

## Replace Arc Jet Complex SVS Boiler

### Attachment J-1 Revision 1

5/15/2013

Note: only specification sections that have changed are included in this document.

1. Change Section 011100, Subsection 1.1 Summary to read '...Request for Proposal...' instead of '...Invitation to Bid...'
2. Change Section 011100, Subsection 1.4 SD-01 Preconstruction Submittals to read '...The Contractor shall...' instead of '...Upon receipt of Government Furnished Equipment, the Contractor shall...'
3. Delete Section 011100, Subsection 1.5.1, Item k.
4. Change Section 011100, Subsection 1.4 Submittal to read '...Contractor shall submit...' instead of 'Upon receipt of the Government Furnished Equipment, the Contractor shall submit...'
5. Change Section 011100, Subsection 1.5.2 BIM to read '...Government...' instead of '...AE...'
6. Change Section 011100, Subsection 1.6 to read '...Normal duty hours for work shall be from 7:00 a.m. to 5:00 p.m., Monday through Friday...'
7. Change Section 011100, Subsection 1.5.2 to read '...Building Information Modeling Scope of Services and Requirements For Construction Contractor In A Design-Bid-Build Process - Replace Arc Jet Complex SVS Boiler' dated May 10, 2013....'
8. Delete Section 011100, Appendix A, dated August 24, 2012.
9. Delete Section 011100, Subsection 1.10.
10. Change Section 011400, Subsection 1.2 to read '...term "working days" shall refer to the Government's working days: 5 days per week Monday thru Friday, excluding holidays....'
11. Change Section 011400, Subsection 1.3.6 to read:
  - a. Notify the COR at least 72 hours prior to starting excavation work. Contractor is responsible for marking and verifying all utilities not marked.
  - b. The Contractor shall verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed. But indicated in locations to be transversed by piping, ducts, and other work to be installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.
  - c. Work shall be scheduled to hold outages to a minimum.
  - d. COR may permit utility outages at his discretion.
  - e. Contractor shall not be entitled to additional payment for utility outages and connections required to be performed outside the regular work hours.
  - f. Requests for utility outages and connections shall be made in writing to the COR at least 10 calendar days in advance of the time required. Each request shall state the system involved, area involved, approximate duration of outage, and the nature of work involved.

g. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays unless otherwise approved by the COR. Conform to procedures required in the Subsection "Work Outside Regular Hours."

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

i. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, and shall be considered utility cutovers pursuant to the Subsection entitled "Work Outside Regular Hours."

j. Building-wide shutdowns shall require 15 working days advanced written notice to the COR.

12. Add Section 011400, Subsections 1.3.7, 1.3.8 and 1.3.9 as follows:

#### 1.3.7 Borrow, Excavation, Welding, and Burning Permits

ACTIVITY	SUBMISSION DATE	SUBMISSION FORM
Borrow Permits	15 calendar days prior to work	
Excavation Permits	15 calendar days prior to work	21
Welding Permits	15 calendar days prior to work	21

Permits shall be posted at a conspicuous location in the construction area.

Burning of trash or rubbish is not permitted on project site.

Any burning of trash or rubbish shall be done in strict compliance with requirements established by the authority having jurisdiction.

#### 1.3.8 Location of Underground Facilities

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

#### 1.3.9 Notification Prior to Excavation

Notify the COR at least 15 days prior to starting excavation work. Contractor is responsible for marking all utilities.

13. Add the following submittal to Section 013000, Subsection 1.2:

SD-07 Certificates

Certificate of completion: Construction Quality Management for Contractors

14. Change Section 013000, Subsection 1.5 to read "...In addition to the above experience requirements, the Project Manager and on-site Project Superintendent shall complete the course entitled "Construction Quality Management for Contractors" prior to the start of construction. Contractor is responsible for scheduling and attending the course. Submit certificates of completion for both the superintendent and project manager..."

15. Change Section 013000, Subsection 1.8 to read "...Within 10 working days after contract award..."

16. Change Section 013201.00 10, Item e. to read "Submission and approval of installed equipment lists."

17. Change Section 013201.00, multiple locations: change “days” to “working days”
18. Change section 01 33 00, subsection 1.5 and its subsections. References to Designer of record (DOR) have been removed and replaced with references to “the government”.
19. Change section 01 33 00 – 1.5.2: for information only to: At the COR's discretion a submittal may be designated "For Information Only". Such submittals are part of the project record but do not require government review or approval.
20. Change DOR (Designer of Record) to Government in the following Subsections:
  - a. Section 013300, Subsection 1.10 and 1.10.1.
21. Change Section 013201.00 10, Subsection 3.5.1 to read ‘...less than or equal to 20 working days...’
22. Change Section 013526, Subsection 1.4.e to read ‘...within five working days both as provided by the COR...’
23. Change Section 013526, Subsection 1.15 to read:

Operations performed by the Contractor that involve the use of equipment with output of high noise levels (jackhammers, air compressors, and explosive-actuated devices) shall be scheduled for during the hours 8 a.m. to 5 p.m. unless otherwise approved in writing by the COR. The government may further restrict the hours of operation of high noise level equipment at the COR's discretion. Use of any such equipment shall be approved in writing by the COR prior to commencement of work.
24. Change Section 013526, Subsection 3.6.2.b to read ‘Notify the COR 10 working days...’
25. Change Section 013526, Subsection 3.2 to read ‘...outages at least 3 working days in advance.’
26. Delete the following from Section 013540.00 20, Subsection 1.5 ‘For projects that require the installation of abrasive blasting or sand/bead blasting equipment, include the equipment specifications detailing manufacturer and model and if the equipment has a particle collection system. Permanent abrasive blasting sources that have a confined volume of less than 100 cubic feet and are abated by a particulate filter are exempt from permitting per BAAQMD Regulation 2-1-118.1’
27. Delete the following from Section 013540.00 20, Subsection 1.5 ‘For projects with a footprint greater than 1 acre:...’
28. Change Section 013540.00 20, Subsection 3.1.2.1b, to read ‘...at least 7 working days...’
29. Change Section 015719.00 20, Subsection 3.1.1, to read ‘...Within thirty calendar days after...’
30. Change Section 015719.00 20, Subsection 3.6, to read ‘...at the end of construction (30 calendar days from final acceptance), and update...’
31. Change Section 015719.00 20, Subsection 3.12, to read ‘...that a verbal notification was made within 15 working days...’
32. Change Section 015719.00 20, Subsection 3.13.2.3a.1, to read ‘...within sixty (60) calendar days after the materials have been generated...’
33. Change Section 015719.0020, Subsection 3.16 to read:

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

34. Change Section 017419, Subsection 1.5, to read '...within 15 calendar days after notice to proceed and not less than 10 calendar days...'
35. Change Section 017800, Subsection 1.4.1.1, to read '...The Government will supply 2 full size sets of the contract drawings to the Contractor for use in the record drawings as needed.'
36. Change Section 017823, Subsection 1.3, to read '...Submit three hard copies and one electronic copy of...'
37. Change Section 018612.07 40, Subsection 1.7, to read '...while system is under warranty 5 working days after...'
38. Change Section 018612.07 40, Subsection 3.1 : Submit record drawings, at least 10 working days after completion of equipment
39. Change Section 018626.07 40, Subsection 1.7, to read '...system is under warranty 7 days after notification, unless additional...'
40. Change Section 051200, Subsection 1.7.1 Drawing Requirements to read '...Government...' instead of '...structural engineer of record...'
41. Change Section 223100, Subsection 2.2.1 to read '...to a maximum effluent total hardness of 0.42 mg/L...'
42. Change Section 223100, Subsection 2.2.3, to read 'A system shall be provided within the softener tank for collecting softened water and distributing backwash water. The system shall be hub-lateral or header-lateral distributor head type. Underdrain system shall distribute the backwash water uniformly over the entire filter area, and at such velocities that will prevent the channeling of the filter bed.'
43. Change Section 223100, Subsection 2.2.3.1 by adding the following at the beginning of the Subsection: 'A hub-lateral or header-lateral distributor is acceptable.'
44. Change Section 223100, Subsection 2.3.1 to read '...fabricated from polyethylene, or steel conforming to...'
45. Change Section 223100, Subsection 2.7.1 to read 'Each softener shall be provided with a displacement or turbine-type water meter reading in U.S. gallons. Meter shall be equipped with necessary wiring and an alarm device to give notice when the unit has delivered 362,388/n gallons of water. Meter shall be installed in the soft-water line from the softener unit, and shall be so located as to be readily accessible for reading and setting. Meter contacts shall be infinitely adjustable over the range of the meter to permit setting to suit actual hardness of the water being treated. The purpose of the alarm is to notify that the capacity of the unit is being approached.'
46. Change Section 223100, Subsection 2.7.2 to read '...when the hardness of the water delivered by the softener unit exceeds 1.0 mg/l.'
47. Change Specification Section 330523.13, Subsection 1.4:
  - a. Government, Delivery, Storage, and Handling of Material to read '... Government...' instead of '... Engineer of Record...'

b. Submittal requirements moved to subsection 1.3.

48. Change Specification Section 40 17 26.00 20, Subsection 1.6.2.2 Performance to read:

All pipe welding shall be performed by stamp holder(s) with stamp designation(s) applicable to this work. Steam boiler piping shall be S stamped and boiler external piping shall be PP stamped. B31.3 and non-boiler external B31.1 piping shall be fabricated by an ASME S, PP or U stamp holder under their ASME quality assurance program except for stamping, which is not required. The Contractor shall be responsible for the quality of joint preparation, welding, and examination. Clearly identify and record materials used in the welding operations. The examination and testing defined in this specification are minimum requirements. Provide additional examination and testing as necessary to achieve the quality required.

## SECTION 01 11 00

## SUMMARY OF WORK

## Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for a description of work covered in this contract and is required for use in all projects.

## 1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Request for proposal, except where a particular edition or revision thereof is indicated in the reference.

## ASTM INTERNATIONAL (ASTM)

ASTM E 2114 Standard Terminology for Sustainability Relative to the Performance of Buildings

## 1.3 DEFINITIONS

Definitions pertaining to sustainable development are as defined in ASTM E 2114, and as specified.

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

## 1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

The Contractor shall submit records in accordance with paragraph entitled, "Government Furnished Property," of this section.

Submit the following items to the COR:

Utility Outage Requests  
Utility Connection Requests  
Borrow Permits  
Excavation Permits  
Welding Permits  
Burning Permits

## 1.5 WORK COVERED BY CONTRACT DOCUMENTS

### 1.5.1 Project Description

This project is located at the NASA Ames Research Center (ARC) entitled Replace Arc Jet Complex Steam Vacuum System (SVS) Boiler. The new, fully functional boiler plant to be constructed will be located north of existing building ARC Building N231 and west of the existing Arc Jet Complex Steam Vacuum System.

The base scope of work includes:

- a. Three (3) low emission, high pressure steam boilers.
- b. Deaerator heater and feedwater tank.
- c. Boiler NOx reduction systems.
- d. Bulk ammonia tank system.
- e. Supporting and connecting piping.
- f. Boiler plant controls.
- g. Other major boiler plant mechanical equipment, including auxiliary boiler, combustion air fan, boiler, feedwater & chemical feed pumps, blowdown recovery heat exchanger, boiler makeup water softener package, flow measuring devices, backflow preventers, steam traps, flash tanks, control valve station, pressure reducing valve station, and safety valves.
- h. Reinforced concrete slab foundation.
- i. Structural steel canopy covering the full footprint of the new boiler plant.
- j. Platforms and stairs for servicing boilers and feedwater/de-aerator tank.
- k. Demolition of site utilities within boundary of construction.
- l. Demolition of room interior within new control room in N231 Arc Jet Complex Boiler Plant.
- m. Electric distribution service.
- n. Boiler control room in Building N231 Arc Jet Complex Boiler Plant.

- o. Control room lighting, fire alarm, security, data and communication systems.
- p. Gas and water utilities.
- q. Earthwork, including grading and drainage improvements.
- r. Asphalt pavement surrounding new boiler plant foundation slab.
- s. Perimeter site fence with concrete ramps, manual sliding gates and card access man gate.
- t. Site restoration.
- u. Traffic control for streets affected by construction operations.
- v. Component and integrated system testing.

The bid option scope of work includes:

**BID OPTION 1 - NOX SPHERE 6**

Demolition of (E) NOx Sphere 6, associated accessory buildings, tanks and piping of abandoned NOx system. Bid option includes all demolition work above ground shown within this boundary. Demolish scrubber sphere and structural supports, NOx scrubber tower, NOx scrubber surge holding tank, NOx scrubber surge waste tank, storage shed, chemical tank and associated piping.

**BID OPTION 2 -BOILER AUXILIARY STEAM HEATING SYSTEM**

Design, furnish and install auxiliary steam heating system for all three boilers to utilize heat exchanger in mud drum for maintaining boiler temperature above 250°F while main burners are shut off. Auxiliary heating system shall heat the two boilers intended for next day service. System shall be designed for automatic unattended service. Combining boiler auxiliary heating system with deaerator auxiliary heating system into one system is an acceptable alternative.

**BID OPTION 3 - BOILER STACK ACCESS**

Provide SVS Boiler stack platforms and caged ladders.

**BID OPTION 4**

Not Used.

**BID OPTION 5 - N231 ARC JET COMPLEX BOILER PLANT RESTROOM**

Remodel N231 Arc Jet Complex Boiler Plant restroom for ADA compliance. Provide shower room and tankless water heater.

**BID OPTION 6 - N231 ARC JET COMPLEX BOILER PLANT PAINTING, PARKING AND CONTROL ROOM HVAC**

Provide N231 Arc Jet Complex Boiler Plant control room replacement HVAC system, entry walkway and ADA ramp, parking lot paving and curbs, and painting of N231 Arc Jet Complex Boiler Plant east high bay wall.

**BID OPTION 7 - N234A BOILER & FWDA DEMOLITION**

Demolition of the (E) SVS Boiler and FWDA system located inside N234A. Demolish (E) mechanical equipment, unless specifically identified to remain. Equipment demolition scope includes all connecting piping, pumps, controls, instruments and electrical power, which are not required for other equipment identified to remain.

**1.5.2 Building Information Modeling (BIM)**

The Contractor shall construct the project utilizing Building Information Modeling procedures and requirements as set forth in the NASA BIM Scope of Services document, Appendix A, 'Building Information Modeling Scope of Services and Requirements For Construction Contractor In A Design-Bid-Build Process - Replace Arc Jet Complex SVS Boiler' dated May 10, 2013.

Upon award of the construction contract, the COR will provide to the Contractor Building Information Model (BIM) developed for this project by the Government. These models are for the use by the contractor in the development of the BIM required under the scope of service document referenced in this specification. The Contractor will not construe the A/E-developed BIM as meeting the whole or part of the requirements identified in scope of services document referenced in Appendix A. These requirements are the sole responsibility of the Contractor.

**1.5.3 Location**

The work shall be located at the Arc Jet Complex at Ames Research Center, Moffett Field, California, approximately as indicated. The exact location will be shown by the COR.

**1.6 WORK RESCHEDULING**

Contractor shall allow for a maximum of 21 calendar days where construction activity is prohibitive. Further allowance for 10 calendar days of excavation and subsurface activity abeyance shall be imposed where other construction activities are permitted. Government will provide 24 hour notification each time the restrictions are invoked.

**1.7 PROJECT ENVIRONMENTAL GOALS**

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

- a. Preserve and restore the site ecosystem and biodiversity; avoid site degradation and erosion. Minimize offsite environmental impact.
- b. Use the minimum amount of energy, water, and materials feasible to meet the design intent. Select energy and water efficient equipment and strategies.
- c. Use environmentally preferable products and decrease toxicity level of materials used.
- d. Use renewable energy and material resources.

- e. Optimize operational performance (through commissioning efforts) in order to ensure energy efficient equipment operates as intended. Consider the durability, maintainability, and flexibility of building systems.
- f. Manage construction site and storage of materials to ensure no negative impact on the indoor environmental quality of the building.
- g. Reduce construction waste through reuse, recycling, and supplier take-back.

#### 1.8 OCCUPANCY OF PREMISES

Building(s) will be occupied during performance of work under this Contract. Occupancy notifications will be posted in a prominent location in the work area.

Before work is started, the Contractor shall arrange with the COR a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

#### 1.9 EXISTING WORK

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

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

#### 1.10 Salvage Material And Equipment

Items designated by the COR to be salvaged shall remain the property of the Government.

The salvaged property shall be segregated, itemized, delivered, and off-loaded at the Government designated storage area located within 1 miles of the construction site.

Contractor shall maintain property control records for material or equipment designated as salvage. Contractor's system of property control may be used if approved by the COR. Contractor shall be responsible for storage and protection of salvaged materials and equipment until disposition by the COR.

#### PART 2 PRODUCTS

Not used.

#### PART 3 EXECUTION

Not used.

-- End of Section --

APPENDIX A

**FACILITY INFORMATION MODELING SCOPE OF  
SERVICES AND REQUIREMENTS FOR  
CONSTRUCTION CONTRACTOR IN A DESIGN-  
BID-BUILD PROCESS**

**Replace Arc Jet Complex SVS Boiler**

**May 10, 2013**

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## **1. INTRODUCTION**

This document defines the Contractor's scope of work and deliverables for using Building Information Modeling on NASA projects delivered using a design-bid-build methodology. If attached to an Invitation For Bid, the Contractor's response should include the below tasks and deliverables within its proposal. If attached to the Contractor's contract with NASA, the tasks and deliverables required by this document will become an integral part of the contract. Services and deliverables must comply with NASA Facility Project Requirements NPR 8820 and APR 8829.1.

### **1.1 Statement of Purpose**

If used effectively, BIM provides opportunities to improve facility quality while maintaining or reducing facility cost. In addition, BIM creates opportunities for reusing data for multiple purposes, including NASA's operation and maintenance of its facilities. To achieve these ends, the BIM must be structured appropriately. This document describes NASA's requirements for use of Building Information Models (BIM) in the construction of its facilities.

### **1.2 Building Information Model**

"Building Information Model" (BIM) or "Model" is a parametric, computable representation of the project design developed by NASA's design professional consultants ("Designers"), and construction details developed by the Contractor and its subcontractors that are integrated into the model. As used in this BIM Specification, references to Building Information Model, BIM, or the Model, include the primary design model or models and all linked, related, affiliated or subsidiary models developed for design, analysis, estimating, detailing, fabrication, construction, operation or maintenance of the project, or any portion or element of the project.

### **1.3 BIM Competence and Responsibilities**

Contractor must provide NASA with a detailed written description of the BIM experience of its key project team members. At a minimum, the key project team members include the construction project manager, the construction cost estimator, scheduling engineer, construction project engineer, and construction superintendent. In addition, Contractor must designate a BIM Manager to oversee the technical aspects of developing, managing and maintaining the BIM model. Contractor's proposal must describe the BIM experience and responsibilities of these key personnel on at least three prior projects that are similar to the

current project in size and complexity. The proposal must also describe how their prior BIM experience relates to specific BIM deliverables and tasks within the Contractor's scope of work or proposal.

Contractor must have, or must obtain at its own cost, sufficient software licenses and computer hardware to adequately perform the services required.

#### **1.4 Data Ownership and Reuse**

NASA owns the BIM, the data contained within it, and all copyrights to the BIM. Contractor must arrange by contract to have the ownership and copyright to those portions of the BIM created by Contractor and its subcontractor's assigned to NASA. Contractor shall make BIM available to NASA exclusively for purposes of determining clash detection of facility systems and components, the quantity of components, calculating the surface area or volumes of materials or assemblies necessary for the completion of the project, optimum construction sequencing, material logistics, and construction equipment placement (the "Reference Uses") and Contractor transfers the BIM to NASA exclusively for Reference Uses.

