.

1.1.2. Refrigerant piping shall be sized, selected, and designed either by the equipment manufacturer or in strict accordance with the manufacturer's published instructions. The schematic piping diagram shall show all accessories such as, stop valves, level indicators, liquid receivers, oil separator, gauges, thermostatic expansion valves, solenoid valves, moisture separators and driers to make a complete installation.

1.1.3. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.1.4. Definitions:

1.1.4.1. Refrigerating system: Combination of interconnected refrigerant-containing parts constituting one closed refrigeration circuit in which a refrigerant is circulated for the purpose of extracting heat.

1.1.4.2. Low side means the parts of a refrigerating system subjected to evaporator pressure.

1.1.4.3. High side means the parts of a refrigerating system subjected to condenser pressure.

1.1.4.4. Brazed joint: A gas-tight joint obtained by the joining of metal parts with alloys which melt at temperatures higher than 449 degrees C (840 degrees F) but less than the melting temperatures of the joined parts.

1.2. RELATED WORK

Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
Section 23 07 11, HVAC, and BOILER PLANT INSULATION.
Section 23 21 13, HYDRONIC PIPING.
Section 23 81 00, DECENTRALIZED UNITARY HVAC EQUIPMENT

1.3. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standards will govern.

1.3.1. AIR CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE (ARI/AHRI):

1.3.1.1. 495-//2005// Standard for Refrigerant Liquid Receivers

1.3.1.2. 730-//2013// Flow Capacity Rating of Suction-Line Filters and Suction-Line Filter-Driers

1.3.1.3. 750-//2016// Thermostatic Refrigerant Expansion Valves

1.3.1.4. 760-//2014// Performance Rating of Solenoid Valves for Use with Volatile Refrigerants

1.3.2. AMERICAN SOCIETY OF HEATING REFRIGERATING AND AIR CONDITIONING ENGINEERS (ASHRAE):

1.3.2.1. 15-//2019// Safety Standard for Refrigeration Systems (ANSI)

1.3.2.2. 17-//2015// Method of Testing Capacity of Thermostatic Refrigerant Expansion Valves (ANSI)

1.3.2.3. 63.2-//2017// Method of Testing Liquid Line Filter Drier Filtration Capability (ANSI)

1.3.3. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):

1.3.3.1. A13.1-//2020// Scheme for Identification of Piping Systems

1.3.3.2. Z535.1-//2017// Safety Color Code

1.3.4. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME):

1.3.4.1. B16.22-//2018// Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings (ANSI)

1.3.4.2. B16.24-//20016// Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500 (ANSI)

1.3.4.3. B31.5-//2019// Refrigeration Piping and Heat Transfer Components (ANSI)

1.3.4.4. B40.100-//2013// Pressure Gauges and Gauge Attachments

1.3.4.5. B40.200-//2008// Thermometers, Direct Reading and Remote Reading

1.3.5. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1.3.5.1. A126-//2014// Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

1.3.5.2. B32-//2020// Standard Specification for Solder Metal

1.3.5.3. B88-//2020// Standard Specification for Seamless Copper Water Tube

1.3.5.4. B88M-//2020// Standard Specification for Seamless Copper Water Tube (Metric)

1.3.5.5. B280-//2020// Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

1.3.6. AMERICAN WELDING SOCIETY, INC. (AWS): BRAZING HANDBOOK

1.3.6.1. A5.8/A5.8M-//2019// Standard Specification for Filler Metals for Brazing and Braze Welding

1.3.7. UNDERWRITERS LABORATORIES (UL):

1.3.8. 207-//2009// Standard for Refrigerant-Containing Components and Accessories, Nonelectrical

1.3.9. 429-//2013// Standard for Electrically Operated Valves

1.4. SUBMITTALS: Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.4.1. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 23 23 00, REFRIGERAN PIPING”, with applicable paragraph identification.

1.4.2. Shop Drawings:

1.4.2.1. Complete information for components noted, including valves and refrigerant piping accessories, clearly presented, shall be included to determine compliance with in the contract documents for components noted below:

1.4.2.1.1. Tubing and fittings

1.4.2.1.2. Valves

1.4.2.1.3. Strainers

1.4.2.1.4. Moisture-liquid indicators

1.4.2.1.5. Filter-driers

1.4.2.1.6. Flexible metal hose

1.4.2.1.7. Liquid-suction interchanges

1.4.2.1.8. Oil separators (when specified)

1.4.2.1.9. Gauges

1.4.2.1.10. Pipe and equipment supports

1.4.2.1.11. Refrigerant and oil

1.4.2.1.12. Pipe/conduit roof penetration cover

1.4.2.1.13. Soldering and brazing materials

1.4.3. Layout of refrigerant piping and accessories, including flow capacities, valves locations, and oil traps slopes of horizontal runs, floor/wall penetrations, and equipment connection details.

1.4.4. Certification: Copies of certificates for welding procedure, performance qualification record and list of welders' names and symbols.

1.4.5. Design Manual: Furnish two copies of design manual of refrigerant valves and accessories.

1.5. QUALITY ASSURANCE

1.5.1. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.5.2. Comply with ASHRAE Standard 15, Safety Code for Mechanical Refrigeration. The application of this Code is intended to assure the safe design, construction, installation, operation, and inspection of every refrigerating system employing a fluid which normally is vaporized and liquefied in its refrigerating cycle.

1.5.3. Comply with ASME B31.5: Refrigerant Piping and Heat Transfer Components.

1.5.4. Products shall comply with UL 207 "Refrigerant–Containing Components and Accessories, "Nonelectrical"; or UL 429 "Electrical Operated Valves."

1.6. AS-BUILT DOCUMENTATION

1.6.1. Comply with requirements in Paragraph “AS-BUILT DOCUMENTATION” in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

PART 2. PRODUCTS

2.1. PIPING AND FITTINGS

2.1.1. Refrigerant Piping: For piping up to 100 mm (4 inch) use Copper refrigerant tube, ASTM B280, cleaned, dehydrated and sealed, marked ACR on hard temper straight lengths. Coils shall be tagged ASTM B280 by the manufacturer. For piping over 100 mm (4 inch) use A53 Black SML steel.

2.1.2. Water and Drain Piping: Copper water tube, ASTM B88M, Type B or C (ASTM B88, Type M or L). Optional drain piping material: Schedule 80 flame retardant Polypropylene plastic.

2.1.3. Fittings, Valves and Accessories

2.1.3.1. Copper fittings: Wrought copper fittings, ASME B16.22.

2.1.3.2. Brazed Joints, refrigerant tubing: Cadmium free, AWS A5.8/A5.8M, 45 percent silver brazing alloy, Class BAg-5.

2.1.3.3. Solder Joints, water and drain: 95-5 tin-antimony, ASTM B32 (95TA).

2.1.3.4. Steel fittings: ASTM wrought steel fittings.

2.1.3.5. Refrigerant piping – Welded Joints.

2.1.3.6. Flanges and flanged fittings: ASME B16.24.

2.1.3.7. Refrigeration Valves:

2.1.3.7.1. Stop Valves: Brass or bronze alloy, packless, or packed type with gas tight cap, frost proof, back seating.

2.1.3.7.2. Pressure Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; UL listed. Forged brass with nonferrous, corrosion resistant internal working parts of high strength, cast iron bodies conforming to ASTM A126, Grade B. Set valves in accordance with ASHRAE Standard 15.

2.1.3.7.3. Solenoid Valves: Comply with ARI 760 and UL 429, UL-listed, two-position, direct acting or pilot-operated, moisture and vapor-proof type of corrosion resisting materials, designed for intended service, and solder-end connections. Fitted with suitable NEMA 250 enclosure of type required by location and normally closed holding coil.

2.1.3.7.4. Thermostatic Expansion Valves: Comply with ARI 750. Brass body with stainless-steel or non-corrosive nonferrous internal parts, diaphragm and spring-loaded (direct-operated) type with sensing bulb and distributor having side connection for hot-gas bypass and external equalizer. Size and operating characteristics as recommended by manufacturer of evaporator and factory set for superheat requirements. Solder-end connections. Testing and rating in accordance with ASHRAE Standard 17.

2.1.3.7.5. Electronic Thermostatic Expansion Valves: Electronic thermal expansion valves shall be stepper motor high resolution drive assembly type for precision control. Valve shall not exceed 6 watts max consumption. Compatibility tested with most CFC, HCFC, and HFC refrigerants and oils. Valve pistons and ports to be characterized to provide improved

flow resolution and performance. Valves to be interfaced with microprocessor-based controllers by devise manufacturer with temperature feedback loop. Electric expansion valves to be sized with nominal steps of stroke for tonnage application as recommended by valve manufacture ranging from 500 steps on small tonnage (under 5 tons per circuit) to 6300 on large tonnage circuits (over 100 tons per circuit)

2.1.3.7.6. Check Valves: Brass or bronze alloy with swing or lift type, with tight closing resilient seals for silent operation; designed for low pressure drop, and with solder-end connections. Direction of flow shall be legibly and permanently indicated on the valve body.

2.1.4. Strainers: Designed to permit removing screen without removing strainer from piping system, and provided with screens 80 to 100 mesh in liquid lines DN 25 (NPS 1) and smaller, 60 mesh in liquid lines greater than DN 25 (NPS 1), and 40 mesh in suction lines. Provide strainers in liquid line serving each thermostatic expansion valve, and in suction line serving each refrigerant compressor not equipped with integral strainer.

2.1.5. Refrigerant Moisture/Liquid Indicators: Double-ported type having heavy sight glasses sealed into forged bronze body and incorporating means of indicating refrigerant charge and moisture indication. Provide screwed brass seal caps.

2.1.6. Refrigerant Filter-Dryers: UL listed, angle or in-line type, as shown in the contract documents. Conform to ARI Standard 730. Heavy gauge steel shell protected with corrosion-resistant paint; perforated baffle plates to prevent desiccant bypass. Size as recommended by manufacturer for service and capacity of system with connection not less than the line size in which installed. Filter driers with replaceable filters shall be furnished with one spare element of each type and size.

2.1.7. Flexible Metal Hose: Seamless bronze corrugated hose, covered with bronze wire braid, with standard copper tube ends. Provide in suction and discharge piping of each compressor.

2.1.8. Water Piping Valves and Accessories: Refer to specification Section 23 21 13, HYDRONIC PIPING.

2.1.9. Oil Separators: Provide for condensing units, if recommended by manufacturer for this installation. All welded steel construction with capacity to eliminate a minimum of 95 percent of the oil from the hot gas flowing through it. Provide manufacturer's published ratings for minimum and maximum refrigeration tonnage corresponding to this oil separating efficiency. Separator shall be equipped with a float valve to prevent return of the hot gas to crankcase, and shall have isolating stop valves so it can be opened and services without pumping out any other part of the system. ASME construction or UL listed.

2.1.10. Receivers: Conform to AHRI 495, steel construction, equipped with taps for liquid inlet and outlet valves, pressure relief valve and liquid level indicator. Provide if recommended by manufacturer for this installation.

2.2. GAUGES

2.2.1. Temperature Gauges: Comply with ASME B40.200. Industrial-duty type and in required temperature range for service in which installed. Gauges shall have Celsius scale in 1-degree (Fahrenheit scale in 2-degree) graduations and with black number on a white face. The pointer shall be adjustable. Rigid stem type temperature gauges shall be provided in thermal wells located within 1525 mm (5 feet) of the finished floor. Universal adjustable angle type or remote element type temperature gauges shall be provided in thermal wells located 1525 to 2135 mm (5 to 7 feet) above the finished floor. Remote element type temperature gauges shall be provided in thermal wells located 2135 mm (7 feet) above the finished floor.

2.2.2. Vacuum and Pressure Gauges: Comply with ASME B40.100 and provide with throttling type needle valve or a pulsation dampener and shut-off valve. Gauge shall be a minimum of 90 mm (3-1/2

inches) in diameter with a range from 0 kPa (0 psig) to approximately 1.5 times the maximum system working pressure. Each gauge range shall be selected so that at normal operating pressure, the needle is within the middle-third of the range.