#### **1.5 Relationship of BIM Requirements to other Requirements**

Contractor's use and development of the BIM must satisfy the requirements of the Invitation For Bid, NASA Facility Project Requirements, this BIM Specification, and any additional requirements noted in the Contract. To the greatest extent practicable, the BIM should describe the project as it will be constructed, with the exception of elements that can not be practicably modeled because of software limitations or that are smaller than elements normally modeled on similar projects. All limitations to the extent of modeling must be identified in the BIM Execution Plan (Section 3) and agreed in writing by the NASA COR. Those project elements that are not modeled must be constructed in accordance with supplementary design information prepared by Contractor that has been fully coordinated with the modeled information.

## **2. MODEL COMMUNICATION AND ACCESSIBILITY**

### **2.1 Security**

The NASA COR will advise Contractor of the security classification applicable to the BIM, including draft and related information. Contractor is responsible for maintaining the security of the BIM, including access to the BIM, in accordance with NASA regulations and

guidelines. The obligation to keep the BIM secure continues throughout performance of this contract and survives termination. At the conclusion of the project, the BIM and all draft or related information must be given to NASA and any copies destroyed in a manner appropriate for the security classification applicable to the information and as required by NASA regulations.

## 2.2 NASA Interaction

Contractor must maintain and administer the BIM and associated servers and provide secure access to NASA personnel and NASA contractors as designated by the NASA COR. NASA's right to review, and NASA's review of the BIM is for NASA's convenience, alone, and does not create any duty for NASA to review the BIM or to take any action upon reviewing the BIM, nor does it relieve the Contractor of any of its responsibility for complying with the terms of its contract, including its responsibility to properly construct the project.

### 2.2.1 Commissioning

Contractor will provide the NASA designated commissioning authority with access to the BIM and associated servers. The Contractor must coordinate with the commissioning authority the integration of model view definitions into the BIM.

### 2.2.2 Facility Management

Contractor will provide the NASA designated facility managers with access to the BIM and associated servers. The Contractor must coordinate with the facility managers the integration of model view definitions and the format and content of the Record BIM.

### 2.2.3 Reviews

The BIM must be reasonably available for NASA review and comment throughout the project. The NASA COR, and others designated by the Project Manager shall be provided with secure access to the server or servers where the BIM is located and with a reasonable method for providing comments regarding the BIM.

NASA's right to review, and NASA's review of the BIM is for NASA's convenience, alone, and does not create any duty for NASA to review the BIM or to take any action upon reviewing the BIM, nor does it relieve Design/Builder of any of its responsibility for complying with the terms of its contract, including its responsibility to properly design and construct the project.

#### 2.2.4 Export information

Contractor will provide the NASA with access to the BIM and associated servers for exporting information. NASA reserves the right to utilize information exported from the BIM at any time during the contract.

### 2.3 Clash Detection and Conflict Resolution

#### 2.3.1 Clash Identification and Resolution Period

The Contractor must conduct and manage an adequate and thorough Clash Detection process before commencing construction so that interferences between facility components will be detected and resolved before fabrication and installation. Contractor is solely responsible for the cost of remedying any clashes that could have been discovered during this Clash Detection process. Before commencing construction, and as indicated in any shop drawing or submittal schedule Contractor must prepare or obtain all shop information, fabrication information, or layout information (Submittals) necessary to clash detect the Submittals against each other and against the Contract Documents. If the Submittals are not in an interoperable 3D modeled format, Contractor must model the Submittal information to allow digital clash detection.

#### 2.3.2 General

The Contractor's BIM Manager must assemble a composite model from all of the model parts for the purpose of performing a visual check of the facility design for spatial and system coordination.

The clash detection process should uncover and address hard clashes between modeled elements and soft clashes, such as infringements into code or maintenance required clearances and necessary clearances for fireproofing, insulation or other non-modeled elements. Prior to each scheduled coordination meeting, an updated clash report must be issued by the BIM Manager to technical and engineering subcontractors.

Contractor must use coordination software for assembling the various construction models to electronically identify, collectively coordinate resolutions, and track and publish interference reports between all disciplines. The Contractor must be responsible for updating their models to reflect the coordinated resolution.

The Contractor must review the model and the clash reports in

coordination meetings as required by the BEP, until all spatial and system coordination issues have been resolved. The clash report must be integrated and overlaid within the BIM.

Internal Clash Resolution – The Contractor must verify that the Subcontractors responsible for multiple scopes of work are coordinating the clashes between those scopes prior to providing those models to the Contractor’s BIM Information Manager for spatial and system coordination.

Spatial Coordination Verification: Contractor to maintain verification and tracking of resolved conflicts of all discipline coordination issues.

For ease of identification during the 3D clash detection/coordination process, it is required that the following trades be represented in these assigned colors:

**Trade colors for Clash Detection**

<b>Trade Name</b>	<b>Color Name</b>	<b>RGB Number</b>
Architecture	White	255,255,255
Structural Steel	Maroon	176,48,96
Concrete	Grey75	191,191,191
HVAC Equipment:	Gold	255,215,0
HVAC Supply Duct/Diffuser	Sky Blue	50,153,204
HVAC Return Duct/Diffuser	Magenta	255,0,255
HVAC Pipe	Gold	255,215,0
Electrical Equipment	Dark Yellow	205,205,0
Electrical Conduits	Light Yellow	255,255,224
Communication Conduit	Light Blue	205,127,50
Electrical Cable Tray	Dark Orange	255,140,0
Electrical Lighting	Yellow	255,255,0
Plumbing Water	Cyan	209,238,238
*Process Piping – Auxiliary Heating Water Return (AWXR)	11,Dark Pink	255 127, 127

*Process Piping – Blowdown (BD)	21,Peach	255, 159, 127
*Process Piping – Boiler Feedwater (BFW)	101,Kelly Green	82, 165, 103
*Process Piping – Chemical Feed (CF)	8,Medium Grey	128, 128, 128
*Process Piping – Feedwater Drain (FWD)	101,Bright Green	127, 255, 159
*Process Piping – Medium Pressure Gas (G)	211,Bright Magenta	255, 127, 255
*Process Piping – High Press. Steam (HPS)	51, Faded Yellow	255, 255, 127
*Process Piping – Instrument Air (IA)	161,Lavender	127, 159, 255
*Process Piping – Low Press. Steam (LPS)	141,Faded Cyan	127, 223, 255
*Process Piping – Soft Cold Water (SCW)	31,Sienna	255, 191, 127
*Process Piping – Vent (A)	161,Lavender	127, 159, 255
Plumbing Sewer	Magenta	255,0,255
Plumbing Storm Drain	Green	0,255,0
Fire Protection	Red	255,0,0
Pneumatic Tube	Dark Green	47,79,47
Equipment	Light Green	152,251,152
Gas	Light Green	152,251,152
Security Systems	Orange	255,165,0
Fire Alarm	Fuchsia	255,0,255

### 2.3.3 Minimum Requirements for Spatial Coordination and Clash Detection

*Architecture + Structural:* Below-grade spaces, proposed floor plates with

major penetrations, floor-to-floor heights, beam clearances, heavy utilities locations, floor loads, core, and vertical shafts, beam depths and required clearances, slab thickness, columns, column caps, and structural bracing including seismic. Provide adequate space for construction and maintenance access to structural elements, facility equipment, and distribution systems.

*MEPF (internal):* Clash detection for MEPF elements.

*Architecture + MEPF:* Structural and space elements, flow and isolation requirements, proposed functional area configurations, floor-to-floor heights, fire containment, vertical and horizontal transportation. Possible NASA defined future expansions must be considered and must be clash-free.

*MEPF/HVAC + Architecture, Structure, and Process Piping:* Main distribution and collection systems, configurations and sizes for piping, duct, conduit, power wiring, blowers; diffusers; large compressors; intakes, large compressors, hangers. Clearance reservations for equipment maintenance filter removal, and equipment removal and replacement must be modeled with the equipment, and sign-off on the adequacy of the space reservations must be obtained from NASA.

Vertical shafts will be reviewed to ensure that adequate space has been allocated for all of the vertical mechanical systems. All of the shafts are to line up floor to floor.

*Architecture/HVAC + Interiors:* Merges must include ductwork and piping + ceilings and FF&E + HVAC.

*General Model Quality Checking:* All walls must be properly joined to prevent “space leaks” in areas defined by enclosing walls. Bounding boxes must not conflict.

*Accessibility Compliance:* Wheelchair pathways and clearances + structure + MEPF components. These components must include plumbing fixtures.

## 2.4 Scheduling

Reviews of the BIM during construction must be part of the required construction meetings. The BIM reviews must be included in the Contractor’s construction meeting agenda. The BIM reviews must include clash detection, model view definitions and facility management requirements integration.

The BIM must be linked to Contractor’s digital critical path method

(“CPM”) approved baseline construction schedule and subsequent CPM schedule updates to allow simulation of the construction phasing and sequencing.

Impacts to the schedule from change orders, which create modifications to the BIM, will require, through the link between the BIM and the schedule, the contractor to identify the schedule impacts in the BIM.

At a minimum, the digital schedule should link to the following modeled systems:

2.4.1 Structural: All structural framing components including foundations, grade beams, columns, load bearing walls, floor and roof decks and supports;

2.4.2 Exterior Facility Envelope: Stud walls, Exterior panels and assemblies, curtain walls, openings, and glazing;

2.4.3 Interior partitions: Main plumbing walls and wall assemblies;

2.4.4 Mechanical systems: Main duct work, process piping and equipment;

2.4.5 Roof systems: Roof assemblies, major roof mounted equipment, openings;

2.4.6 Plumbing: Main connection lines from site, main plumbing lines;

2.4.7 Sitework: Excavation work, footings, foundations, on-grade slab; and

2.4.8 Site Logistics: Site layout, safety access; material storage; coordination.

## **2.5 Construction Management**

### **2.5.1 Submittals**

In addition to any other requirements of the Contract Documents, submittals should be provided as:

2.5.1.1 Manufacturer’s model elements that are interoperable with the BIM and provided by the manufacturer or vendor of materials, equipment or systems;

2.5.1.2 Custom created model elements prepared by the Contractor or its subcontractors that are interoperable with the BIM and model portions of the project, specific installations or details or equipment;

2.5.1.3 Fabrication or detail models that are prepared by Contractor or its subcontractors. These fabrication or detail models must be in software that is interoperable with the BIM or that can be compared to the BIM for clash detection or other purposes through the use of viewing software that is interoperable with the BIM and the fabrication or detail modeling software;

2.5.1.4 Contractor must submit for review an analysis report detailing the BIM coordination and clash detection activities. The report must include:

- Coordination and clash detection between the contract document design models and Contractor created models;
- Coordination and clash detection between all Contractor created models; and
- Identification of coordination issues and clashes

## 2.5.2 Change Orders

Design changes reflected in Change Orders approved by NASA must be promptly incorporated into the BIM such that the BIM reflects the current approved design. Design changes during construction must be clash-detected to determine the extent of impact due to the changed design prior to approval of the Change Order.

## 2.5.3 Commissioning

In addition to any other requirements for commissioning Contractor must:

- Coordinate with the commissioning authority throughout construction to update the BIM with model view definitions of the model elements.
- Provide the commissioning authority access to the BIM during construction to review and export out model information.

## 2.6 Record BIM

The BIM must be updated continuously throughout the construction process and must include all addenda, approved change orders, field orders, clarifications, Request for Information (RFI) responses and as-built conditions. The Record BIM includes the BIM at a Level of Detail 500 and includes a description of the relationship of each model in the Record BIM to the others. Contractor may reference the AIA Document E202 – 2008 for Level of

Detail 500 description. In addition, the Record BIM must be accompanied by the final versions of all fabrication and detailing models prepared by Contractor and its subcontractors. All models must be provided in native file format with a description of the software used to create the model (software manufacturer, software name, version number, and operating system used for the software).

### **3. BIM EXECUTION PLAN (BEP)**

Within 30 days after execution of the Contract, Contractor will prepare a BIM Execution Plan (BEP) confirming the intended uses of the BIM during both the design and construction phases of the project, describing the communication paths, the model structure, the Level of Detail of the modeled elements at each contractual milestone or deliverable, and the BIM process design. The BEP will be provided to NASA for its review and approval. Once approved, the BEP cannot be modified without NASA's written approval.

The BEP must, at a minimum, contain the following elements:

#### **3.1 BIM Staffing Plan**

Contractor must identify for itself and each of its subcontractors and consultants, the persons that within their organizations responsible for managing the BIM, or portion of the BIM. Where an organization is responsible for multiple disciplines, or where the project is divided into sections or phases, the BIM Staffing Plan should include the persons responsible for the discipline, section or phase. For each person identified, the BIM Staffing Plan should include the person's:

- Name;
- Title;
- Contact Information (location, primary phone number, mobile phone number, and email address);
- Description of the duration and extent of the person's experience with the BIM software the Contractor proposes to use;
- Identification and description of prior projects where the person used BIM software and the extent it was used on that project;
- Role (i.e., BIM structural design lead; BIM mechanical design leader, etc.); and
- Anticipated time devoted to the project in hours per week. If the level of activity will vary throughout the project, the staffing plan should be delivered as a schedule. This may be depicted on a monthly schedule basis where the level of activity will vary

during the project.

### **3.2 Security Plan**

Contractor must prepare a Security Plan that describes the procedures and safeguards used to preserve the confidentiality and integrity of the BIM and to demonstrate compliance with NASA requirements for data security and integrity.

### **3.3 Model Progression Matrix**

The BEP must contain a model progression matrix substantially similar to the Model Progression Specification spreadsheet published by American Institute of Architects, California Council or the Model Element Table, Section 4.2 of American Institute of Architect's Document AIA E-202. The columns of the matrix should be modified to match Contractor's submittal schedule and the Level of Detail (LOD) shown must comply with Unifomat II, Level 3 model components and should include user level sub-categorization, (Unifomat Levels 4 & 5 if necessary to provide appropriately defined LOD and model component author responsibility).

### **3.4 BIM Process Design**

Contractor must lead a workshop that includes Contractor's staff, Contractor's subcontractors, and NASA staff. The purpose of the workshop is to develop process diagrams documenting BIM information exchange and BIM workflow. At a minimum, the process mapping should include a process map of the overall BIM processes and individual detailed maps documenting the information and workflow applicable to specific BIM uses. At the conclusion of the workshop, the Contractor must prepare the process overview and detailed BIM process maps and distribute them to the workshop participants. Examples of the BIM process design maps and supporting worksheets are contained in the BIM Project Execution Planning Guide, published by the Penn State Computer Integrated Construction Research Program.

### **3.5 Schedule**

Contractor must prepare a schedule for BIM deliverables tied to the Model Progression Matrix. The schedule must include all BIM tasks of Contractor's subcontractors, the schedule of clash detection and resolution meetings, and appropriate review time by NASA or other governmental agencies that will comment or render decisions regarding the project construction. The schedule must be submitted to NASA for review as directed by the contract documents.

### 3.6 Model Structure

#### 3.6.1 File Naming Structure

File names for models should be formatted as project number-facility number/site description-discipline.file extension. (Example: ARCH-1111-BL001.rvt) File name prefixes by discipline are listed in the table below.

Architectural Model	PROJ#-SITE_DESC-ARCH
Civil Model	PROJ#-SITE_DESC-CIVIL
Mechanical Model	PROJ#-SITE_DESC-MECH
Plumbing Model	PROJ#-SITE_DESC-PLUMB
Electrical Model	PROJ#-SITE_DESC-ELEC
Structural Model	PROJ#-SITE_DESC-STRUC
Telecommunications/Information Technology Model	PROJ#-SITE_DESC-IT
Coordination Model	PROJ#-SITE_DESC-COORD
Construction Model	CONST
Other Model Types as Required	PROJ#-SITE_DESC-AsReq'd

#### 3.6.2 Model Structure and Division of Modeled Information

In most instances, the BIM will consist of a series of related models that depict information relevant to specific disciplines or uses. Moreover, a specific discipline model or use model may be organized into separate floors, sections, divisions or files. The BEP must describe the organization of the model files, explaining how each file and model is separated, the file naming conventions that will be used for each file type, the relationship of files to each other, and the process that Contractor will use to ensure that all of the models remain current and consistent.

#### 3.6.3 Measurement and Coordinate Systems

The measurement and coordinate systems are to be confirmed and documented in the BEP for this project. The Contractor must provide the following

All measurements must be in units of measurement required by standards applicable to the specific NASA center.

### **3.7 Software and Operating Systems**

The BEP must list the BIM software and computer operating system or systems to be used by Contractor and its subcontractors for this project. The software and operating systems should be identified by vendor, product name, version identifier, build identifier, patch number, and data architecture (32bit/64bit). Listed software, and listed operating systems, can not be changed or upgraded without NASA's written approval, which will not be granted unless Contractor demonstrates that the change or upgrade will not affect the ability to use existing BIM information or to reliably and accurately exchange BIM information with other listed software.

### **3.8 Electronic Communication Procedures**

#### **3.8.1 File Access and Archiving**

The BEP must specify:

- The physical and logical locations of BIM files and related electronic information;
- The protocols for archiving and disaster recovery;
- The protocols for user access and file permissions;
- The directory/subdirectory/file structure used to organize the BIM files and related electronic information;
- The internet address and directory structure for a secure web site, internet accessible project manager, or web portal used to store and access BIM files; and
- Maintenance of BIM as-built information during construction

#### **3.8.2 Electronic file formats and use.**

The BEP must specify:

- The types of digital information that will be transmitted between project participants;
- The acceptable methods of transmission; and
- The acceptable file format(s) to be used for the type of digital information.

### 3.8.3 Contractor Information Manager(s)

The BEP must identify and provide contact information for the persons responsible for managing and executing the responsibilities of this section.

### 3.9 Change Management

The BEP should specify the process for integrating submittals, change orders, RFI responses, clarifications and similar construction phase information into the BIM. The process should describe:

- Who is authorized to integrate the construction level information into the BIM;
- How construction level information will be coordinated and clash detected with the existing BIM information;
- How changes to the BIM will be logged; and
- How construction level information will be identified to distinguish it from Design BIM information.

### 3.10 Construction Management

The Execution Plan must outline the strategy and schedule for utilizing BIM Technology to execute construction related activities and project coordination. The Execution Plan must address the following:

- Constructability analysis with BIM
- Animation/graphic showing installed major facility equipment space clearance reservations for operations, repair, maintenance, and replacement
- Proposed trade coordination strategy (clash detection)
- Proposed use of digital fabrication
- Updating as-built conditions in Record BIM
- Utilization of 4D scheduling and construction sequencing technology
- List of subcontractors using digital fabrication
- Proposed BIM Software to be used by the builder and fabrication modelers
- Strategy to assure all trade information is modeled and coordinated
- Proposed subcontractor BIM workshops and training integrated into project schedule
- Integration of construction changes and commissioning data into BIM
- Strategy for COBie2 integration and submittals

### **3.11 Facility Management**

The BEP must specify a workflow to identify model elements that are significant for operations and maintenance of the facility and to map data structures from NASA's Computerized Maintenance Management System (CMMS) and Computer Aided Facility Management (CAFM) to Systems attributes of the identified model elements. Where the CMMS and Facility Management System (FMS) data structure does not have a comparable attribute in a modeled element, the BEP should define an additional custom model element attribute to provide congruent mapping to the CMMS data structure.

The BEP should specify a workflow for transferring FM data from the BIM to the CMMS either directly or through middleware that manages the interchange of information between the Record Model and the CMMS.

## **4. INTEROPERABILITY**

NASA has selected BIM software that is adequate for Contractor's tasks. Moreover, Contractor must demonstrate that compatible software used by it and its subcontractors can exchange BIM information reliably and accurately and can read and export BIM information into open source file formats to the extent required in Section 5.2. Contractor must demonstrate, through the technical specification of the chosen compatible software, that it can meet the required functional requirements of the software listed below.

### **4.1 BIM Software**

BIM software for NASA projects must support intelligent objects and parametric relationships. The software must comply with current industry interoperability standards and be usable in a collaborative environment. All software platforms used for NASA projects must be compliant with:

- The most current version of Industry Foundation Classes (IFC) file format; and
- Commercially available collaboration software that provides interoperability between the different software applications (see below).

Additional software not listed below may be found on the Facility SMART Alliance web site, <http://www.facilitysmartalliance.org/>.

<b>TYPE</b> (These are general categories. Listed software can be used for more than one "Type.")	<b>SOFTWARE</b> (no order of preference)
Authoring – Design (Architecture, Structural)	Revit Architecture, Revit Structure
Authoring - MEPF (Engineering & Construction)	AutoCAD Plant 3D
Authoring – Civil	Autodesk Civil 3D
Coordination (clash detection)	NavisWorks Manage
4D Scheduling	MS Project

## 4.2 Open Source File Formats/Open Standards

### 4.2.1 Statement of Principal

To ensure the life-cycle use of NASA facility information, NASA requires that information supporting common industry deliverables be provided in existing open standards, where available. For those contract deliverables whose open standard formats have not yet been finalized, the deliverable must be provided in a mutually agreed upon format that allows the re-use of facility information outside the context of the proprietary BIM software. The formats used will be specified in the BIM Execution Plan and must include, at a minimum, the following standards:

### 4.2.2 Current Version IFC Model View Definition (MVD) Formats:

Coordination---This format will be required for all deliverables needed to demonstrate the coordination of all disciplines prior to construction. In addition to the Coordination View file(s), where required, the Contractor will provide a report highlighting automatically detected (hard and soft) collisions and identifying those collisions that require further work by the Contractor.

### 4.2.3 Portable Document Format:

Non-modeled information authored directly by the Contractor must be transformed to PDF to allow searching for and selection of text within the document. Documents authored by others, but used by the Contractor such as manufacturer product data sheets, must be provided the format made available by the manufacturer or scanned as image-based PDF documents.

#### 4.2.4 GBxml

At a minimum, Architectural, Mechanical and Electrical BIM software must support accurate and reliable data export to GBxml for environmental analysis, optimization, and sustainability classifications, such as LEED, Green Globes and Energy Star.

#### 4.2.5 COBie2

BIM authoring software must support data export and import from the COBie2 table databases.

#### 4.2.6 FM/BAS Integration Export

NASA currently uses Maximo by IBM as its primary Computerized Maintenance Management System (CMMS). The Record BIM must map Maximo input fields as required by this Specification to allow CMMS data export from the Record BIM into Maximo. Mapping should follow the guidelines of USACE Engineer Research and Development Center, *COBie2 Data Import/Export Interoperability with the MAXIMO Computerized Maintenance Management System*, November 2008.

### 4.3 Requirements

Contractor must update the BIM to accurately reflect all design and construction changes from the final pre-construction DBIM submitted to NASA.

Contractor must create a Record Building Information Model that accurately reflects “as-built” conditions for all building systems including but not limited to, architectural, civil, structural, mechanical, life safety, and electrical systems.

The Contractor must model the following:

- Underground Utilities (within building footprint and 15’ beyond its perimeter);
- Architectural models;
- Structural models;
- Furniture, Furniture and Equipment models;
- Civil models:
  - All underground utilities
  - Site lighting

- Hardscape (parking, pavement, sidewalks, curbs)
- Mechanical elements limited to:
  - All fixed mechanical ducts;
    - Calculation information and sustaining information tied into models views
    - Space – Zone/Circulation Information
  - All fixtures and equipment (Manufacturer, Model size, and Weight);
  - Equipment performance information (Input/Output);
  - All piping, 3/4” or greater and terminations;
- Electrical elements limited to:
  - Electrical conduit 3/4” (19.05mm) or greater and terminations;
  - All fixtures and equipment (Manufacturer, Model size, and Weight);
  - Equipment performance information (Input/Output);
  - Power distribution (Panels and Circuits);
  - Lighting
- Plumbing elements limited to:
  - Plumbing piping 1/4” (6.35mm) or greater and terminations;
  - All fixtures and equipment (Manufacturer, Model size, and Weight);
- Life Safety elements limited to:
  - Life safety piping 1/4” (6.35mm) or greater and terminations;
  - All fixtures and equipment (Manufacturer, Model size, and Weight);
  - Equipment performance information (Input/Output);
- Telecommunications/Data Communications
  - Conduit 3/4” (19.05mm) or greater and terminations;
  - All fixtures and equipment (Manufacturer, Model size, and Weight);

The following must be defined for all systems:

- Materials;
- Finishes;
- All electrical circuiting;
- Cable trays and raceways;
- Tags;
- Labels;
- All Warranty information tied to the model objects and presented in views;
- Product Data / Cut Sheets tied to the objects; and

- Maintenance Schedules and operations data

#### 4.4 Facility Management Information

Record Model must be consistent with the COBie2 Model View Definition published by the National Institute of Building Science in the Whole Building Design Guide.

The Contractor will assist NASA in the integration of the project BIM into the NASA computerized maintenance management system (CMMS). This Contractor's effort will consist of collecting, validating, updating, and exporting design, construction and commissioning data for NASA's use, and if required by the contract, entering the information into NASA's CMMS.

The Contractor will integrate the building systems into the BAS software by providing a Record BIM which maps to BAS software input fields. Mapping between the Record BIM and the BAS will utilize the established COBie2 guidelines for model view definitions and be coordinated with the commissioning authority.

The Contractor must prepare the BIM at each phase with the following defined information

##### 4.4.1 Construction Phase:

- Type information updated by providing manufacturer, model number, warranty information (parts and labor and duration), replacement cost;
- Component information updated by providing serial number, installation date, warranty start date, and optionally tag number or barcode. Installation date for major equipment will be the finish date of the corresponding schedule activity;
- Spare parts provided for types; and
- Attributes provided for types and components.

##### 4.4.2 Commissioning Phase:

- Documents assigned (uploaded) to corresponding BIM objects (types, components, spaces, facility); and
- Attributes corrected based on real measurements.

## **5. MODELING REQUIREMENTS**

### **5.1 General**

BIM will be used for all facility systems design, development, analysis, and fabrication including but not limited to architectural, structural, mechanical, electrical, plumbing, fire suppression, civil and landscape.

Model objects must contain IFC parameters and associated data applicable to facility system requirements. These elements must support the analytic process include size, material, location, mounting heights, and system information where applicable. As an example, a light fixture may contain several parameters such as energy output requirements, user illumination levels, make, model, manufacturer, and bulb life. Elements, objects and equipment must be tagged with unique identifiers (GUIDs).

### **5.2 Types of Model Elements**

Model elements must be derived from the following sources:

Manufacturer's Model Elements - elements created by and acquired from manufacturers often have more information than is prudent to keep in the BIM model; the appropriate level of detail should be retained for the design element. However, embedded performance data must remain for analysis and specification purposes.

Custom Created Model Elements – custom model elements that are created must utilize appropriate BIM Authoring tool templates to create custom elements. Custom models elements need to be assigned as a part of a family or group with parametric model view definition information.

Fabrication Model Elements – elements created by the construction sub-contract fabricators must have embedded model view definition information required by the commissioning authority for transfer from the BIM to the facility management software. The fabrication model elements must be parametric model objects.

### **5.3 Model Geographical Location**

The spatial coordination (coordinates) of the master BIM file will be set at the beginning of the project. Once established, spatial coordinates will only be changed by mutual consent of the Contractor and the NASA COR, with the matter recorded in the meeting minutes

and the BIM Execution Plan. Once the design coordinate system is agreed upon, any model(s) of existing facilities relevant to the project will be converted into the coordinate system used for each designed facility.

As is standard practice, NASA requires that a facility within a BIM file include a geo-reference to accurately locate that facility within the site and to give it a physical location context at larger scales. The Contractor Information Manager will geo-reference site plans and facility models for site layout surveying and future GIS use in accordance with the State Plane Coordinate system where the project is located. The BIM file point will be located at the SW corner of the structural grid.

#### **5.4 Points of Reference**

The Contractor Information Manager must provide a 3D grid for incorporation into the spatial coordination model. This will provide the viewer with a quick point of reference when navigating through the model. Room information must also be incorporated.

Space information imported from the NASA project program requirements will be the source for space creation in BIM.

Areas of four square feet or greater will be tracked and identified by name, even if those spaces are not listed in the program narrative.

Spatial data will be generated and associated with bounding elements (walls, doors, windows, floors, columns, ceilings).

The Assignable Areas Square Footage (ASF), Non-Assignable Areas Square Footage (NaSF), and Gross Square Footage (GSF) will be modeled for each functional space, using the appropriate space/object BIM tool to capture and carry the information. Spaces will be represented and broken down into functional spaces even though they may be parts of a larger physical space. A physical space may contain several areas that are treated individually in the spatial program. If two areas have different functional space classifications, even though they are within the same physical space, they will be modeled as two separate spaces.

Space/area schedules and diagrams must be dynamically updated from the model geometry.

Spatial Requirements must be validated through reports generated from the BIM.

## **5.5 Requirements for Modeling Space**

Spatial data must be generated and associated with bounding elements (walls, doors, windows, floors, columns, ceilings).

## **5.6 Space Naming and Coding**

Contractors space naming and coding must use the following format:

- Facility Name;
- Facility Number – NASA Center Facility Numbering System;
- Floor (and/or Level);
- Department;
- Sub-department;
- Space Name – English Name & Abbreviation;
- Room Number – NASA Wayfinding Room Number;
- Room Number – Construction Document Number (used on large complex projects for builder use);

## **5.7 Requirements for Record BIM and Facility Management Information**

Contractor must incorporate model view definition information into the BIM as defined by COBie2. The Contractor must utilize the Omniclass<sup>TM</sup> Construction Classification System (OCCS) for the classification structure of the data

## **5.8 Contractor BIM Deliverables**

### **5.8.1 Models**

The Contractor will ensure that the models remain current throughout design and construction of the project. During design and construction the Contractor will be responsible for providing a fully coordinated and assembled model compatible with the original software authoring that is consistent with the:

- Native file format(s) of Models (version as agreed in BIM Execution Plan);
- IFC file format (version as agreed in BIM Execution Plan); and
- Collaboration software format (Navisworks Manage or equal or (version as agreed in BIM Execution Plan) for fully coordinated and

assembled BIM.

The Contractor will provide record model(s) for all facility systems. The model(s) must be fully coordinated and the required instructions on file/folder setup must also be included:

- Native file formats of the final consolidated record model(s) for facility systems used in the multi-discipline coordination process (version as agreed in BIM Management Plan); and
- IFC file format of the consolidated facility systems models (version as agreed in BIM Management Plan).

#### 5.8.2 Data Deliverables

Contractor must provide facility management data, model view definitions, in COBie2 format.

#### 5.8.3 2D Deliverables

Contractor's 2D deliverables must be provide in:

- In PDF format with fully bookmarked pages, where not prepared or maintained in CAD formats; or
- DWG format meeting NASA requirements.
- All 2D drawings must comply with the graphic standards as referenced in NASA Facility Project Requirements, NPR 8820

If the contract requires Contractor to design portions of the project and if, for the portion designed by Contractor will be reviewed by inspection or permitting agencies, Contractor must produce printed drawings from the model, signed and sealed by California licensed professional architects and engineers, as required by the reviewing or permitting agency.

#### 5.8.4 Digital Deliverables

All digital deliverables are to be submitted on DVD or provided electronically through a secure website or other electronic portal with the data clearly organized and software version(s) labeled.

## 6. WAIVERS OF SPECIFIC REQUIREMENTS

If a requirement contained in this document can not be achieved, or can not be achieved at a cost commensurate with the value of the requirement, Contractor may request, in writing, that the requirement be withdrawn or modified. The request must certify that Contractor has diligently attempted to meet the requirement, that the requirement can not reasonably be met, and that alternative approaches meet the intent of the requirement. The request must be supported by evidence of Contractor's research and documentation that the alternative approach meets the function and interoperability requirements of this document. NASA, in its sole discretion, may waive requirements found to be currently unachievable or not commercially practicable. All waiver requests must be in writing and signed by the NASA Contracting Officer.

## 7. ABBREVIATIONS LIST

ADA	Americans with Disabilities Act
BEP	BIM Execution Plan
BIM	Facility Information Model (also Modeling or Management)
COBie2	Construction Operation Facility Information Exchange
DBIM	Design Facility Information Model
FM/BAS	Facility Management / Facility Automation System
FF&E	Furniture, Furnishings, & Equipment
GBxml	Green Facility XML
GSA	General Services Administrations
GUID	Globally Unique Identifier
HVAC	Heating, Ventilation, and Air-Conditioning
IFC	Industry Foundation Classes
LOD	Level of Detail
MEPF	Mechanical, Electrical, Plumbing, Fire Protection
NASA	National Aeronautics and Space Administration

## SECTION 01 14 00

## WORK RESTRICTIONS

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for work and site restrictions.

## 1.2 WORKING DAYS DEFINITION

In all sections of these specifications the term "working days" shall refer to the Government's working days: 5 days per week excluding holidays.

## 1.3 CONTRACTOR ACCESS AND USE OF PREMISES

## 1.3.1 Activity Regulations

Permission to interrupt any Activity roads, and/or utility service shall be requested in writing a minimum of 10 working days prior to the desited date of interruption.

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification. All truck and heavy equipment to be used on the project shall use the Truck and Heavy Equipment Route shown on Drawing No A331-1102-G003.

## 1.3.2 Entry to Radiologically Controlled Areas

Contractor personnel shall not, under any circumstances, enter a radiologically controlled area or cross any posted radiological boundary. This paragraph applies to all phases of contract work. Radiation areas are posted with signs consistent with OSHA requirements. Ensure that employees are familiar with the radiation signs and symbols.

Should contract workers encounter radiological postings and/or boundaries which appear to limit their ability to access or carry out their intended work, they shall notify their contract administrator for resolution of the problem.

## 1.3.2.1 Radioactive Materials and Equipment

All testing equipment, containing a radioactive source, shall be operated in accordance with an approved radioactive equipment plan. This plan shall be submitted to the COR and approved by the Radiation Officer prior to bringing the equipment onsite. This plan shall include:

- a. The name and type of equipment.
- b. The type and size of radiation source.

- c. The dates and locations of the equipment's usage.
- d. The radiological controls that the Contractor will use while operating the equipment.

A different radioactive equipment plan will be required for each different type of equipment, type of radioactive source, or size of radioactive source. A data sheet of for each piece of new radioactive equipment shall be submitted to the COR to forward to the Government's Radiation Safety Officer. The data sheet shall contain the following information:

- a. Name of equipment.
- b. Name and address of equipment manufacturer.
- c. Type and size of radiation source.
- d. The location of the installed radioactive equipment (i.e. building no., floor, code/shop area).

#### 1.3.3 Working Hours

Regular working hours shall consist of a period established by the COR, between 7 a.m. and 5:00 p.m., Monday through Friday, excluding Government holidays.

#### 1.3.4 Work Outside Regular Hours

Work outside regular working hours requires COR approval. Make application 10 working days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the COR may approve work outside regular hours. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the COR.

#### 1.3.5 Occupied and Existing Buildings

Provide temporary closures as required to maintain security as directed by the COR.

Provide dust covers or protective enclosures to protect existing work that remains and Government material during the construction period.

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

#### 1.3.6 Utility Cutovers and Interruptions

- a. Notify the COR at least 72 hours prior to starting excavation work. Contractor is responsible for marking and verifying all utilities not marked.
- b. The Contractor shall verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed. But indicated in locations to be transversed by piping, ducts, and other work to be installed. Verify elevations

before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

- c. Work shall be scheduled to hold outages to a minimum.
- d. COR may permit utility outages at his discretion.
- e. Contractor shall not be entitled to additional payment for utility outages and connections required to be performed outside the regular work hours.
- f. Requests for utility outages and connections shall be made in writing to the COR at least 10 calendar days in advance of the time required. Each request shall state the system involved, area involved, approximate duration of outage, and the nature of work involved.
- g. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays unless otherwise approved by the COR. Conform to procedures required in the paragraph "Work Outside Regular Hours."
- h. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.
- i. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, and shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours."
- j. Building-wide shutdowns shall require 15 working days advanced written notice to the COR.

1.3.7 Borrow, Excavation, Welding, and Burning Permits

<u>ACTIVITY</u>	<u>SUBMISSION DATE</u>	<u>SUBMISSION FORM</u>
Borrow Permits	15 calendar days prior to work	
Excavation Permits	15 calendar days prior to work	21
Welding Permits	15 calendar days prior to work	21

Permits shall be posted at a conspicuous location in the construction area.

Burning of trash or rubbish is not permitted on project site.

Any burning of trash or rubbish shall be done in strict compliance with requirements established by the authority having jurisdiction.

1.3.8 Location Of Underground Facilities

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

at which an adjustment in grade can be made.

#### 1.3.9 Notification Prior to Excavation

Notify the COR at least 15 days prior to starting excavation work. Contact Miss Utility 48 hours prior to excavating. Contractor is responsible for marking all utilities not marked by Miss Utility.

### 1.4 SECURITY REQUIREMENTS

#### 1.4.1 Employment Restrictions

All personnel who perform any work on this contract must be either a U.S. citizen or a permanent resident alien.

#### 1.4.2 Contractor Regulations

- a. For contracts with a duration of longer than 90 days, the Contractor's Project Manager and Superintendent shall apply for a PIV Badge (a.k.a., a "hard badge") within 10 working days of the Contract Award date.
- b. The Contractor shall submit a Temporary Badge Request to the COR for any worker scheduled to come on-site at least two working days prior to the work scheduled.
- c. Employees shall wear and display the badge in the chest area at all times while entering, remaining in, and exiting Ames and each badge shall be used only by the specific individual named on the badge.
- d. Maintain strict accountability over identification badges and passes issued by the Pass and ID office. Immediately report to the Pass and ID Office, any badges/passes missing or lost and the circumstances. Return badges/passes to the COR immediately upon termination of any employee, expiration, completion of contract, or when no longer required. The COR will ensure that all badges/passes are returned and forwarded to the Visitors Office.
- e. Restrict hours of work to 7:00 a.m. - 5:00 p.m. Monday through Friday, work days only. When operational needs require scheduling of work after 5:00 p.m. (Monday through Friday) or on weekends and holidays, provide written notification at least 10 working days in advance to the COR. Such notifications will include specific dates, hours of work, location of work, type of work to be performed, contract number and project title.
- f. Restore all traffic/parking/security signs and markings, including space numbers, designations, and lines, to their original form if such signs/markings are defaced or deleted during construction/repair.
- g. Be responsible for control and security of Contractor-owned equipment and materials at the work site. Report immediately, missing/lost/stolen property to the Ames Police Department (phone 650/604-5416) as each case occurs.
- h. Ensure that no material is stacked within 10 feet of the perimeter. Remove from the work site, or secure ladders or other such equipment which could be used to climb the perimeter fence. Ensure that no vehicles are parked within 10 feet of the perimeter.
- i. Provide written notification to the COR 10 working days prior to actual

start of work to allow for notification of the appropriate departments, offices, and shops of the impact resulting from the contract work. Such notifications will include specific details such as work schedules (including actual start date for entry) and impact.

- j. Ensure that no opening in the roof/walls/windows/fence of the building exist at the end of the work day and do not exist where penetration is possible during non-working hours. If the building cannot be secured at the end of the work day, coordinate action with the Contracting Office to notify the cognizant code to arrange for a security watch by their personnel.
- k. Five working days prior to working in a restricted area, contact the COR to make arrangements for a security guard or other measures required to meet all security requirements. Cost of security guard will be charged to the Contractor.
- l. The Contractor must have a representative on-site during all work performed under the contract to maintain security, safety, and quality control requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

Revision 1 - 05/15/2013

PART 1 GENERAL

1.1 SUMMARY

This section covers the requirements for general administrative paragraphs.