2.2.3. Suction: 101 kPa (30 inches Hg) vacuum to 1723 kPa (gauge) (250 psig).

2.2.4. Discharge: 0 to 3445 kPa (gauge) (0 to 500 psig).

2.3. THERMOMETERS AND WELLS

2.3.1. Refer to specification Section 23 21 13, HYDRONIC PIPING.

2.4. PIPE SUPPORTS

2.4.1. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

2.5. ELECTRICAL HEAT TRACING SYSTEM

2.5.1. Refer to specification Section 23 21 13, HYDRONIC PIPING. Provide for freezer unit cooler drain piping.

2.6. REFRIGERANTS AND OIL

2.6.1. Provide EPA approved refrigerant and oil for proper system operation.

2.7. PIPE/CONDUIT ROOF PENETRATION COVER

2.7.1. Prefabricated Roof Curb: Galvanized steel or extruded aluminum 300 mm (12 inches) overall height, continuous welded corner seams, treated wood nailer, 38 mm (1-1/2 inch) thick, 48 kg/cubic meter (3 pounds/cubic foot) density rigid mineral fiberboard insulation with metal liner, built-in cant strip (except for gypsum or tectum decks). For surface insulated roof deck, provide raised cant strip (recessed mounting flange) to start at the upper surface of the insulation. Curbs shall be constructed for pitched roof or ridge mounting as required to keep top of curb level.

2.7.2. Penetration Cover: Galvanized sheet metal with flanged removable top. Provide 38 mm (1-1/2 inch) thick mineral fiber board insulation.

2.7.3. Flashing Sleeves: Provide sheet metal sleeves for conduit and pipe penetrations of the penetration cover. Seal watertight penetrations.

2.8. PIPE INSULATION FOR DX HVAC SYSTEMS

2.8.1. Refer to specification Section 23 07 11, HVAC, PLUMBING, and BOILER PLANT INSULATION.

PART 3. EXECUTION

3.1. INSTALLATION

3.1.1. A. Install refrigerant piping and refrigerant containing parts in accordance with ASHRAE Standard 15 and ASME B31.5

3.1.1.1. Install piping as short as possible, with a minimum number of joints, elbow and fittings.

3.1.1.2. Install piping with adequate clearance between pipe and adjacent walls and hangers to allow for service and inspection. Space piping, including insulation, to provide 25 mm (1 inch)

minimum clearance between adjacent piping or other surface. Use pipe sleeves through walls, floors, and ceilings, sized to permit installation of pipes with full thickness insulation.

3.1.1.3. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown in the contract documents.

3.1.1.4. Use copper tubing in protective conduit when installed below ground.

3.1.1.5. Install hangers and supports per ASME B31.5 and the refrigerant piping manufacturer's recommendations.

3.1.2. Joint Construction:

3.1.2.1. Brazed Joints: Comply with AWS "Brazing Handbook" and with filler materials complying with AWS A5.8/A5.8M.

3.1.2.2. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper tubing.

3.1.2.3. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.1.2.4. Swab fittings and valves with manufacturer's recommended cleaning fluid to remove oil and other compounds prior to installation.

3.1.2.5. Pass nitrogen gas through the pipe or tubing to prevent oxidation as each joint is brazed. Cap the system with a reusable plug after each brazing operation to retain the nitrogen and prevent entrance of air and moisture.

3.1.3. Protect refrigerant system during construction against entrance of foreign matter, dirt and moisture; have open ends of piping and connections to compressors, condensers, evaporators and other equipment tightly capped until assembly.

3.1.4. Pipe relief valve discharge to outdoors for systems containing greater than 45 kg (100 lbs) of refrigerant.

3.1.5. Firestopping: Fill openings around uninsulated piping penetrating floors or fire walls, with firestop material. For firestopping insulated piping refer to Section 23 07 11, HVAC, and BOILER PLANT INSULATION.

3.1.6. If in the substantiated evaluation of the COR, the installation fails to meet the requirements of the construction documents with respect to function and maintainability, an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or time to the Government.

3.2. PIPE AND TUBING INSULATION

3.2.1. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

3.2.2. Apply two coats of weather-resistant finish as recommended by the manufacturer to insulation exposed to outdoor weather.

3.3. SIGNS AND IDENTIFICATION

3.3.1. Each refrigerating system erected on the premises shall be provided with an easily legible permanent sign securely attached and easily accessible, indicating thereon the name and address of

the installer, the kind and total number of pounds of refrigerant required in the system for normal operations, and the field test pressure applied.

3.3.2. Systems containing greater than 50 kg (110 lb) of refrigerant shall be provided with durable signs, in accordance with ANSI A13.1 and ANSI Z535.1, having letters not less than 13 mm (1/2 inch) in height designating:

3.3.2.1. Valves and switches for controlling refrigerant flow, the ventilation and the refrigerant compressor(s).

3.3.2.2. Signs on all exposed high pressure and low pressure piping installed outside the machinery room, with name of the refrigerant and the letters "HP" or "LP."

3.4. FIELD QUALITY CONTROL

3.4.1. Prior to initial operation examine and inspect piping system for conformance to plans and specifications and ASME B31.5. Correct equipment, material, or work rejected because of defects or nonconformance with plans and specifications, and ANSI codes for pressure piping.

3.4.2. After completion of piping installation and prior to initial operation, conduct test on piping system according to ASME B31.5. Furnish materials and equipment required for tests. Perform tests in the presence of COR. If the test fails, correct defects and perform the test again until it is satisfactorily done and all joints are proved tight.

3.4.2.1. Every refrigerant-containing parts of the system that is erected on the premises, except compressors, condensers, evaporators, safety devices, pressure gauges, control mechanisms and systems that are factory tested, shall be tested and proved tight after complete installation, and before operation.

3.4.2.2. The high and low side of each system shall be tested and proved tight at not less than the lower of the design pressure or the setting of the pressure-relief device protecting the high or low side of the system, respectively, except systems erected on the premises using non-toxic and non-flammable Group A1 refrigerants with copper tubing not exceeding DN 18 (NPS 5/8). This may be tested by means of the refrigerant charged into the system at the saturated vapor pressure of the refrigerant at 20 degrees C (68 degrees F) minimum.

3.4.3. Test Medium: A suitable dry gas such as nitrogen or shall be used for pressure testing. The means used to build up test pressure shall have either a pressure-limiting device or pressure-reducing device with a pressure-relief device and a gauge on the outlet side. The pressure relief device shall be set above the test pressure but low enough to prevent permanent deformation of the system components.

3.5. SYSTEM TEST AND CHARGING

3.5.1. System Test and Charging: As recommended by the equipment manufacturer or as follows:

3.5.1.1. Connect a drum of refrigerant to charging connection and introduce enough refrigerant into system to raise the pressure to 70 kPa (10 psig) gauge. Close valves and disconnect refrigerant drum. Test system for leaks with halide test torch or other approved method suitable for the test gas used. Repair all leaking joints and retest.

3.5.2. Connect a drum of dry nitrogen to charging valve and bring test pressure to design pressure for low side and for high side. Test entire system again for leaks.

3.5.3. Evacuate the entire refrigerant system by the triplicate evacuation method with a vacuum pump equipped with an electronic gauge reading in mPa (microns). Pull the system down to 665 mPa (500 microns) 665 mPa (2245.6 inches of mercury at 60 degrees F) and hold for 8 hours then break

the vacuum with dry nitrogen (or refrigerant). Repeat the evacuation two more times breaking the third vacuum with the refrigeration to be charged and charge with the proper volume of refrigerant.

3.6. STARTUP AND TESTING

3.6.1. The COR will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR. Provide a minimum of 7 days prior notice.

3.6.2. Provide services of manufacturer's technical representative for four hours to instruct ANG personnel in operation and maintenance of computer room air conditioning equipment.

3.7. COMMISSIONING

3.7.1. Not included in this project.

3.7.2. Components provided under this section of the specification will be tested as part of a larger system.

3.8. DEMONSTRATION AND TRAINING

3.8.1. Provide services of manufacturer's technical representative for 4 hours to instruct ANG personnel in operation and maintenance of units.

END OF SECTION 23 23 00

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.1.2. Ductwork and accessories for HVAC including the following:

1.1.2.1. Supply air, return air, outside air, exhaust, make-up air, and relief systems.

1.1.3. Definitions:

1.1.3.1. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.

1.1.3.2. Duct Pressure Classification: SMACNA HVAC Duct Construction Standards, Metal and Flexible.

1.1.3.3. Exposed Duct: Exposed to view in a finished room or exposed to weather.

1.2. RELATED WORK

Section 01 00 00, GENERAL REQUIREMENTS.
Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING and EQUIPMENT.
Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.
Section 23 07 11, HVAC and BOILER PLANT INSULATION.
Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
Section 23 34 00, HVAC FANS.
Section 23 36 00, AIR TERMINAL UNITS.
Section 23 73 00, INDOOR CENTRAL-STATION AIR-HANDLING UNITS.
Section 23 82 16, AIR COILS.

1.3. APPLICABLE PUBLICATIONS

1.3.1. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standards will govern.

1.3.2. American Society of Civil Engineers (ASCE):

1.3.2.1. 7-//2016// Minimum Design Loads for Associated Criteria for Buildings and Other Structures

1.3.3. American Society for Testing and Materials (ASTM):

1.3.3.1. A653/A653M-//2020// Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3.3.2. A1011/A1011-//2018a// Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High Strength Low-Alloy with Improved Formability, and Ultra-High Strength

1.3.3.3. B209-//2021// Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

1.3.3.4. C1071-//2019// Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)

1.3.3.5. E1-//2014(R2020)// Standard Specification for ASTM Liquid-in-Glass Thermometers

1.3.3.6. E77-//2014(R2021)// Standard Test Method for Inspection and Verification of Thermometers

1.3.3.7. E84-//2021a// Standard Test Method for Surface Burning Characteristics of Building Materials

1.3.4. National Fire Protection Association (NFPA):

1.3.4.1. 90A-//2021// Standard for the Installation of Air-Conditioning and Ventilating Systems

1.3.4.2. 96-//2021// Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

1.3.5. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1.3.5.1. 006–//2020// HVAC Duct Construction Standards, Metal and Flexible, 4th Edition

1.3.5.2. 016-//2012// HVAC Air Duct Leakage Test Manual, 2nd Edition

1.3.5.3. //2016// Fibrous Glass Duct Construction Standards, 7th Edition

1.3.6. Underwriters Laboratories, Inc. (UL):

1.3.6.1. 181-//2013(R2017)// Standard for Factory-Made Air Ducts and Air Connectors

1.3.6.2. 555-//2006(R2020)// Standard for Fire Dampers

1.3.6.3. 555S-//2014(R2020)// Standard for Smoke Dampers

1.3.7. Department of Veterans Affairs (VA):

1.3.7.1. PG-18-10-//2015// Physical Security Design Manual for VA Mission Critical Facilities

1.4. SUBMITTALS

1.4.1. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.4.2. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 23 XX XX, SECTION TITLE”, with applicable paragraph identification.

1.4.3. Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1.4.3.1. Rectangular Ducts:

1.4.3.1.1. Schedules of duct systems, materials and selected SMACNA construction alternatives for joints, sealing, gauge and reinforcement.

1.4.3.1.2. Duct liner.

1.4.3.1.3. Sealants and gaskets.

1.4.3.1.4. Access doors.

1.4.3.2. Round and Flat Oval Ducts:

1.4.3.2.1. Manufacturer's details for duct fittings.

1.4.3.2.2. Sealants and gaskets.

1.4.3.2.3. Access sections.

1.4.3.2.4. Installation instructions.

1.4.3.3. Volume dampers, back draft dampers.

1.4.3.4. Upper hanger attachments.

1.4.3.5. Fire dampers, fire doors, and smoke dampers with installation instructions.

1.4.3.6. Sound attenuators, including pressure drop and acoustic performance.

1.4.3.7. Flexible ducts and clamps, with manufacturer's installation instructions.

1.4.3.8. Flexible connections.

1.4.3.9. Instrument test fittings.

1.4.3.10. Details and design analysis of alternate or optional duct systems.

1.4.4. Coordination Drawings: Refer to paragraph SUBMITTALS in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.4.5. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replaceable parts, and troubleshooting guide:

1.4.5.1. Include complete list indicating all components of the systems.

1.4.5.2. Include complete diagrams of the internal wiring for each item of equipment.

1.4.5.3. Diagrams shall have their terminals identified to facilitate installation, operation, and maintenance.

1.5. QUALITY ASSURANCE

1.5.1. Fire Safety Code: Comply with NFPA 90A.

1.5.2. Duct System Construction and Installation: Referenced SMACNA Standards are the minimum acceptable quality.

1.5.3. Duct Sealing, Air Leakage Criteria, and Air Leakage Tests: Ducts shall be sealed as per duct sealing requirements of SMACNA HVAC Air Duct Leakage Test Manual for duct pressure classes shown in the contract documents.