1.2 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Certificate of completion: Construction Quality Management for Contractors

SD-04 Samples

Samples

1.3 SAMPLES

Samples shall be large enough to verify contract requirements. COR has the discretion to request larger samples or a different sample format.

1.4 CONTRACTOR SPECIAL REQUIREMENTS

1.4.1 Asbestos Containing Material

All contract requirements of Section 02 82 14.00 10, ASBESTOS HAZARD CONTROL ACTIVITIES assigned to the Private Qualified Person (PQP) shall be accomplished directly by a first tier subcontractor.

1.5 SUPERVISION

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

Provide at least one (1) qualified Project Manager and one (1) on-site Project Superintendent. Both shall comply with English speaking requirements.

In addition to the above experience requirements, the Project Manager and on-site Project Superintendent shall complete the course entitled "Construction Quality Management for Contractors" prior to the start of construction. Contractor is responsible for scheduling and attending the course. Submit certificates of completion for both the superintendent and project manager.

The Project Manager in this context shall mean the individual with the

responsibility for the overall management of the project and the Project Superintendent shall mean the individual with the responsibility for quality and production. Both the Project Manager and Project Superintendent are subject to removal by the COR for non-compliance with requirements specified in the contract and for failure to manage the project to insure timely completion. Furthermore, the COR may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time for excess costs or damages by the Contractor.

Approval of Project Manager and on-site Project Superintendent is required prior to start of construction. Provide resumes for the proposed Project Manager and on-site Project Superintendent describing their experience with references and qualifications to the COR for approval. The COR reserves the right to interview the proposed Project Manager and on-site Project Superintendent at any time in order to verify the submitted qualifications.

#### 1.6 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule prices, shop drawings, and other submittals, scheduling programming, and prosecution of the work. Major subcontractors who will engage in the work shall also attend.

#### 1.7 AVAILABILITY OF CADD AND BIM DRAWING FILES

After award and upon request, the electronic "Computer-Aided Design (CAD) and Building Information Model (BIM)" drawing files will be made available to NASA and its Contractor for use in preparation of construction drawings.

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

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

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

#### 1.8 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments in Microsoft, Adobe Acrobat, and other similar formats. Within 10 working days after contract award, the Contractor shall provide the COR a single (only one) e-mail address for electronic communications from the COR related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The COR may also use e-mail to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple e-mail address will not allowed.

It is the Contractor's responsibility to make timely distribution of all COR initiated e-mail with its own organization including field office(s). The Contractor shall promptly notify the COR, in writing, of any changes to this e-mail address.

#### 1.9 COMPUTER AND INTERNET CONNECTION

The Contractor shall maintain a computer and internet connection capable of accessing and using NASA's online construction management system.

#### PART 2 PRODUCTS

Not Used

#### PART 3 EXECUTION

Not Used

-- End of Section --

## SECTION 01 32 01.00 10

PROJECT SCHEDULE  
Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for the preparation and maintenance of the project schedule for construction projects or design-build construction projects.

## 1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## U.S. ARMY CORPS OF ENGINEERS (USACE)

ECB 2005-10

Scheduling Requirements for Testing of  
Mechanical Systems in Construction  
Contracts

ER 1-1-11

Administration -- Progress, Schedules, and  
Network Analysis Systems

## 1.3 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Schedule

## 1.4 QUALITY ASSURANCE

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating (activity status) and preparation of reports. The authorized representative shall have previously developed, created, and maintained at least 2 electronic schedules for projects similar in nature and complexity to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

### 3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS. Show in the schedule the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences, is required. The scheduling of construction design and construction is the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers Designers, Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool.

#### 3.1.1 Approved Project Schedule

Use the approved Project Schedule to measure the progress of the work and to aid in evaluating time extensions. Make the schedule cost loaded and activity coded. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the COR may withhold approval of progress payments until the Contractor submits the required schedule.

#### 3.1.2 Schedule Status Reports

Provide a Schedule Status Report on at least a monthly basis. If, in the opinion of the COR, the Contractor falls behind the approved schedule, take steps necessary to improve its progress including those that may be required by the COR, without additional cost to the Government. In this circumstance, the COR may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the COR deems necessary to demonstrate how the approved rate of progress will be regained.

#### 3.1.3 Default Terms

Failure of the Contractor to comply with the requirements of the COR shall be grounds for a determination, by the COR, that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the COR may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

### 3.2 BASIS FOR PAYMENT AND COST LOADING

Use the schedule as the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update, or qualified scheduling personnel, will result in the inability of the COR to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all required information will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the COR and those revisions have not been included in subsequent revisions or updates, the COR may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the Project

Schedule have been made. Activity cost loading shall be reasonable, as determined by the COR. The aggregate value of all activities coded to a contract CLIN shall equal the value of the CLIN on the Schedule.

### 3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the Project Schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule.

#### 3.3.1 Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the Project Schedule. Prepare the Project Schedule using the Precedence Diagram Method (PDM).

#### 3.3.2 Level of Detail Required

Develop the Project Schedule to an appropriate level of detail. Failure to develop the Project Schedule to an appropriate level of detail, as determined by the COR, will result in its disapproval. The COR will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

##### 3.3.2.1 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

##### 3.3.2.2 Design and Permit Activities

Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. The schedule shall include review and correction periods associated with each item.

##### 3.3.2.3 Procurement Activities

The schedule must include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve, procure, fabricate, and deliver.

##### 3.3.2.4 Mandatory Tasks

The following tasks must be included and properly scheduled:

- a. Submission, review and acceptance of design packages.

- b. Submission of mechanical/electrical/information systems layout drawings.
- c. Submission and approval of O & M manuals.
- d. Submission and approval of as-built drawings.
- e. Submission and approval of installed equipment lists.
- f. Submission and approval of testing and air balance (TAB).
- g. Submission of TAB specialist design review report.
- h. Submission and approval of fire protection specialist.
- i. Submission and approval of testing and balancing of HVAC plus commissioning plans and data. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with [ECB 2005-10](#).
- j. Air and water balancing.
- k. HVAC commissioning.
- l. Controls testing plan submission.
- m. Controls testing.
- n. Performance Verification testing.
- o. Other systems testing, if required.
- p. Contractor's pre-final inspection.
- q. Correction of punchlist from Contractor's pre-final inspection.
- r. Government's pre-final inspection.
- s. Correction of punch list from Government's pre-final inspection.
- t. Final inspection.

#### 3.3.2.5 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: [approvals, approvals, design reviews, environmental permit approvals by State regulators, inspections, utility tie-in, and Notice to Proceed \(NTP\) for phasing requirements.](#)

Coordinate construction activities with NASA throughout construction. Schedule meetings with users in advance to coordinate activities and establish project schedule. Plan work to minimize interference with normal business operations of facility users. Obtain NASA approval for scheduled shutdowns.. Shutdown and permitted activities schedule is subject to change by NASA during project.

#### 3.3.2.6 Activity Responsibility Coding (RESP)

Assign responsibility Code for all activities to the Prime Contractor,

Subcontractor or Government agency responsible for performing the activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT. Unacceptable code values are abbreviations of the names of subcontractors.

### 3.3.2.7 Activity Work Area Coding

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew, from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

### 3.3.2.8 Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by the COR, with a Contract Changes/REA Code. Key all Code values to the Government's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the COR. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and, therefore, liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code.

### 3.3.2.9 Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

### 3.3.2.10 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities based upon the phase of work in which the activity occurs. Code activities to [either a Design Phase or a Construction Phase](#) [Construction Phase](#). Code fast track [design and construction](#) phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction

packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall be identified with a single project phase and have only one Phase of Work code.

#### 3.3.2.11 Category of Work Coding (CATW)

Assign Category of Work Code to all Activities based upon the category of work to which the activity belongs. Category of Work Code must include, but is not limited to: design, design submittal, design reviews, review conferences, permits, construction submittals, construction submittal approvals, Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start-Up, Test and Turnover. Assign a Category of Work Code to each activity. Each activity shall have only one Category of Work Code.

#### 3.3.2.12 Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 00.00 10 QUALITY CONTROL. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

### 3.3.3 Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration in the accepted contract proposal, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is received by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

#### 3.3.3.1 Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" (or NTP). The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

#### 3.3.3.2 Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in a negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project

schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero fee float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

#### 3.3.3.3 Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

#### 3.3.4 Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

##### 3.3.4.1 Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

##### 3.3.4.2 End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

##### 3.3.4.3 Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

#### 3.3.5 Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the

disapproval of the Contractor's updated schedule and the inability of the COR to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

### 3.3.6 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the COR. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the COR.

### 3.3.7 Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish (SF) relationships.

### 3.3.8 Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

### 3.3.9 Milestones

The schedule must include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

## 3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

### 3.4.1 Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations,

submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3).

#### 3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the COR. Include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead item acquisition prior to design completion. Also cover in the preliminary design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

#### 3.4.3 Design Package Schedule Submission

With each design package submitted to the Government, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

#### 3.4.4 Periodic Schedule Updates

Based on the result of the meeting, specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions will enable the COR to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the COR or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed, lower WBS level construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The COR may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

3.4.5 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: www.rmssupport.com. The SDEF format is as follows:

	Field Code	Activity Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 working days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

3.5.2 Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the COR. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the COR. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

### 3.5.3.1 Activity Report

A list of all activities sorted according to activity number.

### 3.5.3.2 Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order by activity number.

### 3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

### 3.5.4 Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The COR will use, but is not limited to, the following conditions to review compliance with this paragraph:

#### 3.5.4.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

#### 3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

#### 3.5.4.3 Critical Path

Clearly show the critical path.

#### 3.5.4.4 Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

#### 3.5.4.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

### 3.6 PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within **three working** days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start

dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity to review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the COR.

### 3.6.1 Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

### 3.6.2 Status of Activities

Update information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting.

#### 3.6.2.1 Start and Finish Dates

Accurately show the status of the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

#### 3.6.2.2 Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining Durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

#### 3.6.2.3 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1

percent of the total contract value, which activity(ies) may be declared 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

#### 3.6.2.4 Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, Contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

#### 3.6.2.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

### 3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the COR: justification, project schedule data, and supporting evidence as the COR may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

#### 3.7.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The COR's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

#### 3.7.2 Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

- a. A list of affected activities, with their associated project schedule activity number.

- b. A brief explanation of the causes of the change.
- c. An analysis of the overall impact of the changes proposed.
- d. A sub-network of the affected area.

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

### 3.7.3 Additional Submission Requirements

The COR may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 3 working days of the COR's request.

### 3.8 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the COR within 2 weeks of the NTP being issued. The COR will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the COR may furnish the Contractor with suggested revisions to the project schedule. Include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the COR, advise the COR within 2 weeks of receipt of the revisions. Regardless of the objections, continue to update the schedule with the COR's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the COR's proposed revisions, the Contractor will be deemed to have concurred with the COR's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

### 3.9 3-WEEK LOOK AHEAD SCHEDULE

The Contractor shall prepare and issue a 3-Week Look Ahead schedule to provide a more detailed day-to-day plan of upcoming work identified on the Construction Schedule. The work plans shall be updated each week to show the planned work for the current and following two-week period. Additionally, include upcoming outages, closures, preparatory meetings, and initial meetings. Identify critical path activities on the Three-Week Look Ahead Schedule. The detail work plans are to be bar chart type schedules, maintained separately from the Construction Schedule on an electronic spreadsheet program and printed on 8 ½ by 11 or 11 by 17 sheets as directed by the COR. Activities shall not exceed 5 working days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work. Hard copies for each attendee of the weekly Progress Meeting, and one electronic file of the 3-Week Look Ahead Schedule, shall be delivered and reviewed during the weekly Progress Meeting.

### 3.10 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs, etc.) shall reference Schedule activities that are being addressed. All test reports (e.g., concrete, soil

compaction, weld, pressure, etc.) shall reference schedule activities that are being addressed.

### 3.11 WEEKLY PROGRESS MEETINGS

- a. Meet weekly with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the COR shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.
- b. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.
- c. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

### 3.12 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

-- End of Section --

## SECTION 01 33 00

SUBMITTAL PROCEDURES  
Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for general procedures regarding submittals, data normally submitted for review to establish conformance with the design concept and contract documents.

## 1.2 GENERAL

The COR may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

## 1.2.1 NASA's Online Construction Management System

All construction documents including but not limited to submittals, requests for information (RFIs), daily reports, field clarifications, schedules, change orders, and progress payment requests shall be submitted and electronically approved through NASA's online construction management system, SharePoint.

Adobe Digital Signatures or other digital signatures as mutually agreed upon by the Government and the Contractor shall be considered legally binding and the equivalent of pen and ink signatures.

The Government reserves the right to select which electronic format is used in documents submitted online provided that format is in widespread public use (such as PDF) and is commercially available for no more than a nominal fee.

Whenever practical the text in documents submitted online shall be electronically searchable information as opposed to scanned or digitally photographed information.

The Government reserves the right to establish naming conventions for any documents submitted to the online construction management system.

The Government reserves the right to provide a form that shall be used for any document submitted online including but not limited to: requests for information and submittal transmittal forms. The text in these documents shall remain electronically searchable when submitted.

### 1.3 DEFINITIONS

#### 1.3.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

##### SD-01 Preconstruction Submittals

Submittals which are required to be submitted prior to start of construction (work) issuance of contract notice to proceed or commencing work on site or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction Progress Schedule

Submittal register

Schedule of values

Health and safety plan

Work plan

Quality Control (QC) plan

Environmental protection plan

##### SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the

product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

Design drawings require the stamp of a licensed engineer.

#### SD-03 Product Data

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

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

#### SD-04 Samples

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

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

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

#### SD-05 Design Data

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

Design submittals, design substantiation submittals and extensions of design submittals.

Design data requires the stamp of a licensed engineer.

#### SD-06 Test Reports

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

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

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

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

#### SD-07 Certificates

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

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

Confined space entry permits.

Text of posted operating instructions.

#### SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS) concerning impedances, hazards and safety precautions.

#### SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

#### SD-11 Closeout Submittals

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

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

#### 1.3.2 Approving Authority

Office or designated person authorized to approve submittal.

#### 1.3.3 Work

As used in this section, on- and off-site construction required by contract

documents, including labor necessary to produce submittals, [except those SD-01 Pre-Construction Submittals noted above](#), construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

#### 1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section [01 33 00 SUBMITTAL PROCEDURES](#):

[SD-01 Preconstruction Submittals](#)

[Submittal Register](#)

#### 1.5 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

##### 1.5.1 [Submit for Approval](#)

Government approval is required for all submittals described in these specifications, including, but not limited to, extensions of design, critical materials, deviations from the Solicitation, Accepted Proposal or design, substitutions, variations and other items equipment whose compatibility with the entire system must be checked, and other items as designated by the COR. Government approval is required for any as designated by the COR. Within the terms of the Contract Clause entitled, "Specifications and Drawings for Construction," they are considered to be "shop drawings."

The Government will review all intermediate and final Design-build design submittals for conformance with the technical requirements of the solicitation. Review will be only for conformance with the applicable codes, standards and contract requirements. Generally, design submittals should be identified as SD-05 Design Data submittals.

##### 1.5.1.1 [Deviations to the Accepted Design](#)

The Government's concurrence is required for any proposed deviation from the accepted design which still complies with the contract before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled, "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the COR may discuss a submittal proposing a deviation prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

##### 1.5.1.2 [Substitutions](#)

Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for

Government concurrence. Include substantiation, identifying information, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal. If the Contract otherwise prohibits substitutions of equal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, the request is considered a "variation" to the contract. Variations are discussed below in paragraph: "1.10 VARIATIONS".

#### 1.5.2 For Information Only

At the COR's discretion a submittal may be designated "For Information Only". Such submittals are part of the project record but do not require government review or approval.

#### 1.5.3 Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 DESIGN AFTER AWARD covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section 01 33 16 DESIGN AFTER AWARD. Generally, design submittals should be identified as SD-05 Design Data submittals.

### 1.6 PREPARATION

#### 1.6.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to the COR. Transmit submittals with transmittal form prescribed by the COR and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form.

Use the transmittal form provided by the COR for submitting both Government approved and information only submittals. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

#### 1.6.2 Identifying Submittals

When submittals are provided by a Subcontractor, the Prime Contractor is to prepare, review and sign with Contractor's approval, the transmittal form prior to submitting for Government approval.

#### 1.6.3 Format for SD-02 Shop Drawings

Shop drawings are not to be formatted at less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph

entitled, "Identifying Submittals," of this section.

Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

Reserve a blank space, no smaller than 3 by 3 inches on the right hand side of each sheet for the Government disposition stamp.

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

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

#### 1.6.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

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

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

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

Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, state, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, submit as specified for SD-07 Certificates.

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

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will be accepted for expedition of construction effort at the COR's discretion.

Submit manufacturer's instructions prior to installation.

#### 1.6.5 Format of SD-04 Samples

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

- a. Sample of Equipment or Device: Full size.
- b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.
- c. Length of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.
- d. Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.
- e. Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.
- f. Sample Panel: 4 by 4 feet.
- g. Sample Installation: 100 square feet.

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

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

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

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

#### 1.6.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates sized at 8 1/2 by 11 inches.

#### 1.6.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

#### 1.6.8 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

### 1.6.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

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

## 1.7 QUANTITY OF SUBMITTALS

### 1.7.1 Number of Samples SD-04 Samples

- a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.
- b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.
- c. Submit one sample installation, where directed.
- d. Submit one sample of non-solid materials.

## 1.8 for INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the COR is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the COR 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.

## 1.9 VARIATIONS

A contract modification is are required before the Contractor is authorized to proceed with material acquisition or installation for any proposed variation to the contract (the solicitation and/or the accepted proposal), which constitutes a change to the contract terms. Within the terms of the Contract Clause entitled, "Specifications and Drawings for Construction," they are considered to be "shop drawings." The Government reserves the right to accept or reject any such proposed deviation at its discretion.

Variations from contract requirements require Government approval pursuant to contract clause FAR 52.236-21 and will be considered where advantageous to Government.

### 1.9.1 Considering Variations

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

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

#### 1.9.2 Proposing Variations

When proposing variation, deliver written request to the COR, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

#### 1.9.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

#### 1.9.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 5 working days will be allowed for consideration by the Government of submittals with variations.

### 1.10 SUBMITTAL REGISTER AND DATABASE

Prepare and maintain submittal register, as the work progresses. Use electronic submittal register program furnished by the Government or any other format. Do not change data which is output in columns (c), (d), and (e) as delivered by Government; retain data which is output in columns (a), (f), (g), and (h) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.00 40 QUALITY CONTROL.

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

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

The Contractor shall develop a complete list of submittals when preparing the Submittal Register and identify required submittals based on those listed in the specifications and as required by other parts of the contract. The Contractor is required to complete the submittal register and submit it to the COR for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. Coordinate the submit dates and need dates

with dates in the Contractor prepared progress schedule. Submit monthly or until all submittals have been satisfactorily completed, updates to the submittal register showing the Contractor action codes and actual dates with Government action codes. Revise the submittal register when the progress schedule is revised and submit both for approval.

#### 1.10.1 Use of Submittal Register

Submit submittal register in electronic form. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register database submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (f) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (g) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (h) Contractor Material: Date that Contractor needs material delivered to Contractor control.

#### 1.10.2 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request. Deliver in electronic format, unless a paper copy is requested by COR.

### 1.11 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the COR does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."

#### 1.11.1 Constraints

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

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

When acceptability of a submittal is dependent on conditions, items, or

materials included in separate subsequent submittals, submittal will be returned without review.

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

#### 1.12 GOVERNMENT APPROVING AUTHORITY

The Government will:

- a. Review submittals and RFIs and provide pertinent disposition within 10 working days after receipt. Failure by the Government to complete review within this time may be grounds for a time extension but not a change in contract price, unless the delay is over 30 calendar days.
- b. Note date on which submittal was received from the Contractor.
- c. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- d. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.

##### 1.12.1 Review Notations

The Government review will be completed within 10 working days after date of submission. Submittals will be returned to the Contractor with the following notations:

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

#### 1.13 REVISE AND RESUBMIT SUBMITTALS

Contractor shall make corrections required by the Government. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the clause entitled, "Changes," is to be given to the

COR. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

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

#### 1.14 APPROVED SUBMITTALS

The Government's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory. design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work.

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

#### 1.15 APPROVED SAMPLES

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, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

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

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

Approval of the Contractor's samples by the COR does not relieve the Contractor of his responsibilities under the contract.

1.16 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made if all required approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS

Revision 1 - 05/15/2013

PART 1 GENERAL

1.1 SUMMARY

This section covers the requirements for safety and occupational health requirements for the protection of Contractor and Government personnel, property and resources.

1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

- ASSE/SAFE A10.32 Fall Protection
- ASSE/SAFE A10.34 Protection of the Public on or Adjacent to Construction Sites
- ASSE/SAFE Z359.1 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

- ASME B30.22 Articulating Boom Cranes
- ASME B30.3 Tower Cranes
- ASME B30.5 Mobile and Locomotive Cranes
- ASME B30.8 Floating Cranes and Floating Derricks

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

- NASA NPR 8621.1 NASA Mishap Reporting, Investigating and Record Keeping Policy
- NASA NPG 8715.3 NASA Safety Manual
- NASA-STD 8719.12 Safety Standard for Explosives, Propellants, and Pyrotechnics
- APR 1700.1 Ames Health and Safety Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 10 Standard for Portable Fire Extinguishers
- NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
- NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
- NFPA 70E Standard for Electrical Safety in the Workplace

CALIFORNIA CODE OF REGULATIONS (CCR)

- CEC California Electric Code

1.3 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

- Accident Prevention Plan (APP)
- Activity Hazard Analysis (AHA)
- Crane Critical Lift Plan
- Proof of qualification for Crane Operators

SD-06 Test Reports

- Reports
  - Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."
  - Accident Reports
  - Crane Reports
  - Gas Protection for NASA projects

SD-07 Certificates

- Confined Space Entry Permit
- Hot work permit
- License Certificates
- Certificate of Compliance (Crane)

1.4 DEFINITIONS

- a. High Visibility Accident. Any mishap which may generate publicity

and/or high visibility.

- b. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.
- c. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:
  - 1. Death, regardless of the time between the injury and death, or the length of the illness;
  - 2. Days away from work (any time lost after day of injury/illness onset);
  - 3. Restricted work;
  - 4. Transfer to another job;
  - 5. Medical treatment beyond first aid;
  - 6. Loss of consciousness; or
  - 7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.
- d. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.
- e. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.) Any mishap meeting the criteria described above shall be documented in both the Contractor Significant Incident Report (CSIR) and using the NAVFAC prescribed Navy Crane Center (NCC) form submitted within five working days both as provided by the COR.

## 1.5 SITE QUALIFICATIONS, DUTIES AND MEETINGS

### 1.5.1 Personnel Qualifications

#### 1.5.1.1 Site Safety and Health Officer (SSHO)

The contractor shall provide a Safety oversight team that includes a minimum of one (1) Competent Person at each project site to function as the Safety and Health Officer (SSHO). The SSHO shall be at the work site at all times, unless specified differently in the contract, to perform safety and occupational health management, surveillance, inspections, and safety

enforcement for the Contractor, and their training, experience, and qualifications shall be as required by EM 385-1-1 paragraph 01.A.17 and all associated sub-paragraphs. A Competent Personal shall be provided for all of the hazards identified in the Contractor's Safety and Health Program in accordance with the accepted Accident Prevention Plan, and shall be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. The credentials of the Competent Persons(s) shall be approved by the COR in consultation with the Safety Office.

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

#### 1.5.1.2 Construction Safety Hazard Awareness Training

The training requirements for the Site Safety and Health Officer (SSHO) must include the successful completion of the course entitled "Construction Safety Hazard Awareness Training for Contractors". If the SSHO does not have a current certification, they must obtain the course certification within sixty (60) calendar days from award. For Construction Safety Requirements refer to NASA Ames Policy Requirements [APR 1700.1](#) Chapter 27 regarding Construction Safety Requirements and Procedures.

#### 1.5.1.3 Crane Operators

Meet the crane operators requirements in USACE [EM 385-1-1](#), Section 16 and Appendix I. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 50,000 pounds or greater, designate crane operators as qualified by a source that qualifies crane operators (i.e., union, a government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

#### 1.5.2 Personnel Duties

##### 1.5.2.1 Site Safety and Health Officer (SSHO)

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily quality control report.
- b. Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and sub-contractors.
- c. Maintain applicable safety reference material on the job site.
- d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.
- e. Implement and enforce accepted APPS and AHAs.
- f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.
- g. Ensure sub-contractor compliance with safety and health requirements.

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

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

### 1.5.3 Meetings

#### 1.5.3.1 Preconstruction Conference

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).
- b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the COR's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

#### 1.5.3.2 Safety Meetings

Conduct and document meetings as required by EM 385-1-1. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractor's daily report.

### 1.6 ACCIDENT PREVENTION PLAN (APP)

Use a qualified person to prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of USACE EM 385-1-1 and as supplemented herein. Cover all paragraph and subparagraph elements in USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan" and show compliance with NASA NPG 8715.3. Specific requirements for some of the APP elements are described below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or

creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer, the Contractor Quality control Manager, and any designated CSP and/or CIH.

Submit the APP to the COR at the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

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

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the COR, project superintendent, SSO and quality control manager. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the COR within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34,) and the environment.

Copies of the accepted plan will be maintained at the COR's office and at the job site. Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

#### 1.6.1 EM 385-1-1 Contents

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

- a. Confined Space Entry Plan. Develop a confined and/or enclosed space entry plan in accordance with USACE EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive 2.100, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)
- b. Fall Protection and Prevention (FP&P) Program Documentation. The program documentation shall be site specific and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A qualified person for fall protection shall prepare and sign the program documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Revise the Fall Protection and Prevention Program documentation every six months for lengthy projects, reflecting any changes during the course of construction due to changes in personnel,

equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Program documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Program documentation in the Accident Prevention Plan (APP).

- c. Lead Compliance Plan. The safety and health aspects of lead work, prepared in accordance with Section 02 83 13.00 20 LEAD IN CONSTRUCTION.
- d. Asbestos Hazard Abatement Plan. The safety and health aspects of asbestos work, prepared in accordance with Section 02 82 14.00 10.
- e. Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02 41 00 DEMOLITION and referenced sources. Include engineering survey as applicable.
- f. Excavation Plan. The safety and health aspects prepared in accordance with Section 31 00 00 EARTHWORK.

#### 1.7 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE EM 385-1-1, Section 1. Submit the AHA for review at least 10 calendar days prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the COR.

#### 1.8 DISPLAY OF SAFETY INFORMATION

Within 1 working day after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the COR, that is accessible and includes all mandatory information for employee and visitor review, shall be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, section 01.A.06. Additional items required to be posted include:

- a. Confined space entry permit.
- b. Hot work permit.
- c. Emergency phone numbers.
- d. MSDS.

#### 1.9 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including

those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

#### 1.10 EMERGENCY MEDICAL TREATMENT

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

#### 1.11 REPORTS

##### 1.11.1 Mishap Reports

- a. Conduct a mishap investigation for recordable injuries and illnesses, as defined in 1.3.h and property damage mishaps resulting in at least \$2,000 in damages, to establish the root cause(s) of the accident, complete the report and provide the report to the COR within 1 working day of the mishap. The COR will provide copies of any required or special forms.
- b. Conduct an accident investigation for any weight handling equipment accident (including rigging gear accidents) to establish the root cause(s) of the accident, complete the WHE Accident Report (Crane and Rigging Gear) form and provide the report to the COR within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the COR. The COR will provide a blank copy of the accident report form.

##### 1.11.2 Accident Notification

Notify the COR as soon as practical, but not later than two hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$2,000, or any weight handling equipment accident [in accordance with NASA NPR 8621.1](#). Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted.

##### 1.11.3 Crane Reports

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

#### 1.12 HOT WORK

Submit and obtain a written permit prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, from the Code Q representative. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE

WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO NASA AMES DISPATCH. Dial 9-1-1 from a land line. Dial 650-604-5555 from a cell phone.

#### 1.13 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government shall not be closed or obstructed without written permission from the COR.

#### 1.14 GAS PROTECTION

Contractor shall have one or more employees properly trained and experienced in operation and calibration of gas testing equipment and formally qualified as gas inspectors who shall be on duty during times workers are in confined spaces. Their primary functions shall be to test for gas and operate testing equipment. Unless equipment of constant supervisory type with automatic alarm is employed, gas tests shall be made at least every 2 hours or more often when character of ground or experience indicates gas may be encountered. A gas test shall be made before workmen are permitted to enter the excavation after an idle period exceeding one-half hour.

Readings shall be permanently recorded daily, indicating the concentration of gas, point of test, and time of test. Submit copies of the gas test readings to the COR at the end of each work day.

Special requirements, coordination, and precautions will apply to areas that contain a hazardous atmosphere or, by virtue of their use or physical character, may be oxygen deficient. A check by Government is required prior to entering confined space. Surveillance and monitoring shall be required in these types of work spaces by both Contractor and Government personnel.

#### 1.15 HIGH NOISE LEVEL PROTECTION

Operations performed by the Contractor that involve the use of equipment with output of high noise levels (jackhammers, air compressors, and explosive-actuated devices) shall be scheduled for during the hours 8 a.m. to 5 p.m. unless otherwise approved in writing by the COR. The government may further restrict the hours of operation of high noise level equipment at the COR's discretion. Use of any such equipment shall be approved in writing by the COR prior to commencement of work.

#### 1.16 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

- a. Secure outside equipment and materials and place materials that could be damaged in protected areas.
- b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing

facilities.

- c. Ensure that temporary erosion controls are adequate.

#### 1.17 CONFINED SPACE ENTRY REQUIREMENTS.

Contractors entering and working in confined spaces performing shipyard industry work are required to follow the requirements of OSHA 29 CFR 1915 Subpart B. Contractors entering and working in confined spaces performing general industry work are required to follow the requirements of OSHA 29 CFR Part 1926.

#### 1.18 RADIATION SAFETY REQUIREMENTS

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

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

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

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

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

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

## PART 2 PRODUCTS

### 2.1 CONFINED SPACE SIGNAGE

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

## 2.2 FALL PROTECTION ANCHORAGE

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

## PART 3 EXECUTION

### 3.1 CONSTRUCTION AND/OR OTHER WORK

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

#### 3.1.1 Hazardous Material Exclusions

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

#### 3.1.2 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the COR immediately. Within 10 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

### 3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 3 working days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the COR to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

### 3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

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

COR will, at the Contractor's request, apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on for government owned and operated systems.

No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section. No person shall work on any energized equipment including, but not limited to activities such as erecting, installing, constructing, repairing, adjusting, inspecting, un-jamming, setting up, trouble shooting, testing, cleaning, dismantling, servicing and maintaining machines equipment of processes until an evaluation has been conducted identifying the energy source and the procedures which will be taken to ensure the safety of personnel.

When work is to be performed on electrical circuits, only qualified personnel shall perform work on electrical circuits.

A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.

Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks.

Pressurized or vacuum systems shall be vented to relieve differential pressure completely.

Vent valves shall be tagged open during the course of the work.

Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

#### 3.3.1 Tag Placement

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist.

If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached.

When it is required that certain equipment be tagged, the Government will review the characteristics of the various systems involved that affect the

safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

### 3.3.2 Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the COR. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the COR.

## 3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

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

### 3.4.1 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with USACE EM 385-1-1, Section 21.B.

### 3.4.2 Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, Paragraphs 21.N through 21.N.04. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with 29 CFR 1926.500, Subpart M, USACE EM 385-1-1 and ASSE/SAFE A10.32.

#### 3.4.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ASSE/SAFE Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically

designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed **6 feet**. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

#### 3.4.3 Existing Anchorage

Certified (or re-certified) by a qualified person for fall protection existing anchorages, to be used for attachment of personal fall arrest equipment in accordance with **ASSE/SAFE Z359.1**. Existing horizontal lifeline anchorages must be certified (or re-certified) by a registered professional engineer with experience in designing horizontal lifeline systems.

#### 3.4.4 Horizontal Lifelines

Design, install, certify and use under the supervision of a qualified person horizontal lifelines for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (**29 CFR 1926.500**).

#### 3.4.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with **EM 385-1-1** and **29 CFR 1926** Subpart M.

#### 3.4.6 Rescue and Evacuation Procedures

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

### 3.5 SCAFFOLDING

Each scaffold shall be installed, relocated, and dismantled in accordance with designs and instructions of a registered Professional Engineer, and supervised by a competent design person. Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access scaffold platforms greater than **20 feet** maximum in height by use of a scaffold stair system. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than **20 feet** maximum in height. The use of an adequate gate is required. Ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the

storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

### 3.6 EQUIPMENT

#### 3.6.1 Material Handling Equipment

- a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.
- b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.
- c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

#### 3.6.2 Weight Handling Equipment

- a. Equip cranes and derricks as specified in EM 385-1-1, section 16.
- b. Notify the COR 10 working days in advance of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the COR. A copy of the permitting process will be provided at the Preconstruction Conference. Contractor's operator shall remain with the crane during the spot check.
- c. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.
- d. Under no circumstance shall a Contractor make a lift at or above 90 percent of the cranes rated capacity in any configuration.
- e. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and follow the requirements of USACE EM 385-1-1 Section 11 and ASME B30.5 or ASME B30.22 as applicable.
- f. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.
- g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.
- h. All employees must keep clear of loads about to be lifted and of suspended loads.
- i. Use cribbing when performing lifts on outriggers.

- j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.
- k. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.
- l. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by COR personnel.
- m. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by COR personnel.
- n. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

### 3.6.3 Equipment and Mechanized Equipment

- a. Proof of qualifications for operator shall be kept on the project site for review.
- b. Manufacture specifications or owner's manual for the equipment shall be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.
- c. Submit a [Machinery & Mechanized Equipment Certification Form](#) for acceptance by the COR prior to being placed into use. A copy of the certification form will be provided during the Pre-construction Conference.

### 3.6.4 USE OF EXPLOSIVES

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

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

Explosive work shall be performed in accordance with NASA-STD 8719.12. This document is available at:

<http://www.hq.nasa.gov/office/codeq/doctree/871912.htm>

### 3.7 EXCAVATIONS

Perform soil classification by a competent person in accordance with 29 CFR 1926.

### 3.7.1 Utility Locations

Prior to digging, the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.

### 3.7.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within **2 feet** of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility expose the utility by hand digging every **100 feet** if parallel within **5 feet** of the excavation.

### 3.7.3 Shoring Systems

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

### 3.7.4 Trenching Machinery

Operate trenching machines with digging chain drives only when the spotters/laborers are in plain view of the operator. Provide operator and spotters/laborers training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Keep documentation of the training on file at the project site.

## 3.8 UTILITIES WITHIN CONCRETE SLABS

Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with station utility departments in addition to a private locating service. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

## 3.9 ELECTRICAL

### 3.9.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the COR and

Station Utilities for identification. The COR will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers will be permitted to enter. When work requires Contractor to work near energized circuits as defined by the CEC, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In addition, provide electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

### 3.9.2 Portable Extension Cords

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

### 3.10 WORK IN CONFINED SPACES

Comply with the requirements in Section 34 of USACE EM 385-1-1, OSHA 29 CFR 1910.146 and OSHA 29 CFR 1926.21(b)(6). Any potential for a hazard in the confined space requires a permit system to be used.

-- End of Section --

SECTION 01 35 40.00 20

ENVIRONMENTAL MANAGEMENT

Revision 1 - 05/15/2013

PART 1 GENERAL

1.1 SUMMARY

This section covers the requirements for responsibilities and requirements regarding environmental management.

1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z400.1/Z129.1 Hazardous Industrial Chemicals - Material Safety Data Sheets - Preparation

ASTM INTERNATIONAL (ASTM)

ASTM D 4840 Sampling Chain-Of-Custody Procedures

ASTM D 5663 Validating Recycled Content in Packaging Paper and Paperboard

ASTM E 2114 Standard Terminology for Sustainability Relative to the Performance of Buildings

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 14040 Environmental Management - Life Cycle Assessment - Principles and Framework

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST BEES 4.0 Building for Environmental and Economic Sustainability

U.S. DEPARTMENT OF AGRICULTURE (USDA)

Biomass R&D Act Biomass Research and Development Act, as amended by 39001 of the Food Conservation and Energy Act of 2008 (2008 Farm Bill or FCEA)

U.S. Farm Bill Farm Security and Rural Investment Act (2002 Farm Bill) U.S. Farm Bill of May 2002

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

NPDES National Pollutant Discharge Elimination System

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

40 CFR Protection of Environment

40 CFR 261 Identification and Listing of Hazardous Waste

1.3 DEFINITIONS

Definitions pertaining to sustainable development are as defined in

ASTM E 2114 and as specified.

- a. "Biobased content" is calculated as the weight of the biobased material divided by the total weight of the product, and is expressed as a percentage by weight.
- b. "Biobased materials" include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by the

Biomass R&D Act. Minimum biobased content shall be as defined in the U.S. Farm Bill.

- c. "Chain-of-custody" is a process whereby a product or material is maintained under the physical possession or control during its entire life cycle.
- d. "Pollution and environmental damage" is caused by the presence of chemical, physical, or biological elements or agents. Human health or welfare is adversely affected; ecological balances are unfavorably altered; the utility of the environment for aesthetic, cultural, or historical purposes degrades.
- e. "Hazardous material" as defined by Chapter 6.95 of the State of California Health and Safety Code, is any material that poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Common examples are oil, fuel, caustic and acid cleaners, mineral spirits, petroleum distillate based solvents, oil based paints, aerosol spray paints, coolants and antifreeze, and solvents/cleaners containing chlorinated compounds.

"High-GWP refrigerant" means a compound used as a heat transfer or gas that is: (a) a chlorofluorocarbon, a hydrochlorofluorocarbon, a hydrofluorocarbon, a perfluorocarbon, or any compound or blend of compounds, with a GWP (global warming potential) value equal to or greater than 150, or (b) any ozone depleting substance as defined in Title 4 of Code of Federal Regulations, Part 82, Paragraph 82.3.

- f. "High-GWP refrigerant" means a compound used as a heat transfer or gas that is: (a) a chlorofluorocarbon, a hydrochlorofluorocarbon, a hydrofluorocarbon, a perfluorocarbon, or any compound or blend of

compounds, with a GWP (global warming potential) value equal to or greater than 150, or (b) any ozone depleting substance as defined in Title 4 of Code of Federal Regulations, Part 82, Paragraph 82.3.

- g. "Hazardous waste" as defined in California Code of Regulation Title 22, Section 66261.3. Hazardous Waste, includes extremely hazardous waste, acutely hazardous waste, RCRA hazardous waste, non-RCRA hazardous waste and special waste. Examples include waste paint, solvents, PCB transformers, contaminated soil, and oil.
- h. "Non-sewerable" includes wastewater that contains at least one contaminant above the allowable discharge limit set by the Publicly Owned Treatment Works (POTWs) for discharge to the sanitary sewer.
- i. "Reclamation" as defined by California Code of Regulations, Title 22, Section 66260.10, means that a material is processed to recover a usable product, or that it is regenerated. Examples are recovery of lead from spent batteries and regeneration of spent solvents.
- j. "Recycle" is to take something that would otherwise be thrown away and make it into something that can be used again. Examples include fluorescent light tubes and cardboard boxes.
- k. "Solid Waste" includes rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, construction, and agricultural operations, and from community activities.
- l. "Sustainable" as defined in E.O. 13423, is to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans.