1.5.4. Duct accessories exposed to the air stream, such as dampers of all types (except smoke dampers) and access openings, shall be of the same material as he duct or provide at least the same level of corrosion resistance.

1.6. AS-BUILT DOCUMENTATION

1.6.1. Comply with requirements in paragraph AS-BUILT DOCUMENTATION of Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

PART 2. PRODUCTS

2.1. DUCT MATERIALS AND SEALANTS

2.1.1. General: Except for systems specified otherwise, construct ducts, casings, and accessories of galvanized sheet steel, ASTM A653/A653M, coating G90; or, aluminum sheet, ASTM B209, alloy 1100, 3003 or 5052.

2.1.2. Specified Corrosion Resistant Systems: Stainless-steel sheet, Class 302 or 304, Condition A (annealed) Finish No. 4 for exposed ducts and Finish No. 2B for concealed duct or ducts located in mechanical rooms.

2.1.3. Joint Sealing: Refer to SMACNA HVAC Duct Construction Standards, Metal and Flexible.

2.1.3.1. Sealant: Elastomeric compound, gun or brush grade, maximum 25 flame spread, and 50 smoke developed (dry state) compounded specifically for sealing ductwork as recommended by the manufacturer. Generally, provide liquid sealant, with or without compatible tape, for low clearance slip joints and heavy, permanently elastic, mastic type where clearances are larger. Oil base caulking and glazing compounds are prohibited because they do not retain elasticity and bond.

2.1.3.2. Tape: Use only tape specifically designated by the sealant manufacturer and apply only over wet sealant. Pressure sensitive tape shall not be used on bare metal or on dry sealant.

2.1.3.3. Gaskets in Flanged Joints: Soft neoprene.

2.1.4. Approved factory-made joints may be used.

2.2. DUCT CONSTRUCTION AND INSTALLATION

2.2.1. Regardless of the pressure classifications outlined in the SMACNA Standards, fabricate and seal the ductwork in accordance with the following pressure classifications:

2.2.2. Duct Pressure Classification:

2.2.2.1. 0 to 13 mm (0 to 1/2 inch)

2.2.2.2. 13 mm to 25 mm (1/2 inch to 1 inch)

2.2.2.3. 25 mm to 50 mm (1 inch to 2 inch)

2.2.2.4. 50 mm to 75 mm (2 inch to 3 inch)

2.2.2.5. 75 mm to 100 mm (3 inch to 4 inch)

2.2.3. Seal Class: All ductwork shall receive Class A Seal.

2.2.4. Casings and Plenums: Construct in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, including curbs, access doors, pipe penetrations, eliminators and drain pans. Access doors shall be hollow metal, insulated, with latches and door pulls, 508 mm (20 inches) wide by 1219 to 1372 mm (48 to 54 inches) high. Provide view port in the doors where shown. Provide drain for outside air louver plenum. Outside air plenum shall have exterior insulation. Drain piping shall be routed to the nearest floor drain.

2.2.5. Volume Dampers: Single blade or opposed blade, multi-louver type as detailed in SMACNA Standards. Refer to SMACNA for Single Blade and multi-blade Volume Dampers.

2.2.6. Duct Hangers and Supports: Refer to SMACNA Standards. Avoid use of trapeze hangers for round duct.

2.3. DUCT LINER (Where indicated in the contract documents)

2.3.1. Duct sizes shown in the contract documents for lined duct are clear opening inside lining.

2.3.2. Duct liner is only permitted to be used for return, relief and general exhaust ducts. Duct liner is prohibited for outside air ducts, supply air ducts or any other positive pressure ductwork (provide exterior insulation only).

2.3.3. Rectangular Duct or Casing Liner: ASTM C1071, Type I (flexible), or Type II (board), 25 mm (1 inch) minimum thickness, applied with mechanical fasteners and 100 percent coverage of adhesive in conformance with SMACNA.

2.4. DUCT ACCESS DOORS, PANELS AND SECTIONS

2.4.1. Provide access doors, sized and located for maintenance work, upstream, in the following locations:

2.4.1.1. Each duct mounted coil and humidifier.

2.4.1.2. Each fire damper (for link service), smoke damper and automatic control damper.

2.4.1.3. Each duct mounted smoke detector.

2.4.1.4. For cleaning operating room supply air duct and kitchen hood exhaust duct, locate access doors at 6.1 m (20 feet) intervals and at each change in duct direction.

2.4.2. Openings shall be as large as feasible in small ducts, 305 mm by 305 mm (12 inch by 12 inch) minimum where possible. Access sections in insulated ducts shall be double-wall, insulated. Transparent shatterproof covers are preferred for uninsulated ducts.

2.4.2.1. For Rectangular Ducts: Refer to SMACNA HVAC Duct Construction Standards, Metal and Flexible.

2.4.2.2. For Round and Flat Oval Ducts: Refer to SMACNA HVAC Duct Construction Standards, Metal and Flexible.

2.5. FIRE DAMPERS

2.5.1. Galvanized steel, interlocking blade type, UL listing and label, 1-1/2-hour rating, 70 degrees C (158 degrees F) fusible line, 100 percent free opening with no part of the blade stack or damper frame in the air stream.

2.5.2. Fire dampers in wet air exhaust shall be of stainless-steel construction, all others may be galvanized steel.

2.5.3. Minimum Requirements for Fire Dampers:

2.5.3.1. The damper frame may be of design and length as to function as the mounting sleeve, thus eliminating the need for a separate sleeve, as allowed by UL 555. Otherwise provide sleeves and mounting angles, minimum 1.9 mm (14 gauge), required to provide installation equivalent to the damper manufacturer's UL test installation.

2.5.3.2. Submit manufacturer's installation instructions conforming to UL rating test.

2.6. SMOKE DAMPERS

2.6.1. Maximum air velocity, through free area of open damper, and pressure loss: Low pressure and medium pressure duct (supply, return, exhaust, outside air): 457 m/min (1500 fpm). Maximum static pressure loss: 32 Pa (0.13 inch WG).

2.6.2. Leakage: Class I.

2.6.3. Maximum Air Leakage, Closed Damper: 0.32 cubic meters /min/square meter (4.0 cfm per square foot) at 750 Pa (3 inch WG) differential pressure.

2.6.4. Minimum Requirements for Dampers:

2.6.4.1. Shall comply with requirements of UL 555S, except for the Fire Endurance and Hose Stream Test.

2.6.4.2. Frame: Galvanized steel channel with side, top and bottom stops or seals.

2.6.4.3. Blades: Galvanized steel, parallel type preferably, 305 mm (12 inch) maximum width, edges sealed with neoprene, rubber or felt, if required to meet minimum leakage. Airfoil (streamlined) type for minimum noise generation and pressure drop are preferred for duct mounted dampers.

2.6.4.4. Shafts: Galvanized steel.

2.6.4.5. Bearings: Nylon, bronze sleeve or ball type.

2.6.4.6. Hardware: Zinc plated.

2.6.4.7. Operation: Automatic open/close. No smoke damper that requires manual reset or link replacement after actuation is acceptable. See contract documents for required control operation.

2.6.5. Motor Operator (Actuator): Provide pneumatic or electric as required by the automatic control system, externally mounted on stand-offs to allow complete insulation coverage.

2.7. FIRE DOORS

2.7.1. Galvanized steel, interlocking blade type, UL listing and label, 71 degrees C (160 degrees F) fusible link, 3-hour rating and approved for openings in Class A fire walls with rating up to 4 hours, 100 percent free opening with no part of the blade stack or damper frame in the air stream.

2.8. FLEXIBLE AIR DUCT

2.8.1. General: Factory-fabricated, complying with NFPA 90A for connectors not passing through floors of buildings. Flexible ducts shall not penetrate any fire or smoke barrier which is required to

have a fire resistance rating of one hour or more. Flexible duct length shall not exceed 1.5 m (5 feet). Provide insulated acoustical air duct connectors in supply air duct systems and elsewhere as shown.

2.8.2. Flexible ducts shall be listed by Underwriters Laboratories, Inc., complying with UL 181. Ducts greater than 203 mm (8 inches) in diameter shall be Class 1. Ducts less than 203 mm (8 inches) in diameter shall be Class 1 or Class 2.

2.8.3. Insulated Flexible Air Duct: Factory-fabricated including mineral fiber insulation with maximum C factor of 0.25 at 24 degrees C (75 degrees F) mean temperature, encased with a low permeability moisture barrier outer jacket, having a puncture resistance of not less than 50 Beach Units. Acoustic insertion loss shall not be less than 3 dB per 300 mm (foot) of straight duct, at 500 Hz, based on 152 mm (6 inch) duct, of 762 m/min (2500 fpm).

2.8.4. Application Criteria:

2.8.4.1. Temperature Range: -18 to 93 degrees C (0 to 200 degrees F) internal.

2.8.4.2. Maximum Working Velocity: 1219 m/min (4000 fpm).

2.8.4.3. Minimum Working Pressure, Inches of Water Gauge: 2500 Pa (10 inches WG) positive, 500 Pa (2 inches WG) negative.

2.8.5. Duct Clamps: 100 percent nylon strap, 80 kg (176 pounds) minimum loop tensile strength manufactured for this purpose or stainless-steel strap with cadmium plated worm gear tightening device. Apply clamps with sealant and as approved for UL 181, Class 1 installation.

2.8.6. Flexible air duct is prohibited in operating room suites, SPS processing spaces, Pharmacy compounding spaces, Protective Environment spaces, Isolation Rooms, Clean Rooms, Bio-containment Laboratories, Research Laboratories, and Clinical Laboratories.

2.9. FLEXIBLE DUCT CONNECTIONS

2.9.1. Where duct connections are made to fans, air terminal units, and air handling units, install a non-combustible flexible connection of 822 g (29 ounces) neoprene coated fiberglass fabric approximately 152 mm (6 inches) wide. For connections exposed to sun and weather provide hypalon coating in lieu of neoprene. Burning characteristics shall conform to NFPA 90A. Securely fasten flexible connections to round ducts with stainless-steel or zinc-coated iron draw bands with worm gear fastener. For rectangular connections, crimp fabric to sheet metal and fasten sheet metal to ducts by screws 50 mm (2 inches) on center. Fabric shall not be stressed other than by air pressure. Allow at least 25 mm (one inch) slack to ensure that no vibration is transmitted.

2.10. SOUND ATTENUATING UNITS

2.10.1. Casing, not less than 1.0 mm (20 gauge) galvanized sheet steel, or 1.3 mm (18 gauge) aluminum fitted with suitable flanges to make clean airtight connections to ductwork. Sound-absorbent material faced with glass fiber cloth and covered with not less than 0.6 mm (24 gauge) or heavier galvanized perforated sheet steel, or 0.85 mm (22 gauge) or heavier perforated aluminum. Perforations shall not exceed 4 mm (5/32 inch) diameter, approximately 25 percent free area. Sound absorbent material shall be long glass fiber acoustic blanket meeting requirements of NFPA 90A.

2.10.2. Entire unit shall be completely air tight and free of vibration and buckling at internal static pressures up to 2000 Pa (8 inches WG) at operating velocities.

2.10.3. Pressure drop through each unit: Not to exceed indicated value at design air quantities indicated.

2.10.4. Submit complete independent laboratory test data showing pressure drop and acoustical performance.

2.10.5. Cap open ends of attenuators at factory with plastic, heavy duty paper, cardboard, or other appropriate material to prevent entrance of dirt, water, or any other foreign matter to inside of attenuator. Caps shall not be removed until attenuator is installed in duct system.

2.11. DUCT MOUNTED THERMOMETER (AIR)

2.11.1. Stem Type Thermometers: ASTM E1, 7 inch scale, red appearing mercury, lens front tube, cast aluminum case with enamel finish and clear glass or polycarbonate window, brass stem, 2 percent of scale accuracy to ASTM E77 scale calibrated in degrees Fahrenheit.