#### 1.4 PRECONSTRUCTION MEETING

After award of Contract and prior to commencement of the work, the Contractor shall schedule and conduct a meeting with the COR to discuss the proposed Environmental Protection Plan and to develop a mutual understanding relative to the details of environmental protection. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting as specified in Section 01 45 00.00 10 01 45 00.00 20 01 45 00.00 40 QUALITY CONTROL.

#### 1.5 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

[SD-01 Preconstruction Submittals](#)

[Environmental Protection Plan](#)

[Instructor Qualifications](#)

Submit reference data to demonstrate instructors' individual and firm's capabilities and experience.

Request for Incidental Sewer Discharge form, at least 7 working days before commencement of discharge.

MSDSs of proposed coating and/or adhesive materials, before bringing these materials on-site.

Proposed type and quantity (in pounds) of coatings and/or adhesive materials to be used for the project. Ames tracks all coating usage in a facility wide air permit that limits the use of coatings that can be used in any consecutive 12-month period. If a project may cause Ames to exceed the permit limit, a special permit for coatings will be needed.

For projects that require installation of diesel engines (generators, water pumps, fire pumps, air compressors, etc.), provide specifications detailing engine rating (horsepower, HP), air emissions, engine EPA Tier, and other relevant data. Engines greater than 50 HP are subject to air permitting per

#### BAAQMD Regulation 2-1-114.2.1.

For projects utilizing portable diesel engine powered equipment (diesel generators, air compressors, water pumps, etc.) with a rating of 50 HP or more, include the air permit from the BAAQMD or State registration from the California Air Resources Board (CARB). Note: diesel engine powered equipment that will be on-site for less than 72 consecutive hours does not need to include the air permit per

#### BAAQMD Regulation 2-1-114.2.3.

For installation or retrofitting of boilers, provide specifications detailing boiler rating (units of million British thermal units per hour, MMBTU/hr), nitric oxide (NOx) and carbon monoxide (CO) air emissions, and other relevant data. Boilers rated >2 MMBTU/hr are subject to permitting requirements per

BAAQMD Regulation 2-1-114. Natural gas boilers with a rating of 10 MMBTU/hr or more need to obtain an air permit from the BAAQMD per

BAAQMD Regulation 2-1-114.1. The boilers will need to go through a New Source Review and meet the requirements of

BAAQMD Regulation 2, Rule 2 New Source Review. Boilers rated greater than 2 MMBTU/hr but less than 10 MMBTU/hr need to be registered with the BAAQMD per

#### BAAQMD Regulation 9-7-404.

Hazardous Waste Disposal Subcontractors before proposed project commencement. For projects installing/modifying refrigeration systems, provide specifications detailing the refrigerant capacity of the equipment and leak detection capabilities. Refrigeration systems with a capacity or more than 50 pounds need to be registered with the State, CARB.

### SD-03 Product Data

#### Life Cycle Assessments

#### Packaging

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate

relative dollar value of recycled content products to total dollar value of products included in project.

#### SD-06 Test Reports

Field Quality Control Reports

#### SD-07 Certificates

##### Environmental Regulatory Requirements

For Government's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with environmental regulations bearing on performance of the work.

Records of wastewater discharges, including dates and quantities of water discharged, daily.

Spill Cleanup Records, as necessary.

For all projects utilizing temporary equipment with a fuel tank with fuel capacity of 10 gallons or greater:

- Capacity of fuel tank,
- Type of fuel tank to be used (e.g., sub-base tank, etc.),
- Type of secondary containment (must comply with Santa Clara County Hazardous Materials Storage Ordinance),
- Type of fill point spill protection,
- Whether or not the system has plastic tanks (plastic tanks require additional submittal of approval of Ames Fire Marshall).

Records of solvents and coatings usage with MSDSs, upon completion of project.

- Record type of coating/solvent use, date of use and quantity.
- For any coatings or resins that are mixed before they are applied, record the type of components and mix ratio.

Type and quantity (in pounds) of Ozone Depleting Substances (ODS) used, recovered, disposed or otherwise handled.

Site Inspection Checklists, every week for projects handling hazardous materials.

Hazardous Waste Profiles and supporting analytical data before disposal.

#### SD-08 Manufacturer's Instructions

Material Safety Data Sheets

Hazardous Materials Inventories Statement (HMIS) and Material Safety Data Sheets (MSDS), at project commencement and as necessary to reflect changes in materials stored.

#### SD-11 Closeout Submittals

##### Training Program

Submit two copies of instructional program outline for demonstration and training, including a schedule of dates, times, length of instruction, instructors' names, learning objective, and teaching outline for each training module. At completion of training, submit one complete training manual for Government's use, and a list of participants with each participant's results of performance-based test for each training module. For Government's records, submit Contractor

40 CFR employee training records upon request of the COR.

##### Protection of Natural Resources

#### 1.6 CONTRACTOR'S ENVIRONMENTAL MANAGER

Designate an on-site Environmental Manager responsible for overseeing the environmental goals for the project and implementing procedures for environmental protection.

##### 1.6.1 Duties

The Environmental Manager shall be responsible for the following:

- a. Compliance with applicable Federal, State, and local environmental regulations, including maintaining required documentation.
- b. Implementation of the Waste Management Plan.
- c. Implementation of the Indoor Air Quality (IAQ) Management Plan.
- d. Implementation of the Environmental Protection Plan.
- e. Environmental training for Contractor personnel in accordance with their position requirements.
- f. Monitoring and documentation of environmental procedures.

##### 1.6.2 Qualifications

Minimum 5 years construction experience on projects of similar size and scope; minimum 2 years experience with environmental procedures similar to those of this project; familiarity with Environmental Management Systems (EMSs); familiarity with environmental regulations applicable to construction operations.

#### 1.7 ENVIRONMENTAL REGULATORY REQUIREMENTS

The Contractor shall be responsible for knowing Federal, State, and local regulatory requirements pertaining to legal disposal of all construction and demolition waste materials. Comply with all applicable regulations and

maintain records of permits, licenses, certificates, and other environmental regulatory requirement correspondences. The following is a list of major laws, policies and procedures, and is subject to change.

CODE OF FEDERAL REGULATIONS (CFR)

10 CFR Part 435	Energy Conservation
14 CFR Part 1216	NASA Environmental Quality Regulations
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1910.1200	Hazard Communication Training
36 CFR Part 800	National Historic Preservation Act Regulations
40 CFR 82	Protection of Stratospheric Ozone
40 CFR 112	Oil Pollution Prevention
40 CFR Chapter 1 Subchapters A, D, and N	Clean Water Act (Title 33, Chapter 26 of the USC)
40 CFR Part 122 and scattered sections	National Pollutant Discharge Elimination System (NPDES)
40 CFR 1500-1508	National Environmental Policy Act
40 CFR Part 247	Comprehensive Procurement Guidelines
40 CFR 260	Hazardous Waste Management System: General
40 CFR 265.16	Generator Training
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
43 CFR Part 10	Native American Graves Protection and Repatriation Act Regulations
43 CFR 7	Protection of Archaeological Resources Regulations
49 CFR Ch. 1 (parts 100-199)	Transportation Ref Title
50 CFR Part 17	Endangered Species Act Regulations
50 CFR Part 21	Migratory Bird Treaty Act
50 CFR Part 22	Bald and Golden Eagle Protection Act
50 CFR Part 216	Marine Mammal Protection Act Regulations

CALIFORNIA CODE OF REGULATIONS (CCR)

CCR Title 13, Division 3	Motor Vehicles, Air Resources
CCR Title 14	Natural Resources
CCR Title 17, Division 3	Public Health, Air Resources
CCR Title 19	Public Safety
CCR Title 19, Division 1	State Fire Marshal
CCR Title 19, Division 2	Office of Emergency Services
CCR Title 19, Division 3	Seismic Safety Commission
CCR Title 19, Division 5	Earthquake Emergency and Seismic Permit Review Pane 1
CCR Title 22, Division 4.5	Environmental Health Standards for the Management of Hazardous Waste
CCR Title 23	Waters
CCR Title 24, Part 6	California's Energy Efficiency Standard
CCR Title 26	Toxics
CCR Title 27	Environmental Protection
CCR Title 22, 66265.16	Generator Training
EO 13423	Strengthening Federal Environmental, Energy, and Transportation Management
EO 13514	Federal Leadership in Environmental, Energy, and Economic Performance

UNITED STATES CODES (USC)

16 USC 469	National Historic Preservation Action Amendments of 1980
16 USC 470	National Historic Preservation Act of 1966, as amended
16 USC 470aa-470mm	Archaeological Resources Protection Act
16 USC Chapt. 31, 1361 et seq.	Marine Mammal Protection Act
16 USC 668-668d	Bald and Golden Eagle Protection Act
16 USC 703-712	Migratory Bird Treaty Act
16 USC 1531-1544	Endangered Species Act
25 USC 3001-3013	Native American Graves - Protection
33 USC 1251 et seq.	Clean Water Act

33 USC 2701 et seq.	Oil Pollution Act
42 USC 4371 et seq.	National Environmental Policy Act
42 USC 6901-6992	Resource Conservation and Recovery Act
42 USC 7401 et seq.	Clean Air Act
42 USC 8251 et seq.	National Energy Conservation Policy Act, Part B/Federal Energy Management
42 USC 9601 et seq.	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
42 USC 13101- 13109	Pollution Prevention Act of 1990

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, GENERAL NPDES PERMITS

CAS000001	Industrial Storm Water Discharges
CAS000002	Construction Storm Water Discharges
CAS000004	Small Municipal Separate Storm Sewer Systems
CAG912003	Discharge or Reuse of Extracted and Treated Groundwater

BAY AREA AIR QUALITY MANAGEMENT DISTRICT RULES AND REGULATIONS, AIR QUALITY (BAAQMD)

BAAQMD Regulations 1-12	General
BAAQMD Regulation 2, Rule 1	General Requirements
BAAQMD Regulation 8, Rule 3	Architectural Coatings
BAAQMD Regulation 8, Rule 49	Aerosol Paint Products
BAAQMD Regulation 8, Rule 51	Adhesive and Sealant Products
BAAQMD Regulation 9, Rule, 6	Natural Gas-Fired Boilers and Water heaters (Boilers rated 0-2 MMBTU/hr)
BAAQMD Regulation 9, Rule 7	Boilers (Boilers rated >2 MMBTU/hr)
BAAQMD Regulation 12, Rule 3	Asphalt Air Blowing
BAAQMD Regulation 12, Rule 4	Sandblasting

SANTA CLARA COUNTY

Sunnyvale Municipal Code 12	City of Sunnyvale Waters and Sewer Ordinance
Palo Alto Chapter 16	City of Palo Alto Sewer Use Ordinance

SCC ordinance Code B11 Santa Clara County Hazardous Materials and Toxic Gas Storage and Permitting

NASA POLICY AND PLANS AND EXECUTIVE ORDERS

APD 8500.1 Ames Environmental Policy

APR 8500.1 Ames Environmental Procedural Requirements

APR 8553.1 Ames Environmental Management System(incorporating by reference Environmental Work Instructions (<http://environmentalmanagement.arc.nasa.gov/ems/index.h>

NPD 8500.1 NASA Environmental Management

NPR 8553.1 NASA Environmental Management Systems

NPR 8580.1 NASA Procedural Requirements for Implementing the National Environmental Policy Act and Executive Order 12114

SWPPP and BMPs Storm Water Pollution Prevention Plan and Best Management Practices

SPCC Spill Prevention, Control and Countermeasures Plan

ESL (2008) California Regional Water Quality Control Board, Region IX, Environmental Screening Levels

EPA RSL (2011) U.S. Environmental Protection Agency, Region IX, Regional Screening Levels Table

SSPP NASA Strategic Sustainability Performance Plan

1.8 ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

1.8.1 Material Safety Data Sheets (MSDS)

Submit an MSDS for each product specified in other sections or required by OSHA to have an MSDS. MSDS shall be prepared within the previous five years. Include information for MSDS Sections 1 through 16 in accordance with ANSI Z400.1/Z129.1 and 29 CFR 1910.1200 Appendix D.

In addition to the MSDS, provide the additional information:

- a. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects. Provide written description of the process used in evaluating chemical hazards relative to preparation of the MSDS.
- b. Include data regarding the proper disposal of the chemical, including the disposal of any contaminated packaging. Include information regarding recycling and reuse. Indicate whether or not the product is considered to be "hazardous waste" according to 40 CFR 261.

- c. Identify Federal, State, and local regulations applicable to the material.
- d. Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts. Identify the date MSDS was prepared.

#### 1.8.2 Life Cycle Assessments (LCAs)

For the following products, submit LCA data developed in accordance with ISO 14040; and where BEES data exists, submit NIST BEES 4.0 analysis using 100 percent Environmental Performance Weighting and the EPA Scientific Advisory Board Environmental Impact Category Weights.

- a. Masonry
- b. Finish Carpentry
- c. Plastic Fabrications
- d. Building Insulation
- e. Roofing
- f. Joint Sealers
- g. Wood & Plastic Doors
- h. Windows
- i. Skylights
- j. Glazed Curtain Wall
- k. Gypsum Board
- l. Tile
- m. Acoustical Ceilings
- n. Resilient Flooring
- o. Carpet
- p. Toilet Compartments
- q. Loading Dock Equipment
- r. Office Equipment
- s. Furnishings & Accessories
- t. Renewable Energy Equipment
- u. Elevators
- v. HVAC equipment

- x. Lighting equipment

#### 1.9 ENVIRONMENTAL PROTECTION PLAN

Prepare and submit an Environmental Protection Plan not less than 10 days before the preconstruction meeting. At a minimum, address the following elements in accordance with this section:

- a. Identification and contact information for Environmental Manager.
- b. General site information, including preconstruction description and photographs.
- c. Summary of training program.
- d. Procedures to address water resources.
- e. Procedures to address land resources.
- f. Procedures to address air resources.
- g. Procedures to address fish, wildlife and plant (and their habitats)resources.
- h. Procedures to address cultural resources.
- i. Monitoring and quality control procedures.

Procedures to avoid interfering with remediation activities or creating new pathways.

Revise and resubmit Plan as required by the COR. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

#### 1.10 ENVIRONMENTAL DEMONSTRATION AND TRAINING

Contractor shall provide environmental training for workers performing work on the project site.

##### 1.10.1 Instructor Qualifications

Training shall be given by a firm or individual experienced in providing training or education similar in content and extent to that indicated for this project.

##### 1.10.2 Coordination

Coordinate instruction schedule with Government operations. Adjust schedule as required to minimize disruption of Government operations. Coordinate instruction with demonstration and training of general building systems.

##### 1.10.3 Training Program

Develop a training program for all site workers that includes the following topics:

- a. Overview of environmental and sustainability issues related to the

building industry.

- b. Overview of environmental and sustainability issues related to the project.
- c. Compliance with applicable Federal, State, and local environmental regulations.
- d. Review of site specific procedures and management plans implemented during construction, including the Waste Management Plan, Indoor Air Quality (IAQ) Management Plan, Environmental Protection Plan, and procedures for noise and acoustics management.
- e. All personnel shall be trained in the hazards and safe work practices for their tasks.
- f. Personnel performing hazardous operations shall receive training as specified in applicable regulations.
  1. Personnel handling hazardous materials shall have received Hazard Communication Training per 29 CFR 1910.1200 and CCR Title 8 Section 5194 and Emergency Response Awareness Level training per 29 CFR 1910.120. Employee training documents shall be kept at the jobsite.
  2. Personnel containing spills or conducting cleanup of small spills shall have received First Responder Operations level training per 29 CFR 1910.120.
  3. Personnel generating hazardous waste shall receive training on the proper management of hazardous waste per 40 CFR 265.16 and CFR Title 22 Section 265.16.
  4. Personnel using personal protective equipment (PPE) shall receive training on its proper use per 29 CFR 1910.132.
  5. Personnel involved with hazardous materials and hazardous waste preparation for shipment shall receive training as hazmat employees per 49 CFR 172.704(c)(2).
- g. Personnel handling hazardous materials shall have received Hazard Communication Training per 29 CFR 1910.1200 and CCR Title 8 Section 5194 and Emergency Response Awareness Level training per 29 CFR 1910.120. Employee training documents shall be kept at the jobsite.
- h. Personnel containing spills or conducting cleanup of small spills shall have received First Responder Operators level training per 29 CFR 1910.120.
- i. Personnel generating hazardous waste shall have received training on the proper management of hazardous waste per 40 CFR 6265.16 and CFR Title 22 Section 6265.16.
- j. All Contractor personnel involved in operations with potential to impact storm water quality or the storm drain system shall have awareness training regarding the project specific SWPPP and the applicable BMPs. Documentation of this training shall be provided to the Government.

- k. Personnel operating in wildlife habitats, where operations may be affected by wildlife, or who may come in contact with wildlife shall have wildlife awareness training relevant to this project.
- l. Personnel operating in or whose operations may affect cultural resources shall have awareness training relevant to the project.
- m. Personnel shall have awareness training of the NASA Ames Environmental Management System, including high priority risks (air, hazmat, energy, water).

#### 1.10.3.1 Scheduling

Provide instruction at mutually agreeable times.

#### 1.10.3.2 Training Modules

Develop a learning objective and teaching outline for each topic in the Training Program. Include a description of specific skills and knowledge that each participant is expected to acquire. Instructors shall be well-versed in the particular topics that they are presenting.

#### 1.10.3.3 Evaluation

At the conclusion of each training module, assess and document each participant's understanding of the module by use of a written performance-based test.

## PART 2 PRODUCTS

### 2.1 ENVIRONMENTALLY PREFERABLE PRODUCTS

Consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and disposal of products, and provide products and materials with the least effect on the environment, determined by LCA analysis, released toxins, and other methods.

- a. All products purchased for Federal projects with Federal funds, including contractors, are required by [EO 13423](#) and Part 23 of the Federal Acquisition Regulations (FAR) to assess and give preference to those products and services that are environmentally preferable. Environmentally preferable products are of recycled content, recyclable, of low toxicity, reusable, locally produced, low-polluting, have long life cycles, are harvested on a sustained yield basis, and are biobased.
- b. In addition, [EO 13423](#) and [RCRA 6002](#) require the U.S. EPA and USDA to maintain the Comprehensive Procurement Guidelines (CPG) and BioPreferred Program, which are lists of products and materials that MUST be purchased at the maximum recycled-content level specified. CPG items include: building insulation, carpet, carpet cushion, cement, concrete, latex paint, floor tiles, flowable fill, laminated paperboard, modular threshold ramps, non-pressure pipe, patio blocks, roofing materials, shower and restroom dividers/partitions, plastic lumber landscaping timbers and posts, plastic fencing, playground equipment, playground surfaces, blasting grit, industrial drums, manual grade strapping, mats, pallets, signage, bike racks, and structural fiberboard. BioPreferred product categories include: roof coatings, composite panels, fluid-filled transformers, plastic insulating foam,

carpets, greases, hydraulic fluids, metal working fluids, wood and concrete sealers, concrete and asphalt release fluids, erosion control materials, and interior paints and coatings.

- c. If using Federal funds, including contractors, and purchasing one of these products, the product must be purchased at the highest recycled content level practicable.
- d. The complete up-to-date list of CPG products and required recycled content levels is available at <http://www.epa.gov/cpg/>. The list of USDA BioPreferred program product categories and the minimum biobased content standards established for each category is at <http://www.biopREFERRED.gov/ProposedAndFinalItemDesignations.aspx>.
- e. If this product is unacceptable based on quality, availability, or cost, a waiver must be submitted to and approved by the Environmental Management Division. The COR will provide form ARC 813 to the contractor when required. More information is available at <http://environmentalmanagement.arc.nasa.gov/forms/>.
- f. For guidance on finding specific products that meet these requirements, please contact the Environmental Management Division.