2.11.2. Thermometer Supports:

2.11.2.1. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.11.2.2. Flange: 75 mm (3 inch) outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.12. DUCT MOUNTED TEMPERATURE SENSOR (AIR)

2.12.1. Refer to Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

2.13. INSTRUMENT TEST FITTINGS

2.13.1. Manufactured type with a minimum 50 mm (2 inch) length for insulated duct, and a minimum 25 mm (1 inch) length for duct not insulated. Test hole shall have a flat gasket for rectangular ducts and a concave gasket for round ducts at the base, and a screw cap to prevent air leakage.

2.13.2. Provide instrument test holes at each duct or casing mounted temperature sensor or transmitter, and at entering and leaving side of each heating coil, cooling coil, and heat recovery unit.

2.14. AIR FLOW CONTROL VALVES (AFCV)

2.14.1. Refer to Section 23 36 00, AIR TERMINAL UNITS and Section 23 82 00, CONVECTION HEATING and COOLING UNITS.

PART 3. EXECUTION

3.1. INSTALLATION

3.1.1. If an installation is unsatisfactory to the COR, the contractor shall correct the installation at no additional cost or time to the Government.

3.1.2. Comply with provisions of Section 23 05 11, COMMON WORK RESULTS FOR HVAC, particularly regarding coordination with other trades and work in existing buildings.

3.1.3. Fabricate and install ductwork and accessories in accordance with referenced SMACNA Standards:

3.1.3.1. Contract documents show the general layout of ductwork and accessories but do not show all required fittings and offsets that may be necessary to connect ducts to equipment, boxes, diffusers, grilles, etc., and to coordinate with other trades. Fabricate ductwork based on field measurements. Provide all necessary fittings and offsets at no additional cost to the Government. Coordinate with other trades for space available and relative location of HVAC equipment and accessories on ceiling grid. Duct sizes in the contract documents are inside

dimensions which shall be altered by Contractor to other dimensions with the same air handling characteristics where necessary to avoid interferences and clearance difficulties.

3.1.3.2. Provide duct transitions, offsets and connections to dampers, coils, and other equipment in accordance with SMACNA Standards. Provide streamliner, when an obstruction cannot be avoided and must be taken in by a duct. Repair galvanized areas with galvanizing repair compound.

3.1.3.3. Provide bolted construction and tie-rod reinforcement in accordance with SMACNA Standards.

3.1.3.4. Construct casings, eliminators, and pipe penetrations in accordance with SMACNA Standards. Design casing access doors to swing against air pressure so that pressure helps to maintain a tight seal.

3.1.4. Install duct hangers and supports in accordance with SMACNA Standards.

3.1.5. Install fire dampers and smoke dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test. Install fire dampers and smoke dampers at locations indicated and where ducts penetrate fire rated and/or smoke rated walls, shafts and where required by the COR. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges per UL and NFPA. Demonstrate resetting of fire dampers and operation of smoke dampers to the COR.

3.1.6. Seal openings around duct penetrations of floors and fire rated partitions with fire stop material as required by NFPA 90A.

3.1.7. Flexible Duct Installation: Refer to SMACNA Standards. Ducts shall be continuous, single pieces not over 1.5 m (5 feet) long per NFPA 90A, as straight and short as feasible, adequately supported. Centerline radius of bends shall be not less than two duct diameters. Make connections with clamps as recommended by SMACNA. Clamp per SMACNA with one clamp on the core duct and one on the insulation jacket. Flexible ducts shall not penetrate floors, or any chase or partition designated as a fire or smoke barrier, including corridor partitions fire rated one hour or two hours. Support ducts SMACNA Standards.

3.1.8. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, paint the inside of the duct with flat black paint to reduce visibility.

3.1.9. Control Damper Installation:

3.1.9.1. Provide necessary blank-off plates required to install dampers that are smaller than duct size. Provide necessary transitions required to install dampers larger than duct size.

3.1.9.2. Assemble multiple sections dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.

3.1.9.3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix and seal permanently in place, only after stratification problem has been eliminated.

3.1.9.4. Install all damper control/adjustment devices on stand-offs to allow complete coverage of insulation.

3.1.10. Air Flow Measuring Devices: Install units with minimum straight run distances, upstream and downstream as recommended by the manufacturer.

3.1.11. Low Pressure Duct Liner: Install in accordance with SMACNA Standards.

3.1.12. Protection and Cleaning: Adequately protect equipment and materials against physical damage. Place equipment in first class operating condition or return to source of supply for repair or replacement, as determined by COR. Protect equipment and ducts during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting. When new ducts are connected to existing ductwork, clean both new and existing ductwork by mopping and vacuum cleaning inside and outside before operation.

3.2. DUCT LEAKAGE TESTS AND REPAIR

3.2.1. Ductwork leakage testing shall be performed by the Testing and Balancing Contractor directly contracted by the General Contractor and independent of the Sheet Metal Contractor.

3.2.2. Ductwork leakage testing shall be performed for the entire air distribution system (including all supply, return, exhaust and relief ductwork), section by section, including fans, coils and filter sections. //Based upon satisfactory initial duct leakage test results, the scope of the testing may be reduced by the COR on ductwork constructed to the 500 Pa (2 inches WG) duct pressure classification. In no case shall the leakage testing of ductwork constructed above the 500 Pa (2 inches WG) duct pressure classification or ductwork located in shafts or other inaccessible areas be eliminated.

3.2.3. Test procedure, apparatus and report shall conform to SMACNA HVAC Air Duck Leakage Test Manual. The maximum leakage rate allowed is 4 percent of the design air flow rate.

3.2.4. All ductwork shall be leak tested first before enclosed in a shaft or covered in other inaccessible areas.

3.2.5. All tests shall be performed in the presence of the COR and the Test and Balance agency. The Test and Balance agency shall measure and record duct leakage and report to the COR and identify leakage source with excessive leakage.

3.2.6. If any portion of the duct system tested fails to meet the permissible leakage level, the Contractor shall rectify sealing of ductwork to bring it into compliance and shall retest it until acceptable leakage is demonstrated to the COR.

3.2.7. All tests and necessary repairs shall be completed prior to insulation or concealment of ductwork.

3.2.8. Make sure all openings used for testing flow and temperatures by TAB Contractor are sealed properly.

3.3. DUCTWORK EXPOSED TO WIND VELOCITY

3.3.1. Provide additional support and bracing to all exposed ductwork installed on the roof or outside the building to withstand wind velocity of 145 km/h (90mph).

3.4. TESTING, ADJUSTING, AND BALANCING (TAB)

3.4.1. Refer to Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC.

3.5. OPERATING AND PERFORMANCE TESTS

3.5.1. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

END OF SECTION 23 31 00

SECTION 23 73 00
INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. NOTE: The existing Air Handling Units shall remain – only the cooling coils will be replaced under this contract. This specification is included for reference – only the parts of this specification relating to cooling coil are applicable.

1.1.2. A complete listing of common acronyms and abbreviations are included in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.1.3. Air handling units including integral components specified herein.

1.1.4. Definition of Air Handling Unit (AHU): A factory-fabricated and tested assembly of modular sections consisting of a housed-centrifugal fan with V-belt drive, single or multiple plenum fans with direct-drive, coils, filters, and other necessary equipment to perform one or more of the following functions of circulating, cleaning, heating, cooling, humidifying, dehumidifying, and mixing of air. Design capacities of units shall be as scheduled in the contract documents.

1.2. RELATED WORK

Section 01 00 00, GENERAL REQUIREMENTS.
Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT.
Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.
Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC.
Section 23 07 11, HVAC AND BOILER PLANT INSULATION.
Section 23 31 00, HVAC DUCTS and CASINGS.
Section 23 34 00, HVAC FANS.
Section 23 82 16, AIR COILS.
Section 26 29 11, MOTOR CONTROLLERS.

1.3. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Where conflicts occur these specifications and the VHA standards will govern.

1.3.1. Air-Conditioning, Heating, and Refrigeration Institute (AHRI):

1.3.1.1. 260-//2017// Sound Rating of Ducted Air Moving and Conditioning Equipment

1.3.1.2. 410-//2001// Forced-Circulation Air-Cooling and Air-Heating Coils with Addenda 1, 2 and 3

1.3.1.3. 430-//2020// Performance Rating of Central Station Air-Handling Unit Supply Fans

1.3.2. Air Movement and Control Association International, Inc. (AMCA):

1.3.2.1. 99-//2016// Standards Handbook

1.3.2.2. 210-//2016// Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

1.3.3. American Bearing Manufacturers Association (ABMA):

1.3.3.1. 9-//2015(R2020)// Load Ratings and Fatigue Life for Ball Bearings

1.3.4. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):

1.3.4.1. 51-//2016// Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

1.3.4.2. 170-//2021// Ventilation of Health Care Facilities

1.3.5. F. American Society for Testing and Materials (ASTM):

1.3.5.1. A653/A653M-//2020// Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3.5.2. B117-//2019// Standard Practice for Operating Salt Spray (Fog) Apparatus

1.3.5.3. D1654-//2008(R2016)e1// Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

1.3.5.4. D1735-//2014// Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus

1.3.5.5. D3359-//2017// Standard Test Methods for Rating Adhesion by Tape Test

1.3.5.6. G152-//2013(R2021)// Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

1.3.6. Energy Policy Act of 2005 (P.L.109-58)

1.3.7. Military Specifications (Mil. Spec.):

1.3.7.1. P-21035B-//2021// Paint, High Zinc Dust Content, Galvanizing Repair (Metric)

1.3.8. National Fire Protection Association (NFPA):

1.3.8.1. 70-//2020// National Electrical Code

1.3.8.2. 90A-//2021// Standard for Installation of Air-Conditioning and Ventilating Systems

1.3.9. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1.3.9.1. 016-//2012// HVAC Air Duct Leakage Test Manual, 2nd Edition

1.4. SUBMITTALS: Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Information and material submitted under this section shall be marked “SUBMITTED UNDER SECTION 23 XX XX, SECTION TITLE”, with applicable paragraph identification.

1.4.1. Manufacturer's Literature and Data Including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1.4.1.1. Submittals for AHUs shall include fans, drives, motors, coils, //humidifiers,// //sound attenuators,// mixing box with outside/return air dampers, filter housings, //blender sections,// and all other related accessories. The contractor shall provide custom drawings showing total air handling unit assembly including dimensions, operating weight, access sections, //diffusion plates,// flexible connections, door swings, controls penetrations, electrical disconnect, lights, duplex receptacles, switches, wiring, utility connection points, unit support system, vibration isolators, drain pan, pressure drops through each component (filter, coil etc).

1.4.1.2. Submittal drawings of section or component coil only will not be is acceptable. Contractor shall also submit performance data including performance test results, charts, curves, or certified computer selection data; data sheets; fabrication and insulation details. If the unit cannot be shipped in one piece, the contractor shall indicate the number of pieces that each unit will have to be broken into to meet shipping and job site rigging requirements.

1.4.1.3. Submit sound power levels in each octave band for the inlet and discharge of the fan and at entrance and discharge of AHUs at scheduled conditions. In absence of sound power ratings refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.

1.4.1.4. Provide fan curves showing Liters/Second (cubic feet per minute), static pressure, efficiency, and horsepower for design point of operation and at maximum design Liters/Second (cubic feet per minute).

1.4.1.5. Submit total fan static pressure, external static pressure, for AHU including total, inlet and discharge pressures, and itemized specified internal losses and unspecified internal losses. Refer to air handling unit schedule in the contract documents.

1.4.2. Submit written test procedures two weeks prior to factory testing. Submit written results of factory tests for approval prior to shipping.

1.4.3. Submit shipping information that clearly indicates how the units will be shipped in compliance with the descriptions below.

1.4.3.1. Units shall be shipped in one (1) piece where possible and in shrink wrapping to protect the unit from dirt, moisture and/or road salt.

1.4.3.2. If not shipped in one (1) piece, provide manufacturer approved shipping splits where required for installation or to meet shipping and/or job site rigging requirements in modular sections. Indicate clearly that the shipping splits shown in the submittals have been verified to accommodate the construction constraints for rigging as required to complete installation and removal of any section for replacement through available access without adversely affecting other sections.

1.4.3.3. If shipping splits are provided, each component shall be individually shrink wrapped to protect the unit and all necessary hardware (e.g., bolts, gaskets etc.) will be included to assemble unit onsite.

1.4.3.4. Lifting lugs will be provided to facilitate rigging on shipping splits and joining of segments. If the unit cannot be shipped in one piece, the contractor shall indicate the number of pieces that each unit will have to be broken into to meet shipping and job site rigging requirements.

1.4.4. Complete operating and maintenance manuals including wiring diagrams, technical data sheets, information for ordering replaceable parts, and troubleshooting guide:

1.4.4.1. Include complete list indicating all components of the systems.

1.4.4.2. Include instructions for lubrication, filter replacement, motor and drive replacement, and spare parts list.

1.4.4.3. Include complete diagrams of the internal wiring for each item of equipment.

1.4.4.4. Diagrams shall have their terminals identified to facilitate installation, operation, and maintenance.

1.4.5. Completed System Readiness Checklist completed by the contractor, signed by a qualified technician, and dated on the date of completion.

1.5. QUALITY ASSURANCE

1.5.1. Comply with requirements in paragraph QUALITY ASSURANCE of Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.5.2. Air Handling Units Certification:

1.5.2.1. Air Handling Units with Housed Centrifugal Fans: The air handling units shall be certified in accordance with AHRI 430 and tested/rated in accordance with AHRI 260.

1.5.2.2. Air Handling Units with Plenum Fans:

1.5.2.2.1. Air Handling Units with a single Plenum Fan shall be certified in accordance with AHRI 430 and tested/rated in accordance with AHRI 260.

1.5.2.2.2. Air handling Units with Multiple Fans in an Array shall be tested and rated in accordance with AHRI 430 and AHRI 260.

1.5.3. Heating, Cooling, and Air Handling Capacity and Performance Standards: AHRI 430, AHRI 410, ASHRAE 51, and AMCA 210.

1.5.4. Performance Criteria:

1.5.4.1. The fan BHP shall include all system effects for all fans and v-belt drive losses for housed centrifugal fans.

1.5.4.2. The fan motor shall be selected within the rated nameplate capacity, without relying upon NEMA Standard Service Factor.

1.5.4.3. Select the fan operating point as follows:

1.5.4.3.1. Forward Curve and Axial Flow Fans: Right hand side of peak pressure point.

1.5.4.3.2. Air Foil, Backward Inclined, or Tubular Fans Including Plenum Fans: At or near the peak static efficiency but at an appropriate distance from the stall line.

1.5.4.4. Operating Limits: AMCA 99 and manufacturer’s recommendations.

1.5.5. Units shall be factory-fabricated, assembled, and tested by a manufacturer, in business of manufacturing similar air-handling units for at least five (5) years.

1.6. AS-BUILT DOCUMENTATION

1.6.1. Comply with requirements in paragraph AS-BUILT DOCUMENTATION of Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

PART 2. PRODUCTS

2.1. AIR HANDLING UNITS

2.1.1. General:

2.1.1.1. AHUs shall be fabricated from insulated, solid double-wall galvanized steel without any perforations in draw-through configuration. Galvanizing shall be hot dipped conforming to ASTM A653/A653M and shall provide a minimum of 0.275 kg of zinc per square meter (0.97 oz.

of zinc per square foot) (G90). Aluminum constructed units, subject to VA approval, may be used in place of galvanized steel. The unit manufacturer shall provide published documentation confirming that the structural rigidity of aluminum air-handling units is equal or greater than the specified galvanized steel.

2.1.1.2. The contractor and the AHU manufacturer shall be responsible for ensuring that the unit will not exceed the allocated space shown in the contract documents, including required clearances for service and future overhaul or removal of unit components. All structural, piping, wiring, and ductwork alterations of units, which are dimensionally different than those specified, shall be the responsibility of the contractor at no additional cost or time to the Government.

2.1.1.3. AHUs shall be fully assembled by the manufacturer in the factory in accordance with the arrangement shown in the contract documents. The unit shall be assembled into the largest sections possible subject to shipping and rigging restrictions. The correct fit of all components and casing sections shall be verified in the factory for all units prior to shipment. All units shall be fully assembled, tested, and then split to accommodate shipment and job site rigging. On units not shipped fully assembled, the manufacturer shall tag each section and include air flow direction to facilitate assembly at the job site. Lifting lugs or shipping skids shall be provided for each section to allow for field rigging and final placement of unit.

2.1.1.4. The AHU manufacturer shall provide the necessary gasketing, caulking, and all screws, nuts, and bolts required for assembly. The manufacturer shall provide a factory-trained and qualified local representative at the job site to supervise the assembly and to assure that the units are assembled to meet manufacturer's recommendations and requirements noted in the contract documents. Provide documentation to the Contracting Officer that the local representative has provided services of similar magnitude and complexity on jobs of comparable size. If a local representative cannot be provided, the manufacturer shall provide a factory representative.

2.1.1.5. Gaskets: All door and casing and panel gaskets and gaskets between air handling unit components, if joined in the field, shall be high quality which seal airtight and retain their structural integrity and sealing capability after repeated assembly and disassembly of bolted panels and opening and closing of hinged components. Bolted sections may use a more permanent gasketing method provided they are not disassembled.

2.1.1.6. Structural Rigidity: Provide structural reinforcement when required by span or loading so that the deflection of the assembled structure shall not exceed 1/200 of the span based on a differential static pressure of 2000 Pa (8 inch WG) or higher.

2.1.2. Base:

2.1.2.1. Provide a heavy duty steel base for supporting all major AHU components. Bases shall be constructed of wide-flange steel I-beams, channels, or minimum 127 mm (5 inch) high 3.5 mm (10 Gauge) steel base rails. Welded or bolted cross members shall be provided as required for lateral stability. Contractor shall provide supplemental steel supports as required to obtain proper operation heights for cooling coil condensate drain trap //and steam coil condensate return trap as shown in the contract documents.

2.1.3. AHUs shall be completely self-supporting for installation on concrete housekeeping pad, steel support pedestals, or suspended as shown in the contract documents.

2.1.3.1. The AHU bases not constructed of galvanized steel shall be cleaned, primed with a rust inhibiting primer, and finished with rust inhibiting exterior enamel.

2.1.4. Casing (Including Wall, Floor, and Roof):

2.1.4.1. General: AHU casing shall be constructed as solid double wall, galvanized steel insulated panels without any perforations, integral of or attached to a structural frame. The

thickness of insulation, mode of application and thermal breaks shall be such that there is no visible condensation on the exterior panels of the AHU located in the non-conditioned spaces.

2.1.4.2. Casing Construction:

Outer Panel	0.8 mm (22 Gauge) Minimum
Inner Panel	0.8 mm (22 Gauge) Minimum
Insulation Thickness Density	Foam 50 mm (2 inch) Minimum 48 kg/m3 (3.0 lb/ft3) Minimum
Total R Value	2.3 m2.K/W (13.0 ft2.OF.hr/Btu) Minimum

2.1.4.3. Casing Construction (Contractor's Option):

Outer Panel	1.3 mm (18 Gauge) Minimum
Inner Panel	1.0 mm (20 Gauge) Minimum
Insulation Thickness Density	Fiberglass 50 mm (2 inch) Minimum 24 kg/m3 (1.5 lb/ft3) Minimum
Total R Value	1.4 m2.K/W (8.0 ft2.OF.hr/Btu) Minimum

2.1.4.4. Blank-Off: Provide blank-offs as required to prevent air bypass between the AHU sections, around coils, and filters.

2.1.4.5. Casing panels shall be secured to the support structure with stainless-steel or zinc-chromate plated screws and gaskets installed around the panel perimeter. Panels shall be completely removable to allow removal of fan, coils, and other internal components for future maintenance, repair, or modifications. Welded exterior panels are prohibited.

2.1.4.6. Access Doors: Provide in each access section and where shown in the contract documents. Show single-sided and double-sided access doors with door swings on the floor plans. Doors shall be a minimum of 50 mm (2 inch) thick with same double wall construction as the unit casing. Doors shall be a minimum of 610 mm (24 inches) wide, unless shown of different size in the contract documents, and shall be the full casing height up to a maximum of 1829 mm (6 feet). Doors shall be gasketed, hinged, and latched to provide an airtight seal. The access doors for fan section, mixing box, //humidifier// coil section shall include a minimum 152 mm x 152 mm (6 inch x 6 inch) double thickness, with air space between the glass panes tightly sealed, reinforced glass or Plexiglas window in a gasketed frame.

2.1.4.6.1. Hinges: Manufacturer's standard, designed for door size, weight and pressure classifications. Hinges shall hold door completely rigid with minimum 45 kg (100 lb) weight hung on latch side of door.

2.1.4.6.2. Latches: Non-corrosive alloy construction, with operating levers for positive cam action, operable from either inside or outside. Doors that do not open against unit operating pressure shall allow the door to ajar and then require approximately 0.785 radian (45 degrees) further movement of the handle for complete opening. Latch shall be capable of restraining explosive opening of door with a force not less than 2000 Pa (8 inch WG).

2.1.4.6.3. Gaskets: Neoprene, continuous around door, positioned for direct compression with no sliding action between the door and gasket. Secure with high quality mastic to eliminate possibility of gasket slipping or coming loose.

2.1.4.7. Provide sealed sleeves, metal or plastic escutcheons or grommets for penetrations through casing for power and temperature control wiring and pneumatic tubing. Coordinate with

electrical and temperature control subcontractors for number and location of penetrations. Coordinate lights, switches, and duplex receptacles and disconnect switch location and mounting. All penetrations and equipment mounting may be provided in the factory or in the field. All field penetrations shall be performed neatly by drilling or saw cutting. No cutting by torches will be allowed. Neatly seal all openings airtight.

2.1.5. Painted Exterior Finish: Galvanized steel (G90) exterior shall be mill prepared for painting by bonderizing and factory prepared for prime coat of paint by acid etch cleaning, as required, to assure paint adhesion. Provide factory applied prime coat and enamel finish coat of paint of color selected by owner. Paint corrosion resistance and adhesion shall have satisfactorily passed ASTM B117, ASTM D1654, ASTM D1735, ASTM D3359, and ASTM G152 for a minimum of 500 hours. Rating of failure at the scribe mark shall not be less than 6, average creepage not greater than 3.2 mm (1/8 inch). Rating of the inscribed area shall not be less than 10, no failure.

2.1.6. Floor:

2.1.6.1. Unit floor shall be level without offset space or gap and designed to support a minimum of 488 kg/square meter (91 lbs per square foot) distributed load without permanent deformation or crushing of internal insulation. Provide adequate structural base members beneath floor in service access sections to support typical service foot traffic and to prevent damage to unit floor or internal insulation. Unit floors in casing sections, which may contain water or condensate, shall be watertight with drain pan.

2.1.6.2. Where indicated, furnish and install floor drains flush with the floor, with nonferrous grate cover and stub through floor for external connection.

2.1.7. Condensate Drain Pan: Drain pan shall be designed to extend entire length of cooling coils including headers and return bends. Depth of drain pan shall be at least 43 mm (1.7 inches) and shall handle all condensate without overflowing. Drain pan shall be double-wall, double sloping type, and fabricated from stainless-steel (304) with at least 50 mm (2 inch) thick insulation sandwiched between the inner and outer surfaces. Drain pan shall be continuous metal or welded watertight. No mastic sealing of joints exposed to water will be permitted. Drain pan shall be placed on top of casing floor or integrated into casing floor assembly. Drain pan shall be pitched in all directions to drain line.

2.1.7.1. An intermediate, stainless-steel (304) condensate drip pan with copper downspouts shall be provided on stacked cooling coils. Use of intermediate condensate drain channel on upper casing of lower coil is permissible provided it is readily cleanable. Design of intermediate condensate drain shall prevent upper coil condensate from flowing across face of lower coil.