#### 2.1.1 Prohibited Materials

The use of the following materials is prohibited:

- a. Products containing asbestos.
- b. Products containing urea formaldehyde.
- c. Products containing polychlorinated biphenyls.
- d. Products containing chlorinated fluorocarbons.
- e. Solder or flux containing more than 0.2 percent lead and domestic water pipe or pipe fittings containing more than 8 percent lead.
- f. Paint containing more than 0.06 percent lead.

#### 2.1.2 Packaging

Where Contractor has the option to provide one of the listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging, and to manufacturers with policies that take back product packaging.

##### 2.1.2.1 Industrial Paperboard

Minimum 100 percent post-consumer recycled content in accordance with [ASTM D 5663](#).

##### 2.1.2.2 Carrier Board

Minimum 100 percent recycled content with a minimum of 15 percent post-consumer recycled content in accordance with [ASTM D 5663](#).

### 2.1.2.3 Brown Papers

Minimum 40 percent recycled content with a minimum of 20 percent post-consumer recycled content in accordance with [ASTM D 5663](#).

### 2.1.3 Substitutions

Notify the COR when Contractor is aware of materials, equipment, or products that meet the aesthetic and programmatic intent of Contract Documents, but which are more environmentally responsible than materials, equipment, or products specified or indicated in the Contract Documents. Submit the following for initial review by the COR:

- a. Product data including manufacturer's name, address, and phone number.
- b. Description of environmental advantages of proposed substitution over specified product.

## PART 3 EXECUTION

### 3.1 PROTECTION OF NATURAL RESOURCES

Comply with applicable regulations and these specifications. Preserve the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the COR. Where violation of environmental procedures requirements will irreversibly damage the site, the Contractor shall immediately contact the COR and CO to coordinate with the NASA Ames Environmental Management Division to develop a mitigation strategy and, if necessary, report to regulatory agencies.

#### 3.1.1 General Disturbance

Confine demolition and construction activities to work area limits indicated on the Drawings. Remove debris, rubbish, and other waste materials resulting from demolition and construction operations from site. Transport materials with appropriate vehicles and dispose of them off site to areas that are approved for disposal by governing authorities having jurisdiction. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways. Burning is prohibited.

#### 3.1.2 Water Resources

Comply with requirements of the [NPDES](#) and the applicable State Pollutant Discharge Elimination System (SPDES). Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Store and service construction equipment at areas designated for collection of oil wastes. Prevent ponding of stagnant water conducive to mosquito breeding habitat. Prevent run-off from site during demolition and construction operations. Equipment will be permitted to ford live streams if temporary culverts or bridges are constructed for the purpose and the CO and COR have obtained approval from the NASA Ames Environmental Management Division that the action will not violate wetlands or wildlife laws, regulations and policies, such as those covering steelhead salmon, western pond turtle, salt marsh harvest mouse, and protected birds. Remove temporary culverts and bridges upon completion of work and repair the area to its original condition, unless otherwise accepted in writing by the COR.

## 3.1.2.1 Wastewater Discharge Permits

- a. In accordance with the Clean Water Act, the City of Sunnyvale Water and Sewers Ordinance, and the City of Palo Alto Sewer Use Ordinance, a specific written Incidental Sewer Discharge permit is required before discharging wastewaters to the sanitary sewer system from project activities such as excavation dewatering, saw cutting coolant water, cleaning operations, and decontamination water.
- b. The Contractor shall complete and submit a Request for Incidental Sewer Discharge form to the COR at least 7 working days before the planned discharge of groundwater or other wastewater. The request shall include the estimated discharge volume, discharge rate, source of the wastewater and the duration of discharge. The Government will sample the wastewater and obtain the discharge approval.
- c. Wastewater Discharge
  1. With the exception of groundwater from excavation, wastewater from Contractor operations shall be containerized by the Contractor until the Contractor is notified a discharge permit has been obtained.
  2. The Contractor shall record and submit information specified in the discharge permit issued to the project including, but not limited to, the dates of discharge, quantity of water discharged, source of the wastewater, dates wastewater was sampled and analyzed (if required), and filtering method (if required).
  3. Non-sewerable wastewater shall be disposed of by the Government in accordance with subsection 3.1.8.1, Government Disposal.
  4. Non-sewerable wastewater shall be treated, managed, and disposed of properly by the Contractor in accordance with subsection 3.1.8.2, Contractor Disposal.
- d. In the event that the POTW requires a Groundwater Discharge Permit, the Contractor will coordinate with the Environmental Management Division to complete the application. This may take 2-4 weeks. The Environmental Management Division must submit the completed application, along with all fees, and receive the approved permit prior to any discharge of any groundwater.

## 3.1.2.2 Storm Water Management

- a. All development or redevelopment with a footprint that exceeds 5,000 square feet shall be in accord with the Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act, which states that "the sponsor . . . shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."
- b. Site Inspections - In accordance with Santa Clara County Hazardous Materials Storage Ordinance No. NS-517.31 the project site and all hazardous materials storage areas shall be inspected weekly by the

Government to ensure compliance. In accordance with the project specific Storm Water Pollution Prevention Plan (SWPPP), the Government shall conduct inspections prior to any forecasted storm event, every 24 hour period during extended rain events and after every storm event to ensure required Best Management Practices (BMPs) were implemented and remained effective.

- c. Hazardous Materials Storage
  - 1. Hazardous materials storage shall be in accordance with Santa Clara County Hazardous Materials Storage Ordinance No. NS-517.31, and the General Storm Water Permit. Hazardous materials shall be handled in manner that minimizes the potential for releases. All liquid hazardous materials must be secondarily contained. Adequate spill response equipment shall be readily available.
  - 2. Hazardous materials and hazardous wastes shall be labeled, handled properly, and stored in watertight containers with appropriate secondary containment. Secondary containment shall be of adequate size and compatible with the materials stored. Storage areas shall be properly labeled and secured.
- d. Staging Area - In accordance with the Clean Water Act and Ames SWPPP, to the maximum extent practicable, the staging area must be located away from storm drain inlets, gutters, drainage ditches, storm drain inlets, and creeks.
- e. Granular Material Storage - In accordance with the Clean Water Act and Ames SWPPP, granular material shall be stored at least 10 ft from drainage ditches, catch basins, and curbs.
- f. Refuse Bins - Refuse bins shall not be overloaded. Liquid materials shall not be placed in dumpsters or bins. Leaking dumpsters shall be replaced. Dumpsters and bins shall not be cleaned on-site. Dumpsters and bins shall be kept closed except when loading or emptying. Waste disposal containers shall be covered at the end of every business day and during a rain event. Dumpsters shall be wildlife resistant (per NADRPEIS and ROD 2002)
- g. Landscaping - The Contractor shall control soil erosion and storm run-off to protect natural habitat from the project site to the satisfaction of the COR.
- h. Stockpiles - All loose stockpiled construction materials that are not actively being used (soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.) shall be covered and bermed.
- i. Site Operations - shall be conducted in accordance with the Clean Water Act and Ames SWPPP.
- j. Equipment Fueling and Maintenance - In accordance with the applicable BMP, equipment fluid changes and fueling shall be conducted over drip pans to prevent spilled materials from contacting the ground surface. The operator of leaking equipment shall contain and control the leak. All other maintenance and repairs of Contractor equipment is prohibited on-site.
- k. Paint Clean-up

1. Painting operations must be conducted in accordance with Ames SWPPP and applicable BAAQMD requirements.
  2. Water Based Paints
    - a) The Contractor shall paint out as much excess paint as possible from brushes, rollers, and equipment before starting clean up. Rinse brushes, rollers, and other tools over a sink that drains to the sanitary sewer using water only. Tools and equipment shall not be cleaned into streets, gutters, storm drains, or creeks. Dispose of dry brushes, rollers, rags, and drop cloths as solid waste.
    - b) Disposal of containers with any liquids as a solid waste is prohibited. These materials must be used elsewhere or handled as a hazardous waste and disposed of in accordance with subsection 3.1.8.2, Contractor Disposal.
  3. Oil Based Paints
    - a) The Contractor shall paint out as much excess paint as possible from brushes, rollers, and equipment before starting clean up. Cleaning wash water shall be containerized and disposed of as hazardous waste. Reuse thinners and solvents by pouring back into original container through a filter.
    - b) Dispose of waste thinners, solvents, paint sludge, and wash water from cleaning of equipment and tools as hazardous waste. Containers with residual product shall be managed as a hazardous waste and disposed of in accordance with subsection 3.1.8.2, Contractor Disposal.
1. Paving Operations
    1. Catch basins and manholes shall be protected when paving or applying seal coat, tack coat, slurry seal, or fog seal. Sweeping or washing down excess sand (from applying sand seals or covering excess oil) into gutters, storm drains, or creeks is prohibited. Excess materials shall either be collected and returned to the stockpile or disposed of properly.
    2. Paving operations shall not obscure existing utility boxes, ground water monitoring wells, manholes, valve boxes or similar features. Notify the COR of any features potentially impacted.
  - m. Concrete/Asphalt Cutting and Core Drilling - In accordance with the applicable BMP, the Contractor shall not allow slurry run-off from saw cutting or core drilling to enter the storm or sanitary sewer collection systems. Catch basins and drains shall be protected. The Contractor shall sweep/shovel up slurry cutting waste from work areas before leaving an area or at the end of each work day, whichever is sooner. If saw-cut slurry enters a drain, the Contractor shall remove the slurry and notify the COR immediately.
  - n. Concrete Truck/Wash Out - In accordance with the applicable BMP, washing out concrete trucks or equipment into streets, gutters, storm drains, or creeks is prohibited. Trucks may be washed out on the ground surface in a location approved by the COR.

- o. Sweeping - Roadways and on-site paved areas impacted by the project shall be cleaned as necessary to the satisfaction of the COR and swept at the end of each workday, prior to forecasted rain, at the end of each phase and at project completion. Hosing down paved areas and streets is prohibited.
- p. Reclaimed Water - The Contractor shall use reclaimed water for dust control and other construction site operations unless an exception is granted by the COR. Reclaimed water is available at no cost from a hydrant located on Moffett Federal Airfield approximately 328 ft south of the intersection of Macon Road and Fifth Avenue.
- q. Storm Drain Management
  - 1. In accordance with the applicable BMP, catch basins near the project shall be protected to prevent debris, pollutants, sediments and releases from entering the storm drain system. Catch basins shall be inspected and cleaned out to the satisfaction of the COR at the end of each phase or at project completion.
  - 2. In accordance with the applicable BMP, the Contractor shall control soil erosion and storm runoff from the Contractor's site to the satisfaction of the COR.
- r. Broken/Ruptured Pipes - If the Contractor breaks a utility pipe, or observes any broken or leaking pipes, it shall immediately notify the COR. The Contractor shall immediately notify Ames Environmental Management Division if the pipe contained any liquid except potable water. The Contractor shall berm the area to prevent run-off from releases of non-potable water from entering the storm drain.
- s. Draining, Tanks, Piping, and Equipment
  - 1. Tanks, piping, and equipment shall be drained as required. Devices to properly contain the product shall be provided by the Contractor. Storm drains in the vicinity shall be covered during drainage operations.
  - 2. The Government will conduct the sampling of drained fluid in order to determine disposal options unless there is sufficient generator knowledge to determine disposal options.
  - 3. The Government will obtain the necessary sanitary sewer discharge permits if the discharge is sewerable. Non-sewerable water shall be treated to a level to allow discharge to the sanitary sewer or managed and disposed of properly.
  - 4. Disposal of drained fluid and associated costs shall be by the Government in accordance with subsection 3.1.8.1, Government Disposal.
- t. Authorized Non-Storm Water Discharges
  - 1. Following is a list of authorized non-storm water discharges:
    - a) Atmospheric condensate including refrigeration, air conditioning and compressor condensate.
    - b) Irrigation drainage and landscape watering.

- c) Uncontaminated ground water provided that the water does not become contaminated with soil or sediment (muddy).
- d) Water from fire hydrant flushing or testing.
- e) Water from fire fighting activities.

- 2. To the extent practicable, authorized non-storm water discharges shall be minimized. Additionally, the Environmental Management Division shall be notified of all authorized non-storm water discharges so that they may be observed and/or documented as required by the General Storm Water Permits.

### 3.1.2.3 Spill Prevention, Control, and Reporting

- a. All liquid petroleum products must be secondarily contained in accordance with Ames Spill Prevention Control and Countermeasures Plan and 40 CFR 112, spill clean-up materials (such as rags, absorbent booms/pads), and tools (such as shovels and brooms) shall be maintained at the project site and be readily accessible. Releases of hazardous materials to the environment shall be contained and measures implemented to prevent leaks and spills from entering storm drains. Spills of hazardous materials to unpaved surfaces in excess of 1 ounce shall immediately be reported to Environmental Management Division.
- b. Dial 911 from any NASA phone or 650-604-5555 from an outside phone to request assistance of any spill by the Contractor.

### 3.1.2.4 Drinking Water Resources

Any proposed drinking water well must be coordinated with the Ames Remediation Program Manager, who is the only person authorized to sign well permit applications on behalf of NASA as the landowner before applications are submitted to the Santa Clara County Water District. Under no circumstances may a drinking water well be placed in a location that has not been cleaned up to residential standards, e.g., capped landfills, petroleum sites, or in a location that would otherwise interfere with on-going remediation activities.

### 3.1.3 Land Resources

Prior to construction, identify land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms without permission from the COR. Coordinate protection practices with work specified in Division 2 EXISTING CONDITIONS.

- a. Construction Over Or In MEW Study Area
  - 1. Any construction over or in the area of shallow groundwater contamination known as the MEW Study Area must implement the remedy prescribed in the Record of Decision for the Middlefield/Ellis/Whisman (MEW) Study Area and Record of Decision Amendment for the Vapor Intrusion Pathway and be coordinated with the Ames Environmental Management Division Remediation Program Manager.
  - 2. Soil boring and well data shall be transmitted to the Ames

Remediation Program Manager.

3. The Contractor shall follow procedures outlined in Section 02 61 13. This section can be detained from the COR, if needed.

b. Contaminated Soil Management

1. The Contractor shall notify the COR immediately if soil appears discolored or has an odor. The Contractor shall place suspect soil on plastic sheeting and cover with a plastic tarpaulin. The suspect soil will be tested by the Government for contamination.
2. Contaminated soil shall be transferred to a designated on-site location for disposal by the Government in accordance with subsection 3.1.8.1, Government Disposal or properly disposed of by the contractor in accordance with subsection 3.1.8.2, Contractor Disposal.

c. Construction Over or In Landfill Sites and Petroleum Contaminated Sites

Any construction over or in the vicinity of former landfill sites, petroleum contaminated sites, treatment systems and other remediation activities, must be coordinated with the Ames Environmental Management Division Remediation Program Manager for consistency with CERCLA, RCRA, and TSCA decision documents issued by the U.S. Environmental Protection Agency, Regional Water Quality Control Board, and California Department of Toxic Substances Control. In no case shall residential construction be authorized where the sites have not been cleaned up to residential standards.

d. Construction, Removal, or Modification of Wells

Any request to construct, remove, or modify a well, including, e.g., drinking water wells, geothermal wells, monitoring wells, must be coordinated with the Ames Environmental Management Division Remediation Program Manager for consistency with CERCLA, RCRA, and TSCA decision documents issued by the U.S. Environmental Protection Agency, Regional Water Quality Control Board, and California Department of Toxic Substances Control. Only the Ames RPM is authorized to sign well permit applications on behalf of NASA as the landowner prior to submittal to the Santa Clara County Water District for approval. In no case shall drinking water well permit applications be authorized by NASA where the sites have not been cleaned up to residential standards.

3.1.3.1 Erodible Soils

Plan and conduct earthwork to minimize the duration of exposure of unprotected soils, except where the constructed feature obscures borrow areas, quarries, and waste material areas. Clear areas in reasonably sized increments only as needed to use the areas developed. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.

3.1.3.2 Erosion and Sedimentation Control Devices

Construct or install temporary and permanent erosion and sedimentation control features as required.

### 3.1.3.3 Tree and Plant Protection

Protect as specified in Division 2 EXISTING CONDITIONS and as specified. Prior to start of construction, tag each tree and plant scheduled to remain. In the event of damage to tree or plant, the Government may, at the COR's discretion, deduct the indicated value of the damaged tree or plant from the Contract Sum.

### 3.1.3.4 Drinking Water Sources

Any proposed drinking water well must be coordinated with Ames Remediation Program Manager, who is the only person authorized to sign well permit applications on behalf of NASA as the landowner before applications are submitted to the Santa Clara County Water District. Under no circumstances may a drinking water well be placed in a location that has not been cleaned up to residential standards, e.g., capped landfills, petroleum sties, or in a location that would otherwise interfere with on-going remediation activities.

### 3.1.4 Air Resources

Comply with Indoor Air Quality (IAQ) Management Plan and as follows:

- a. Prevent creation of dust, air pollution, and odors.
- b. Sequence construction to avoid unnecessary disturbance to site.
- c. Use mulch, water sprinkling, temporary enclosures, and other appropriate methods as needed to limit dust and dirt rising and scattering in air. Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
- d. Store volatile liquids, including fuels and solvents, in closed containers. Do not store with materials that have a high capacity to adsorb VOC emissions or in occupied spaces.
- e. Properly maintain equipment to reduce gaseous pollutant emissions.
- f. Construction operations and materials used on the project shall be in compliance with the Rules and Regulations for Air Quality of the Bay Area Air Quality Management District (BAAQMD).
- g. If coatings are used, the coatings need to meet the VOC requirements of the BAAQMD Regulations. The VOC requirements vary depending on the coating operation. For architectural coatings, follow the requirements of [BAAQMD Regulation 8, Rule 3](#). For surface coating of miscellaneous metal parts and products, follow the requirements of [BBAQMD Regulation 8, Rule 49](#). For adhesive and sealant products, follow the requirements of [BAAQMD Regulation 8, Rule 51](#). the VOC content can be found on the coating's MSDS. The VOC normally is listed in the section listing the physical and chemical properties of the coating. General assistance is always available from the Environmental Management Division to ensure compliance with BAAQMD coating regulations.
- h. Aerospace Coatings - Aerospace coatings shall conform to [BAAQMD Regulation 8, Rule 29](#) for VOC content limits.
- i. Architectural Coatings - Architectural coatings and paints shall

conform to BAAQMD Regulation 8, Rule 3 for VOC content - Architectural Coating Limits.

- j. Spray Paints - Spray paints shall conform to BAAQMD Regulation 8, Rule 49 for VOC content - Aerosol Coatings.
- k. Chlorofluorocarbons (CFCs) and Other Class I Ozone Depleting Substances.
  - 1. Class I Ozone Depleting Substances (ODS) as defined and identified herein shall not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition shall prevail over any other provision, specification, drawing, or referenced documents.
  - 2. Class I ODS is defined in Section 602(a) of the Clean Air Act and includes the following chemicals:
    - a) Chlorofluorocarbon-11 (CFC-11)
    - b) Chlorofluorocarbon-12 (CFC-12)
    - c) Chlorofluorocarbon-13 (CFC-13)
    - d) Chlorofluorocarbon-111 (CFC-111)
    - e) Chlorofluorocarbon-112 (CFC-112)
    - f) Chlorofluorocarbon-113 (CFC-113)
    - g) Chlorofluorocarbon-114 (CFC-114)
    - h) Chlorofluorocarbon-115 (CFC-115)
    - i) Chlorofluorocarbon-211 (CFC-211)
    - j) Chlorofluorocarbon-212 (CFC-212)
    - k) Chlorofluorocarbon-213 (CFC-213)
    - l) Chlorofluorocarbon-214 (CFC-214)
    - m) Chlorofluorocarbon-215 (CFC-215)
    - n) Chlorofluorocarbon-216 (CFC-216)
    - o) Chlorofluorocarbon-217 (CFC-217)
    - p) Halon-1211
    - q) Halon-1301
    - r) Halon-2402
    - s) Carbon tetrachloride
    - t) Methyl chloroform
  - 3. Service, maintain, renovate, and demolish ODS containing equipment in accordance with 40 CFR 82. Prevent a discharge of ODS to the atmosphere. ODS recovery equipment shall be certified by an EPA-approved equipment testing organization. Place recovered ODS in cylinders suitable for the type of ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. For new ODS added to existing equipment, provide the following data to the Environmental Management Division, Mail Stop 237-14, within 48 hours of adding the new ODS: equipment manufacturer and model number, location, type of ODS, quantity added, and date the work was performed.
  - 4. The Contractor shall ensure that CFC refrigerants are recovered by a certified technician in accordance with the Final Rule of the Clean Air Act of 1990, Section 608, before the equipment is removed from Government property. Keep copies of technician certification at the technician's place of business.
  - 5. In accordance with §82.3 of Section 608 of the CAA, recovered ODS for destruction must be shipped to a destruction facility which uses one of the following destruction technologies: liquid

injection incineration, reactor cracking, gaseous/fume oxidation, rotary kiln incineration, cement kiln, or radio frequency plasma; recovered ODS for reclamation must be sent to an EPA-certified refrigerant reclaiming. A list can be viewed at:  
<http://www.epa.gov/ozone/partnerships/rad/radpartners.html>.