2.1.7.2. Drain pan shall be piped to the exterior of the unit. Drain pan shall be readily cleanable.

2.1.7.3. Installation, including frame, shall be designed and sealed to prevent blow-by.

2.1.8. Housed Centrifugal Fan Sections:

2.1.8.1. Fans shall be minimum Class II construction, double width, double inlet centrifugal, //air foil or backward inclined// //forward curved// type as indicated in the contract documents, factory balanced and rated in accordance with AMCA 210 or ASHRAE 51. Provide self-aligning, pillow block, regreasable ball-type bearings selected for a B (10) life of not less than 50,000 hours and an L (50) average fatigue life of 200,000 hours per ABMA 9. Extend bearing grease lines to motor and drive side of fan section. Fan shall be located in airstream to assure proper air flow.

2.1.8.2. Provide internally vibration isolated fan, motor and drive, mounted on a common integral bolted or welded structural steel base with adjustable motor slide rail with locking device. Provide vibration isolators and flexible duct connections at fan discharge to completely isolate fan assembly. Refer to Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT, for additional requirements.

2.1.8.3. Allowable vibration tolerances for fan shall not exceed a self-excited vibration maximum velocity of 0.005 m/s (0.20 inch per second) RMS, filter in, when measured with a vibration meter on bearing caps of machine in vertical, horizontal, and axial directions or measured at equipment mounting feet if bearings are concealed. After field installation, compliance to this requirement shall be demonstrated with field test in accordance with Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT and Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC. Following fan assembly, the complete fan assembly balance shall be tested using an electronic balance analyzer with a tunable filter and stroboscope. Vibration measurements shall be taken on each motor bearing housing in the vertical, horizontal, and axial planes (5 total measurements, 2 each motor bearing and 1 axial).

2.1.9. Fan Motor, Drive, and Mounting Assembly (Housed Centrifugal Fans):

2.1.9.1. Fan Motor and Drive: Motors shall be premium energy efficient type, as mandated by the Energy Policy Act of 2005, with efficiencies as shown in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION, in the contract documents and suitable for use in variable frequency drive applications on AHUs where this type of drive is indicated. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC, for additional motor and drive specifications. Refer to Section 26 29 11, MOTOR CONTROLLERS.

2.1.9.2. Fan drive and belts shall be factory mounted with final alignment and belt adjustment to be made by the Contractor after installation. Drive and belts shall be as specified in Section 23 05 11, COMMON WORK RESULTS FOR HVAC. Provide additional drive(s) if required during balancing, to achieve desired airflow.

2.1.10. Plenum Fans – Single and/or Multiple Fans in an Array:

2.1.10.1. General: Fans shall be Class II (minimum) construction with single inlet, aluminum wheel and stamped air-foil aluminum bladed. The fan wheel shall be mounted on the directly-driven motor shaft in AMCA Arrangement 4. Fans shall be dynamically balanced and internally isolated to minimize the vibrations. Provide a steel inlet cone for each wheel to match with the fan inlet. Locate fan in the air stream to assure proper flow. The fan performance shall be rated in accordance with AMCA 210 or ASHRAE 51.

2.1.10.2. Allowable vibration tolerances for fan shall not exceed a self-excited vibration maximum velocity of 0.005 m/s (0.20 inch per second) RMS, filter in, when measured with a vibration meter on bearing caps of machine in vertical, horizontal, and axial directions or measured at equipment mounting feet if bearings are concealed. After field installation, compliance to this requirement shall be demonstrated with field test in accordance with Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT and Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC. Following fan assembly, the complete fan assembly balance shall be tested using an electronic balance analyzer with a tunable filter and stroboscope. Vibration measurements shall be taken on each motor bearing housing in the vertical, horizontal, and axial planes (5 total measurements, 2 each motor bearing and 1 axial).

2.1.10.3. The plenum fans shall be driven by variable speed drives with at least one back-up drive as shown in the design documents. Use of a drive with bypass is prohibited.

2.1.10.4. Multiple fans shall be installed in a pre-engineered structural frame to facilitate fan stacking. All fans shall modulate in unison, above or below the synchronous speed within the limits specified by the manufacturer, by a common control sequence. Staging of the fans is prohibited. Redundancy requirement shall be met by all operating fans in an array and without the provision of an idle standby fan.

2.1.10.5. Fan Accessories:

2.1.10.5.1. Fan Isolation: Provide //an actuator-controlled damper// //a manual blank off plate// //an automatic back draft damper// to isolate the fan not in operation due to failure.

2.1.10.5.2. Fan Airflow Measurement: Provide an airflow measuring device integral to the fan to measure air volume within +/- 5 percent accuracy. The probing device shall not be placed in the airflow path to stay clear of turbulence and avoid loss of performance.

2.1.11. Fan Motor and Drive (Plenum Fans): Motors shall be premium energy efficient type, as mandated by the Energy Policy Act of 2005, with efficiencies as shown in Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT, in the contract documents and suitable for use in variable frequency drive applications. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC, for additional motor and drive specifications. Refer to Section 26 29 11, MOTOR CONTROLLERS.

2.1.12. Multi-zone damper blades shall be galvanized steel or aluminum type. Dampers shall have metal compressible jamb seals and extruded vinyl or metal blade edge seals. Dampers shall rotate on stainless-steel bearings or bronze bushings. Leakage rate shall not exceed 2.5 cubic meters/minute/square meter (8 CFM per sq. foot) at 250 Pa (1 inch WG). Dampers and operators shall be furnished and factory-installed by AHU manufacturer. Damper operators shall be of the same manufacturer as controls furnished under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

2.1.13. Mixing Boxes: Mixing box shall consist of casing and outdoor air and return air dampers in opposed blade arrangement with damper linkage for automatic operation. Coordinate damper operator with Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC. Dampers shall be of ultra-low leak design with metal compressible bronze jamb seals and extruded vinyl edge seals on all blades. Blades shall rotate on stainless-steel sleeve bearings or bronze bushings. Leakage rate shall not exceed 1.6 cubic meters/min/square meter (5 CFM per square foot) at 250 Pa (1 inch WG) and 2.8 cubic meters/min/square meter (9 CFM per square foot) at 995 Pa (4 inch WG). //Electronic// operators shall be furnished and mounted in an accessible and easily serviceable location by the air handling unit manufacturer at the factory. Damper operators shall be of same manufacturer as controls furnished under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

2.1.14. Blenders: Construction of the blender section shall be of welded aluminum 2 mm (0.081 inch) thick framing and turbulators. The mixer shall have no moving parts and shall contain a primary set of directional changing vanes, a secondary set of turbulator vanes, and a cone design for mixing of air streams. Certify blender performance to achieve no greater than a 5 degrees F variation across the cross section of the AHU measured 305 mm (12 inches) downstream of the blender over a face velocity range of 1-4 m/s (200-787 FPM).

2.1.15. Filter Section:

2.1.15.1. Filters including one complete set for temporary use at site shall be provided independent of the AHU. The AHU manufacturer shall install filter housings and racks in filter section compatible with filters furnished. The AHU manufacturer shall be responsible for furnishing temporary filters (pre-filters and after-filters, as shown in the contract documents) required for AHU testing.

2.1.15.2. Factory-fabricated filter section shall be of the same construction and finish as the AHU casing including filter racks and hinged double wall access doors.

2.1.16. Diffuser Section: Furnish a diffuser segment with perforated diffuser plate immediately downstream of supply fan to assure uniform distribution of leaving air across the face of the downstream after-filters to create uniform velocity profiles across the entire opening. Bolt or weld diffuser plate to a sturdy steel support frame so that it remains rigid. Manufacturer shall include any diffuser section pressure loss in excess of diffuser plate and this value shall be included in unspecified internal losses when selecting fan.//

2.1.17. Coils: Coils shall be mounted on hot dipped galvanized steel supports to assure proper anchoring of coil and future maintenance. Coils shall be face or side removable for future replacement thru the access doors or removable panels. Each coil shall be removable without disturbing adjacent coil. Cooling coils //and glycol-water exhaust heat recovery coils// shall be designed and installed to ensure no condensate carry over. Provide factory-installed extended supply, return, drain, and vent piping connections. //Coils installed in the air handling units serving surgical suites shall be equipped with copper fins. Copper fins are also required for all duct-mounted and terminal reheat coils.// //All coils in the high humidity areas, shall be epoxy-coated as shown below.// Refer to the contract documents and Section 23 82 16, AIR COILS for additional coil requirements.

2.1.17.1. Epoxy Immersion Coating – Electrically Deposited: The multi-stage corrosion-resistant coating application comprises of cleaning (heated alkaline immersion bath) and reverse-osmosis immersion rinse prior to the start of the coating process. The coating thickness shall be maintained between 0.6-mil and 1.2-mil. Before the coils are subjected to high-temperature oven cure, they are treated to permeate immersion rinse and spray. Where the coils are subject to UV exposure, UV protection spray treatment comprising of UV-resistant urethane mastic topcoat shall be applied. Provide complete coating process traceability for each coil and minimum five years of limited warranty.

2.1.17.2. The coating process shall such that uniform coating thickness is maintained at the fin edges. The quality control shall be maintained by ensuring compliance to the applicable ASTM Standards for the following:

2.1.17.2.1. Salt Spray Resistance (Minimum 6,000 Hours)

2.1.17.2.2. Humidity Resistance (Minimum 1,000 Hours)

2.1.17.2.3. Water Immersion (Minimum 260 Hours)

2.1.17.2.4. Cross-Hatch Adhesion (Minimum 4B-5B Rating)

2.1.17.2.5. Impact Resistance (Up to 160 Inch/Pound)

2.1.17.2.6. Water coils //including glycol-water.

2.1.17.3. Integral Face and Bypass Steam Coils: Provide integral vertical face and bypass dampers. Electric damper operators shall be furnished and mounted by the AHU manufacturer at the factory. Damper operators shall be of same manufacturer as controls furnished under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

2.1.17.4. Steam distributing tube coils.\

2.1.18. Humidifier: When included in design, provide air-handling unit-mounted humidification section with stainless-steel drain pan of adequate length to allow complete absorption of water vapor. Provide stainless-steel dispersion panel or distributors as indicated, with stainless-steel supports and hardware.

2.1.19. Sound Attenuators: Refer to the contract documents, Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT, and Section 23 31 00, HVAC DUCTS AND CASINGS, for additional unit mounted sound attenuator requirements. AHU sound attenuators shall be factory-installed as an integral part of AHU.

2.1.20. Discharge Section: Provide aerodynamically designed framed discharge openings or spun bellmouth fittings to minimize pressure loss.

2.1.21. Electrical and Lighting: Wiring and equipment specifications shall conform to Division 26, ELECTRICAL.

2.1.21.1. Vapor-proof lights using cast aluminum base style with glass globe and cast aluminum guard shall be installed in access sections for fan, mixing box, //humidifier,// and any section over 305 mm (12 inch) wide. A switch shall control the lights in each compartment with pilot light mounted outside the respective compartment access door. Wiring between switches and lights shall be factory-installed. All wiring shall run in neatly installed electrical conduits and terminate in a junction box for field connection to the building system. Provide single point 115 volt - one phase connection at junction box.

2.1.21.2. Install compatible LED bulb in each light fixture.

2.1.21.3. Provide a convenience duplex //weatherproof// receptacle next to the light switch.

2.1.21.4. Disconnect switch and power wiring: Provide factory or field mounted disconnect switch. Coordinate with Division 26, ELECTRICAL.

2.1.21.5. Provide single point power connection. Coordinate with Division 26, ELECTRICAL.

PART 3. EXECUTION

3.1. INSTALLATION

3.1.1. If an installation is unsatisfactory to the COR, the contractor shall correct the installation at no additional cost or time to the Government.

3.1.2. Install air handling unit in conformance with AHRI 430.

3.1.3. Assemble air handling unit components following manufacturer's instructions for handling, testing and operation. Repair damaged galvanized areas with paint in accordance with Mil. Spec. P-21035B. Repair painted units by touch up of all scratches with finish paint material. Vacuum the interior of air handling units clean prior to operation.

3.1.4. Leakage and test requirements for air handling units shall be the same as specified for ductwork in Section 23 31 00, HVAC DUCTS AND CASINGS except leakage shall not exceed Leakage Class (CL) 12 listed in SMACNA HVAC Air Duct Leakage Test Manual when tested at 1.5 times the design static pressure. Repair casing air leaks that can be heard or felt during normal operation and to meet test requirements.

3.1.5. Perform field mechanical (vibration) balancing in accordance with Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.

3.1.6. Seal and/or fill all openings between the casing and AHU components and utility connections to prevent air leakage or bypass.

3.2. STARTUP AND TESTING

3.2.1. The air handling unit shall not be operated for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings are lubricated, and the fan has been test run under observation.

3.2.2. After the air handling unit is installed and tested, provide startup and operating instructions to VA personnel.

3.2.3. An authorized factory representative should startup, test, and certify the final installation and application specific calibration of control components. Items to be verified include fan performance

over entire operating range, noise and vibration testing, verification of proper alignment, overall inspection of the installation, Owner/Operator training, etc.

3.2.4. Perform tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

3.2.5. When any defects are detected, correct defects and repeat test at no additional cost or time to the Government.

3.3. DEMONSTRATION AND TRAINING

3.3.1. Provide services of manufacturer's technical representative for 4 hours to instruct each VA personnel responsible in operation and maintenance of the system.

END OF SECTION 23 73 00

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

1.2. RELATED WORK

Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS
Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION

1.3. QUALITY ASSURANCE

1.3.1. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4. SUBMITTALS

1.4.1. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1.4.1.1. Shop Drawings:

1.4.1.1.1. Submit sufficient information to demonstrate compliance with drawings and specifications.

1.4.1.1.2. Submit the following data for approval:

1.4.1.1.2.1. Electrical ratings and insulation type for each conductor and cable.

1.4.1.1.2.2. Splicing materials and pulling lubricant.

1.4.1.2. Certifications: Two weeks prior to final inspection, submit the following.

1.4.1.2.1. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.

1.4.1.2.2. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

1.5. APPLICABLE PUBLICATIONS: Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.

1.5.1. American Society of Testing Material (ASTM):

1.5.1.1. D2301-10 Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

1.5.1.2. D2304-18 Test Method for Thermal Endurance of Rigid Electrical Insulating Materials

1.5.1.3. D3005-17 Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

1.5.2. National Electrical Manufacturers Association (NEMA):

1.5.2.1. WC 70-21 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy

1.5.3. National Fire Protection Association (NFPA):

1.5.3.1. 70-23 National Electrical Code (NEC)

1.5.4. Underwriters Laboratories, Inc. (UL):

1.5.4.1. 44-18 Thermoset-Insulated Wires and Cables

1.5.4.2. 83-17 Thermoplastic-Insulated Wires and Cables

1.5.4.3. 467-13 Grounding and Bonding Equipment

1.5.4.4. 486A-486B-18 Wire Connectors

1.5.4.5. 486C-18 Splicing Wire Connectors

1.5.4.6. 486D-15 Sealed Wire Connector Systems

1.5.4.7. 486E-15 Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

1.5.4.8. 493-18 Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables

1.5.4.9. 514B-12 Conduit, Tubing, and Cable Fittings

PART 2. PRODUCTS

2.1. CONDUCTORS AND CABLES

2.1.1. Conductors and cables shall be in accordance with ASTM, NEMA, NFPA, UL, as specified herein, and as shown on the drawings.

2.1.2. Conductors shall be copper.

2.1.3. Single Conductor:

2.1.3.1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.

2.1.3.2. No. 8 AWG and larger: Stranded.

2.1.3.3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.

2.1.3.4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

2.1.4. Conductor Color Code:

2.1.4.1. No. 10 AWG and smaller: Solid color insulation or solid color coating.

2.1.4.2. No. 8 AWG and larger: Color-coded using one of the following methods:

2.1.4.2.1. Solid color insulation or solid color coating.

2.1.4.2.2. Stripes, bands, or hash marks of color specified.

2.1.4.3. Color using 19 mm (0.75 inches) wide tape.

2.1.4.4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.

2.1.4.5. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

2.1.4.6. Lighting circuit “switch legs”, and 3-way and 4-way switch “traveling wires,” shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COR.

2.1.4.7. Color code for isolated power system wiring shall be in accordance with the NEC.

2.2. SPLICES

2.2.1. Splices shall be in accordance with NEC and UL.

2.2.2. Above Ground Splices for No. 10 AWG and Smaller:

2.2.2.1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.

2.2.2.2. The integral insulator shall have a skirt to completely cover the stripped conductors.

2.2.2.3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

2.2.3. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:

2.2.3.1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

2.2.3.2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.

2.2.3.3. Splice and insulation shall be product of the same manufacturer.

2.2.3.4. All bolts, nuts, and washers used with splices shall be //zinc-plated//cadmium-plated// steel.

2.2.4. Above Ground Splices for 250 kcmil and Larger:

2.2.4.1. Long barrel “butt-splice” or “sleeve” type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

2.2.4.2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.

2.2.4.3. Splice and insulation shall be product of the same manufacturer.

2.2.5. Underground Splices for No. 10 AWG and Smaller:

2.2.5.1. Solderless, screw-on, reusable pressure cable type, with integral insulation. Listed for wet locations, and approved for copper and aluminum conductors.

2.2.5.2. The integral insulator shall have a skirt to completely cover the stripped conductors.

2.2.5.3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

2.2.6. Underground Splices for No. 8 AWG and Larger:

2.2.6.1. Mechanical type, of high conductivity and corrosion-resistant material. Listed for wet locations, and approved for copper and aluminum conductors.

2.2.6.2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.

2.2.6.3. Splice and insulation shall be product of the same manufacturer.

2.2.7. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

2.3. CONNECTORS AND TERMINATIONS

2.3.1. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

2.3.2. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

2.3.3. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be //zinc-plated//cadmium-plated// steel.

2.4. CONTROL WIRING

2.4.1. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14 AWG, or as required by the control wiring equipment manufacturer.

2.4.2. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.5. WIRE LUBRICATING COMPOUND

2.5.1. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.

2.5.2. Shall not be used on conductors for isolated power systems.

PART 3. EXECUTION

3.1. GENERAL

3.1.1. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

3.1.2. Install conductors in raceway systems.

3.1.3. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.

3.1.4. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.

3.1.5. For conductors installed in vertical raceways, provide conductor support (also known as cable support), to counter gravity pull on conductor weight. Conductor support shall be split-wedge conductor support type. Prior to installing the conductor support plug, remove all pulling compound from conductors where they pass through the conductor support body. After installing the conductor support plug, tap the conductor support plug firmly in the conductor support body.

3.1.6. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic "zip" ties.

3.1.7. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.

3.1.8. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.

3.1.9. Conductor Pulling:

3.1.9.1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.

3.1.9.2. Use nonmetallic pull ropes.

3.1.9.3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.

3.1.9.4. All conductors in a single conduit shall be pulled simultaneously.

3.1.9.5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

3.1.10. Number of conductors for branch circuits shall not exceed more than three branch circuits in any one conduit.

3.1.11. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.2. INSTALLATION IN MANHOLES

3.2.1. Train the conductors around the manhole walls, but do not bend to a radius less than six times the overall conductor diameter.

3.2.2. Fireproofing:

3.2.2.1. Install fireproofing on low-voltage conductors where the low-voltage conductors are installed in the same manholes with medium-voltage conductors.

3.2.2.2. Use fireproofing tape as specified in Section 26 05 13, MEDIUM-VOLTAGE CABLES, and apply the tape in a single layer, half-lapped, or as recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (1 inch) into each duct.

3.2.2.3. Secure the fireproofing tape in place by a random wrap of glass cloth tape.

3.3. SPLICE AND TERMINATION INSTALLATION

3.3.1. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.

3.3.2. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

3.4. CONDUCTOR IDENTIFICATION

3.4.1. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where markings are covered by tape, apply tags to conductors, stating size and insulation type.

3.5. FEEDER CONDUCTOR IDENTIFICATION

3.5.1. In each interior pullbox and each underground manhole and handhole, install brass tags on all feeder conductors to clearly designate their circuit identification and voltage. The tags shall be the embossed type, 40 mm (1-1/2 inches) in diameter and 40 mils thick. Attach tags with plastic ties.

3.6. EXISTING CONDUCTORS

3.6.1. Unless specifically indicated on the plans, existing conductors shall not be reused.

3.7. CONTROL WIRING INSTALLATION

3.7.1. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.

3.7.2. Install a separate power supply circuit for each system, except where otherwise shown on the drawings.

3.8. CONTROL WIRING IDENTIFICATION

3.8.1. Install a permanent wire marker on each wire at each termination.

3.8.2. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.

3.8.3. Wire markers shall retain their markings after cleaning.

3.8.4. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.9. DIRECT BURIAL CABLE INSTALLATION

3.9.1. Tops of the cables:

3.9.1.1. Below the finished grade: Minimum 600 mm (24 inches) unless greater depth is shown.

3.9.1.2. Below road and other pavement surfaces: In conduit as specified, minimum 760 mm (30 inches) unless greater depth is shown.

3.9.1.3. Do not install cables under railroad tracks.

3.9.2. Under road and paved surfaces: Install cables in concrete-encased galvanized steel rigid conduits. Size as shown on plans, but not less than 50 mm (2 inches) trade size with bushings at each end of each conduit run. Provide size/quantity of conduits required to accommodate cables plus one spare.

3.9.3. Work with extreme care near existing ducts, conduits, cables, and other utilities to prevent any damage.

3.9.4. Excavation and backfill is specified in Section 31 20 00, EARTH MOVING. In addition:

3.9.4.1. Place 75 mm (3 inches) bedding sand in the trenches before installing the cables.

3.9.4.2. Place 75 mm (3 inches) shading sand over the installed cables.

3.9.4.3. Install continuous horizontal 25 mm by 200 mm (1 inch x 8 inches) preservative-impregnated wood planking 75 mm (3 inches) above the cables before backfilling.

3.9.5. Provide horizontal slack in the cables for contraction during cold weather.

3.9.6. Install the cables in continuous lengths. Splices within cable runs shall not be accepted.

3.9.7. Connections and terminations shall be listed submersible-type designed for the cables being installed.

3.9.8. Warning tape shall be continuously placed 300 mm (12 inches) above the buried cables.

3.10. ACCEPTANCE CHECKS AND TESTS

3.10.1. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

3.10.1.1. Visual Inspection and Tests: Inspect physical condition.

3.10.1.2. Electrical tests:

3.10.1.2.1. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.

3.10.1.2.2. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.

3.10.1.2.3. Perform phase rotation test on all three-phase circuits.

END OF SECTION 26 05 19

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.

1.1.2. “Grounding electrode system” refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.

1.1.3. The terms “connect” and “bond” are used interchangeably in this section and have the same meaning.

1.2. RELATED WORK

Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS
Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
Section 26 24 13, DISTRIBUTION SWITCHBOARDS
Section 26 24 16, PANELBOARDS
Section 26 24 19, MOTOR CONTROL CENTERS
Section 26 41 00, FACILITY LIGHTNING PROTECTION

1.3. QUALITY ASSURANCE

1.3.1. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4. SUBMITTALS

1.4.1. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1.4.1.1. Shop Drawings:

1.4.1.1.1. Submit sufficient information to demonstrate compliance with drawings and specifications.

1.4.1.1.2. Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.

1.4.1.2. Test Reports:

1.4.1.2.1. Two weeks prior to the final inspection, submit ground resistance field test reports to the COR.

1.4.1.3. Certifications:

1.4.1.3.1. Certification by the Contractor that the grounding equipment has been properly installed and tested.

1.5. APPLICABLE PUBLICATIONS: Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

1.5.1. American Society for Testing and Materials (ASTM):

1.5.1.1. B1-13 Standard Specification for Hard-Drawn Copper Wire

1.5.1.2. B3-13(R2018) Standard Specification for Soft or Annealed Copper Wire

1.5.1.3. B8-11(R2017) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

1.5.2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1.5.2.1. 81-12 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements

1.5.3. National Fire Protection Association (NFPA):

1.5.3.1. 70-23 National Electrical Code (NEC)

1.5.3.2. 70E-21 National Electrical Safety Code

1.5.4. Underwriters Laboratories, Inc. (UL):

1.5.4.1. 44-18 Thermoset-Insulated Wires and Cables

1.5.4.2. 83-17 Thermoplastic-Insulated Wires and Cables

1.5.4.3. 467-13 Grounding and Bonding Equipment

PART 2. PRODUCTS

2.1. GROUNDING AND BONDING CONDUCTORS

2.1.1. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.

2.1.2. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.

2.1.3. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.

2.1.4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

2.2. GROUND RODS

2.2.1. Steel or copper clad steel or Stainless steel, 19 mm (0.75 inch) diameter by 3 M (10 feet) long.

2.2.2. Quantity of rods shall be as shown on the drawings, and as required to obtain the specified ground resistance.

2.3. CONCRETE ENCASED ELECTRODE

2.3.1. Concrete encased electrode shall be No. 4 AWG bare copper wire, installed per NEC.

2.4. GROUND CONNECTIONS

2.4.1. Below Grade and Inaccessible Locations: Exothermic-welded type connectors.

2.4.2. Above Grade:

2.4.2.1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use zinc-plated or cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.4.2.2. Connection to Building Steel: Exothermic-welded type connectors.

2.4.2.3. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated or cadmium plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.4.2.4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated or cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.4.2.5. equipment rack and cabinet ground bars

2.4.3. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

2.5. GROUND TERMINAL BLOCKS

2.5.1. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with zinc-plated or cadmium plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.6. GROUNDING BUS BAR

2.6.1. Pre-drilled rectangular copper bar with stand-off insulators, minimum 6.3 mm (0.25 inch) thick x 100 mm (4 inches) high in cross-section, length as shown on the drawings, with hole size, quantity, and spacing per detail shown on the drawings. Provide insulators and mounting brackets.

PART 3. EXECUTION

3.1. GENERAL

3.1.1. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

3.1.2. System Grounding:

3.1.2.1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.

3.1.2.2. Separately derived systems (transformers downstream from the service entrance): ground the secondary neutral.

3.1.2.3. Isolation transformers and isolated power systems shall not be system grounded.

3.1.3. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.1.4. For patient care area electrical power system grounding, conform to the latest NFPA 70 and 99.

3.2. INACCESSIBLE GROUNDING CONNECTIONS

3.2.1. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

3.3. MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS

3.3.1. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.

3.3.2. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.

3.3.3. Pad-Mounted Transformers:

3.3.3.1. Provide a driven ground rod and bond with a grounding electrode conductor to the transformer grounding pad.

3.3.3.2. Ground the secondary neutral.

3.3.4. Lightning Arresters: Connect lightning arresters to the equipment ground bus or ground rods as applicable.

3.4. SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

3.4.1. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

3.4.2. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):

3.4.2.1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.

3.4.2.2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.

3.4.3. Switchgear, Switchboards, Unit Substations, Panelboards, Motor Control Centers, Engine-Generators, Automatic Transfer Switches, and other electrical equipment:

3.4.3.1. Connect the equipment grounding conductors to the ground bus.

3.4.3.2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.

3.4.4. Transformers:

3.4.4.1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.

3.4.4.2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode system or the ground bar at the service equipment.

3.5. RACEWAY

3.5.1. Conduit Systems:

3.5.1.1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.

3.5.1.2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.

3.5.1.3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.

3.5.1.4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

3.5.2. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and all branch circuits.

3.5.3. Boxes, Cabinets, Enclosures, and Panelboards:

3.5.3.1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).

3.5.3.2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

3.5.4. Wireway Systems:

3.5.4.1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.

3.5.4.2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 M (50 feet).

3.5.4.3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.

3.5.4.4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 M (49 feet).

3.5.5. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.

3.5.6. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

3.5.7. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.5.8. Raised Floors: Provide bonding for all raised floor components as shown on the drawings.

3.5.9. Panelboard Bonding in Patient Care Areas: The equipment grounding terminal buses of the normal and essential branch circuit panel boards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not less than No. 10 AWG, installed in rigid metal conduit.

3.6. OUTDOOR METALLIC FENCES AROUND ELECTRICAL EQUIPMENT

3.6.1. Fences shall be grounded with a ground rod at each fixed gate post and at each corner post.

3.6.2. Drive ground rods until the top is 300 mm (12 inches) below grade. Attach a No. 4 AWG copper conductor by exothermic weld to the ground rods, and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond the wire to post and the other to bond the wire to fence. Each gate section shall be bonded to its gatepost by a 3 mm x 25 mm (0.375 inch x 1 inch) flexible, braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.7. CORROSION INHIBITORS

3.7.1. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.8. CONDUCTIVE PIPING

3.8.1. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.8.2. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

3.9. LIGHTNING PROTECTION SYSTEM

3.9.1. Bond the lightning protection system to the electrical grounding electrode system.

3.10. MAIN ELECTRICAL ROOM GROUNDING

3.10.1. Provide ground bus bar and mounting hardware at each main electrical room where incoming feeders are terminated, as shown on the drawings. Connect to pigtail extensions of the building grounding ring, as shown on the drawings.

3.11. EXTERIOR LIGHT POLES

3.11.1. Provide 6.1 M (20 feet) of No. 4 AWG bare copper coiled at bottom of pole base excavation prior to pour, plus additional un-spliced length in and above foundation as required to reach pole ground stud.

3.12. GROUND RESISTANCE

3.12.1. Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Government. Final tests shall ensure that this requirement is met.

3.12.2. Grounding system resistance shall comply with the electric utility company ground resistance requirements.

3.13. GROUND ROD INSTALLATION

3.13.1. For outdoor installations, drive each rod vertically in the earth, until top of rod is 610 mm (24 inches) below final grade.

3.13.2. For indoor installations, leave 100 mm (4 inches) of each rod exposed.

3.13.2.1. Where buried or permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure-type ground connectors.

3.13.3. Where rock or impenetrable soil prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified ground resistance.

3.14. ACCEPTANCE CHECKS AND TESTS

3.14.1. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company

ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.

3.14.2. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

3.14.3. Below-grade connections shall be visually inspected by the COR prior to backfilling. The Contractor shall notify the COR 24 hours before the connections are ready for inspection.

END OF SECTION 26 05 26

SECTION 26 29 21
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1. GENERAL

1.1. DESCRIPTION

1.1.1. This section specifies the furnishing, installation, and connection of fused and unfused disconnect switches (indicated as switches in this section), and separately-enclosed circuit breakers for use in electrical systems rated 600 V and below.

1.2. RELATED WORK

Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS:
Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
Section 26 24 16, PANELBOARDS

1.3. QUALITY ASSURANCE

1.3.1. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4. SUBMITTALS

1.4.1. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1.4.1.1. Shop Drawings:

1.4.1.1.1. Submit sufficient information to demonstrate compliance with drawings and specifications.

1.4.1.1.2. Submit the following data for approval:

1.4.1.1.2.1. Electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, fuses, circuit breakers, wiring and connection diagrams, accessories, and device nameplate data.

1.4.1.2. Manuals

1.4.1.2.1. Submit complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering fuses, circuit breakers, and replacement parts.

1.4.1.2.1.1. Include schematic diagrams, with all terminals identified, matching terminal identification in the enclosed switches and circuit breakers.

1.4.1.2.1.2. Include information for testing, repair, troubleshooting, assembly, and disassembly.

1.4.1.2.2. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

1.4.1.3. Certifications: Two weeks prior to final inspection, submit the following.

1.4.1.3.1. Certification by the manufacturer that the enclosed switches and circuit breakers conform to the requirements of the drawings and specifications.

1.4.1.3.2. Certification by the Contractor that the enclosed switches and circuit breakers have been properly installed, adjusted, and tested.

1.5. APPLICABLE PUBLICATIONS: Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

1.5.1. International Code Council (ICC):

1.5.1.1. IBC-21 International Building Code

1.5.2. National Electrical Manufacturers Association (NEMA):

1.5.2.1. FU I-12 Low Voltage Cartridge Fuses

1.5.2.2. KS I-13 Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum)

1.5.3. National Fire Protection Association (NFPA):

1.5.3.1. 70-23 National Electrical Code (NEC)

1.5.4. Underwriters Laboratories, Inc. (UL):

1.5.4.1. 98-16 Enclosed and Dead-Front Switches

1.5.4.2. 248 1-11 Low Voltage Fuses

1.5.4.3. 489-16 Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2. PRODUCTS

2.1. FUSED SWITCHES RATED 600 AMPERES AND LESS

2.1.1. Switches shall be in accordance with NEMA, NEC, UL, as specified, and as shown on the drawings.

2.1.2. Shall be NEMA classified General Duty (GD) for 240 V switches, and NEMA classified Heavy Duty (HD) for 480 V switches.

2.1.3. Shall be horsepower (HP) rated.

2.1.4. Shall have the following features:

2.1.4.1. Switch mechanism shall be the quick-make, quick-break type.

2.1.4.2. Copper blades, visible in the open position.

2.1.4.3. An arc chute for each pole.

2.1.4.4. External operating handle shall indicate open and closed positions, and have lock-open padlocking provisions.

2.1.4.5. Mechanical interlock shall permit opening of the door only when the switch is in the open position, defeatable to permit inspection.

2.1.4.6. Fuse holders for the sizes and types of fuses specified.

2.1.4.7. Solid neutral for each switch being installed in a circuit which includes a neutral conductor.

2.1.4.8. Ground lugs for each ground conductor.

2.1.4.9. Enclosures:

2.1.4.9.1. Shall be the NEMA types shown on the drawings.

2.1.4.9.2. Where the types of switch enclosures are not shown, they shall be the NEMA types most suitable for the ambient environmental conditions.

2.1.4.9.3. Shall be finished with manufacturer's standard gray baked enamel paint over pretreated steel.

2.1.4.10. Electrically operated switches shall only be installed where shown on the drawings.

2.2. UNFUSED SWITCHES RATED 600 AMPERES AND LESS

2.2.1. Shall be the same as fused switches, but without provisions for fuses.

2.3. FUSED SWITCHES RATED OVER 600 AMPERES TO 1200 AMPERES

2.3.1. Shall be the same as fused switches, and shall be NEMA classified Heavy Duty (HD).

2.4. MOTOR RATED TOGGLE SWITCHES

2.4.1. Type 1, general purpose for single-phase motors rated up to 1 horsepower.

2.4.2. Quick-make, quick-break toggle switch with external reset button and thermal overload protection matched to nameplate full-load current of actual protected motor.

2.5. CARTRIDGE FUSES

2.5.1. Shall be in accordance with NEMA FU 1.

2.5.2. Service Entrance: //Class L, fast acting// //Class L, time delay// //Class RK1, fast acting// //Class RK1, time delay// //Class J, fast acting// //Class J, time delay// //Class T, fast acting//.

2.5.3. Feeders: //Class L, fast acting// //Class L, time delay// //Class RK1, fast acting// //Class RK1, time delay// //Class RK5, fast acting// //Class RK5, time delay// //Class J, fast acting// //Class J, time delay//.

2.5.4. Motor Branch Circuits: //Class RK1// //Class RK5//, time delay.

2.5.5. Other Branch Circuits: //Class RK1, time delay// //Class RK5, time delay// //Class J, fast acting// //ClassJ, time delay//.

2.5.6. Control Circuits: Class CC, //fast acting// //time delay//.

2.6. SEPARATELY-ENCLOSED CIRCUIT BREAKERS

2.6.1. Provide circuit breakers in accordance with the applicable requirements in Section 26 24 16, PANELBOARDS.

2.6.2. Enclosures shall be the NEMA types shown on the drawings. Where the types are not shown, they shall be the NEMA type most suitable for the ambient environmental conditions.

PART 3. EXECUTION

3.1. INSTALLATION

3.1.1. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer’s instructions.

3.1.2. Fused switches shall be furnished complete with fuses. Arrange fuses such that rating information is readable without removing the fuses.

3.2. ACCEPTANCE CHECKS AND TESTS

3.2.1. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

3.2.1.1. Visual Inspection and Tests:

3.2.1.1.1. Compare equipment nameplate data with specifications and approved shop drawings.

3.2.1.1.2. Inspect physical, electrical, and mechanical condition.

3.2.1.1.3. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method.

3.2.1.1.4. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3. SPARE PARTS

3.3.1. Two weeks prior to the final inspection, furnish one complete set of spare fuses for each fused disconnect switch installed on the project. Deliver the spare fuses to the COR.

END OF SECTION 26 29 21

---------- END OF SPECIFICATION ----------