1. Hydrochlorofluorocarbons (HCFCs) and Other Class II Ozone Depleting Substances.

1. Class II Ozone Depleting Substances (ODS) as defined and identified herein shall not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition shall prevail over any other provision, specification, drawing, or referenced documents. Refer to the EPA Significant New Alternatives Policy (SNAP) Program for a listing of acceptable ODS substitutes by sector found at  
<http://www.epa.gov/ozone/snap/lists/index.html>.

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

- a) hydrochlorofluorocarbon-21 (HCFC-21)
- b) hydrochlorofluorocarbon-22 (HCFC-22)
- c) hydrochlorofluorocarbon-31 (HCFC-31)
- d) hydrochlorofluorocarbon-121 (HCFC-121)
- e) hydrochlorofluorocarbon-122 (HCFC-122)
- f) hydrochlorofluorocarbon-123 (HCFC-123)
- g) hydrochlorofluorocarbon-124 (HCFC-124)
- h) hydrochlorofluorocarbon-131 (HCFC-131)
- i) hydrochlorofluorocarbon-132 (HCFC-132)
- j) hydrochlorofluorocarbon-133 (HCFC-133)
- k) hydrochlorofluorocarbon-141 (HCFC-141)
- l) hydrochlorofluorocarbon-142 (HCFC-142)
- m) hydrochlorofluorocarbon-221 (HCFC-221)
- n) hydrochlorofluorocarbon-222 (HCFC-222)
- o) hydrochlorofluorocarbon-223 (HCFC-223)
- p) hydrochlorofluorocarbon-224 (HCFC-224)
- q) hydrochlorofluorocarbon-225 (HCFC-225)
- r) hydrochlorofluorocarbon-226 (HCFC-226)
- s) hydrochlorofluorocarbon-231 (HCFC-231)
- t) hydrochlorofluorocarbon-232 (HCFC-232)
- u) hydrochlorofluorocarbon-233 (HCFC-233)
- v) hydrochlorofluorocarbon-234 (HCFC-234)
- w) hydrochlorofluorocarbon-235 (HCFC-235)
- x) hydrochlorofluorocarbon-241 (HCFC-241)
- y) hydrochlorofluorocarbon-242 (HCFC-242)
- z) hydrochlorofluorocarbon-243 (HCFC-243)
- aa) hydrochlorofluorocarbon-244 (HCFC-244)
- bb) hydrochlorofluorocarbon-251 (HCFC-251)
- cc) hydrochlorofluorocarbon-252 (HCFC-252)
- dd) hydrochlorofluorocarbon-253 (HCFC-253)
- ee) hydrochlorofluorocarbon-261 (HCFC-261)
- ff) hydrochlorofluorocarbon-262 (HCFC-262)
- gg) hydrochlorofluorocarbon-271 (HCFC-271)

3. Service, maintain, renovate, and demolish ODS containing equipment in accordance with 40 CFR 82. Prevent a discharge of ODS to the atmosphere. ODS recovery equipment must be certified by an EPA-approved equipment testing organization. Place recovered ODS

in cylinders suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. For new ODS added to existing equipment, provide the following data to the Environmental Management Division, Mail Stop 237-14, within 48 hours of adding the new ODS: equipment manufacturer and model number, location, type of ODS, quantity added, and date the work was performed.

4. The Contractor shall ensure that HCFC refrigerants are recovered by a certified technician in accordance with the Final Rule of the Clean Air Act of 1990, Section 608, before the equipment is removed from Government property. Keep copies of technician certification at the technician's place of business.
  5. In accordance with §82.3 of Section 608 of the CAA, recovered ODS for destruction must be shipped to a destruction facility which uses one of the following destruction technologies: liquid injection incineration, reactor cracking, gaseous/fume oxidation, rotary kiln incineration, cement kiln, or radio frequency plasma; recovered ODS for reclamation must be sent to an EPA-certified refrigerant reclaimer. A list can be viewed at <http://www.epa.gov/ozone/partnerships/rad/radpartners.html>.
- m. Reduce indoor levels of radon gas and formaldehyde emissions by following industry and U.S. EPA guidelines on indoor environmental quality (see <http://www.epa.gov/iaq> for more information).

The Contractor is responsible for meeting the State and CARB requirements for both the off-road and on-road vehicle regulations.

Use of sulfur hexafluoride (SF6) is restricted to gas insulated switchgear equipment and some research and development activities. Contact the Environmental Management Division, Code JQ, before bringing any SF6 containing equipment on-site.

Refrigeration systems with a full charge greater than 50 pounds of high-GWP refrigerant, must meet the requirements of the CARB regulation for the management of high global warming potential refrigerants for stationary sources (California Code of Regulations Title 17 Subarticle 5.1 Sections 95380 to 95398).

The Contractor shall provide information (construction schedule, construction equipment fleet emissions information, etc.) to the Environmental Management Division to calculate construction related emissions. The COR and the Contractor shall coordinate construction activities to ensure that the NASA Ames overall emission of ozone precursor compounds associated with project construction and operation do not exceed a cumulative total of 100 tones per year.

The Contractor shall use mitigation measures to reduce nitrogen oxides (NOx) emission from construction activities. The Contractor shall reduce unnecessary idling of construction equipment and follow NASA Ames idling guidelines for diesel power equipment. All construction equipment is prohibited from idling more than 5 minutes. The Contractor shall properly maintain construction equipment.

The staging of three or more pieces of construction equipment near or just upwind from sensitive receptors, such as residences or daycare uses, is prohibited.

### 3.1.5 Fish, Wildlife, Plant Resources, and Habitat

Manage and control construction activities to minimize interference with and damage to fish and wildlife and plants and habitat. Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat related to the project and critical to the survival of fish and wildlife, and protected plants except as indicated or specified. Do not introduce non-native species. Contact Ames Facilities Maintenance for assistance in control of common pests, such as rats, bees, fleas, and the EMD for assistance in managing wildlife concerns.

#### 3.1.5.1 Burrowing Owl Habitat

- a. The Contractor shall conduct its activities in a manner that does not negatively impact fauna or flora, in accordance with 40 CFR 1500, 50 CFR 402, and Ames Environmental Procedural Requirement, APR 8500.1.
- b. The Contractor shall comply with the "Burrowing Owl Management Policy for Ames Research Center."

### 3.1.6 Cultural Resources, Plant Resources, and Habitat

Manage and control construction activities to minimize interference with and damage to cultural resources and plants and habitat. Do not disturb cultural resources. Do not alter water flows or otherwise significantly disturb the native habitat related to the project and critical to the preservation of cultural resources, and protected plants except as indicated or specified. Do not introduce non-native species.

### 3.1.7 Resource Conservation/Sustainability

The Contractor shall conduct its activities in a manner that conserves resources and minimizes pollution in accordance with NASA Ames EMS, NASA Strategic Sustainability Performance Plan, Executive Order 13423 "Strengthening Federal Environmental, Energy, and Transportation Management" and Executive Order 13514 "Federal Leadership in Environmental, Energy, and Economic Performance." All new construction, major renovation or repair and alteration of NASA buildings will comply with "Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings" (Guiding Principles) at <http://www.wbdg.org/references/mou.php>.

- a. Minimize the amount of energy required during construction and operation by using resource efficient construction techniques, building systems (including HVAC, heating, electrical, water, lighting, heat-pumps and boilers), insulation, fixtures, appliances, and controls.
- b. Whenever possible, utilize energy efficient office equipment through the Environmental Protection Agency's Energy Star labeling program (<http://www.energystar.gov>).
- c. Use automated monitors and controls for energy, water, waste, temperature, moisture, and ventilation.
- d. Conserve water with systems that reduce consumption and recycle water through reclamation and treatment systems.
- e. Maximize the reduction, reuse, recycling or composting of waste and scrap materials.

- f. Minimize waste, spillage, pilferage, spoil, and misuse of building materials.
- g. Consider adaptive reuse, rather than demolition whenever possible.
- h. Follow Federal Comprehensive Procurement Guidelines (<http://www.epa.gov/epawaster/consERVE/tools/cpg/index.htm>) for building materials and products. Select materials that have a long-life cycle; select least toxic materials; select recyclable materials; select materials that are resource-efficient; select materials with the maximum recycled content; select materials harvested on a sustained yield basis; and select products causing the least pollution during their manufacture, use and reuse.
- i. Reduce, reuse, and recycle to minimize consumption and waste in business operations.
- j. Utilize environmental life cycle cost analysis in the development process.

### 3.1.8 Hazardous Waste Management

#### 3.1.8.1 Government Disposal

- a. The Contractor shall label, package, and secondarily contain liquid hazardous wastes before submitting the hazardous wastes to the Government for subsequent disposal.
- b. Hazardous Waste Manifest
  - 1. NASA Ames Research Center shall be designated as the generator on the manifest and only approved Environmental Management Division personnel shall sign the Uniform Hazardous Waste Manifests. Contractors shall not sign hazardous waste manifests.
  - 2. If the waste is generated from a tenant's site, where the tenant holds the generator permit, the tenant with requisite training must sign the manifest.
  - 3. NASA Ames Research Center Ames Dispatch (650)604-5416 shall be designated as the emergency contact on the manifest.

#### 3.1.8.2 Contractor Disposal

- a. Hazardous wastes generated by materials brought on site by the Contractor shall be properly handled, shipped, and disposed of as required by Federal, State, and local regulations. No hazardous materials shall remain at the worksite upon completion of the project unless specified otherwise. The Government shall sample waste streams for purposes of waste characterization. Waste Profiles shall be submitted to the COR. Hazardous wastes shall be disposed of at a permitted Treatment, Storage, and Disposal Facility (TSDF) authorized to accept the specific waste to be shipped. Use of deep well injection as a treatment or disposal method is prohibited.
- b. Hazardous Waste Manifest
  - 1. NASA Ames Research Center shall be designated as the generator on

- the manifest and only approved Ames Environmental Management Division personnel shall sign the Uniform Hazardous Waste Manifests. Contractors shall not sign hazardous waste manifests.
2. If the waste is generated from a tenant's site, where the tenant holds the generator permit, the tenant with requisite training must sign the manifest.
  3. NASA Ames Research Center (650)604-5416 (Ames Dispatch) shall be designated as the emergency contact on the manifest.
  4. The Contractor shall prepare shipments in compliance with 49 CFR. The Contractor shall meet the removal and disposal time frames established by law.
  5. The Contractor shall use only disposal facilities that have a valid permit to manage hazardous waste, and shall be responsible for determining that permit allows for the type of management and disposal intended for that waste. The Contractor shall be responsible for ensuring that any party handling hazardous waste, including subcontractors, transporters, and TSDFs are in compliance with applicable Federal, State, and local regulations.
- c. Treatment, Storage, And Disposal Facility List - The Contractor shall provide a list of storage and disposal facilities (TSDF) that perform treatment, storage, or disposal services under this contract. Each facility shall have, as a minimum, EPA RCRA interim status or state approval as a treatment or disposal facility and be in good standing with the regulatory community. Recycling facilities shall meet applicable Federal, State, and local regulations. The Contractor agrees that no facility other than those initially approved for use under this contract will be used, without first obtaining the written approval of the COR.
- d. Hazardous Waste Liability - For the purpose of this contract, the Contractor shall be responsible for any release or threatened release of the materials or substances handled under this contract, as well as any liabilities resulting or arising from or related to this contract, and shall bear all costs pertaining to such releases including, but not limited to, responses, remediation, testing, or disposal costs, and further shall defend and indemnify the Government for any costs including, but not limited to, any judgments, penalties, assessments, litigation, or attorney fees.
- e. Hazardous Waste Transportation - Certified Waste Haulers shall be utilized. Government directed waste shall be transported to the disposal facility or interim storage facility without delay, in accordance with Department of Transportation (DOT) manifest regulations. The Contractor shall notify the Government if 30 days or more have elapsed during shipment.
- f. Containerized Hazardous Waste - Hazardous wastes and other materials picked up by the Contractor from other facilities may not be added to any container of Government hazardous waste.
- g. Bulk Hazardous Waste - Bulk hazardous waste shipments shall be weighed to confirm shipping weight.
- h. Fluorescent Light Tubes - Fluorescent light tubes removed by the

Contractor shall be turned over to the Government for recycling.

### 3.1.9 Chemical Usage and Handling

- a. Hazardous material shall be used only as described on the Material Safety Data Sheet. The Contractor shall wear the protective equipment recommended by the manufacturer. Containers of hazardous materials and hazardous wastes shall be kept closed except when in use. Containers of liquid hazardous materials shall be stored in secondary containment at the end of each work shift.
- b. Reclamation of Equipment Containing Hazardous Material Residues - The Contractor shall disclose to COR the facility to which equipment containing hazardous material residues are shipped for reclamation, such as electrical wire wrapped with asbestos and electrical panels containing asbestos. The disclosure shall be documented on the Bill of Lading or by other written means.
- c. Disposal of Non-Hazardous Waste Containing Hazardous Material Residue - The Contractor shall disclose to COR the facility to which equipment containing hazardous material residues are shipped for disposal, such as steel coated with lead paint. The disclosure shall be documented on the Bill of Lading or by other written means. Supporting analytical data shall be included to document the equipment is not hazardous waste.
- d. Labeling
  1. Containers, drums, vessels, tanks, and associated piping containing hazardous materials shall be labeled in accordance with [California Code of Regulations Title 8 Section 5194](#) and the most recent edition of the California Fire Code.
  2. Label containers with description of contents, percentages of components (if not pure), hazardous properties, name of contact person or waste generator, phone number, and date. If material is a waste, container shall have a hazardous waste accumulation label.
  3. Report such chemicals to NASA Ames Environmental Management Division if chemicals to be on-site for more than 20 working days. Division will enter chemicals into NASA Ames chemical inventory system and affix a label.
  4. Report when chemicals labeled under d.3 are used up or removed from the Center so that the Division can remove from Ames chemical inventory.

### 3.2 FIELD QUALITY CONTROL

Comply with requirements of agencies having jurisdiction and as specified herein. Provide field practices, shipping, and handling of samples in accordance with [ASTM D 4840](#). Provide [Field Quality Control Reports](#) in accordance with approved Environmental Protection Plan.

-- End of Section --

SECTION 01 57 19.00 20

TEMPORARY ENVIRONMENTAL CONTROLS

Revision 1 - 05/15/2013

PART 1 GENERAL

1.1 SUMMARY

This section covers the requirements for environmental protection and other environmental temporary controls.

1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 833-R-060-04                      Developing Your Storm Water Pollution Prevention Plan, a Guide for Construction Sites

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

29 CFR 1910.120                      Hazardous Waste Operations and Emergency Response

40 CFR 112                              Oil Pollution Prevention

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

40 CFR 241                              Guidelines for Disposal of Solid Waste

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

40 CFR 258                              Subtitle D Landfill Requirements

40 CFR 260                              Hazardous Waste Management System: General

40 CFR 261                              Identification and Listing of Hazardous Waste

40 CFR 262                              Standards Applicable to Generators of Hazardous Waste

40 CFR 263                              Standards Applicable to Transporters of

Hazardous Waste

- 40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 40 CFR 266 Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
- 40 CFR 268 Land Disposal Restrictions
- 40 CFR 270 EPA Administered Permit Programs: The Hazardous Waste Permit Program
- 40 CFR 271 Requirements for Authorization of State Hazardous Waste Programs
- 40 CFR 272 Approved State Hazardous Waste Management Programs
- 40 CFR 273 Standards For Universal Waste Management
- 40 CFR 279 Standards for the Management of Used Oil
- 40 CFR 280 Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
- 40 CFR 372-SUBPART D Specific Toxic Chemical Listings
- 40 CFR 761 Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
- 40 CFR 82 Protection of Stratospheric Ozone
- 49 CFR 171 General Information, Regulations, and Definitions
- 49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
- 49 CFR 173 Shippers - General Requirements for Shipments and Packagings
- 49 CFR 178 Specifications for Packagings

1.3 DEFINITIONS

1.3.1 Sediment

Soil and other debris that have eroded and have been transported by runoff

water or wind.

### 1.3.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material, including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations.

Types of solid waste typically generated at construction sites may include:

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

Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as

amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

#### 1.3.3 Hazardous Debris

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

#### 1.3.4 Chemical Wastes

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

#### 1.3.5 Garbage

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

#### 1.3.6 Hazardous Waste

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

#### 1.3.7 Hazardous Materials

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

Hazardous material is any material that:

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

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

### 1.3.8 Waste Hazardous Material (WHM)

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

### 1.3.9 Oily Waste

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

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

### 1.3.10 Regulated Waste

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

### 1.3.11 Class I Ozone Depleting Substance (ODS)

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

- chlorofluorocarbon-11 (CFC-11)
- chlorofluorocarbon-12 (CFC-12)
- chlorofluorocarbon-13 (CFC-13)
- chlorofluorocarbon-111 (CFC-111)
- chlorofluorocarbon-112 (CFC-112)
- chlorofluorocarbon-113 (CFC-113)
- chlorofluorocarbon-114 (CFC-114)
- chlorofluorocarbon-115 (CFC-115)
- chlorofluorocarbon-211 (CFC-211)
- chlorofluorocarbon-212 (CFC-212)
- chlorofluorocarbon-213 (CFC-213)
- chlorofluorocarbon-214 (CFC-214)
- chlorofluorocarbon-215 (CFC-215)
- chlorofluorocarbon-216 (CFC-216)
- chlorofluorocarbon-217 (CFC-217)
- chlorofluorocarbon-500 (CFC-500)
- chlorofluorocarbon-502 (CFC-502)
- chlorofluorocarbon-503 (CFC-503)
- halon-1211
- halon-1301
- halon-2402
- carbon tetrachloride
- methyl bromide
- methyl chloroform

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

hydrochlorofluorocarbon-21 (HCFC-21)  
hydrochlorofluorocarbon-22 (HCFC-22)  
hydrochlorofluorocarbon-31 (HCFC-31)  
hydrochlorofluorocarbon-121 (HCFC-121)  
hydrochlorofluorocarbon-122 (HCFC-122)  
hydrochlorofluorocarbon-123 (HCFC-123)  
hydrochlorofluorocarbon-124 (HCFC-124)  
hydrochlorofluorocarbon-131 (HCFC-131)  
hydrochlorofluorocarbon-132 (HCFC-132)  
hydrochlorofluorocarbon-133 (HCFC-133)  
hydrochlorofluorocarbon-141 (HCFC-141)  
hydrochlorofluorocarbon-142 (HCFC-142)  
hydrochlorofluorocarbon-221 (HCFC-221)  
hydrochlorofluorocarbon-222 (HCFC-222)  
hydrochlorofluorocarbon-223 (HCFC-223)  
hydrochlorofluorocarbon-224 (HCFC-224)  
hydrochlorofluorocarbon-225 (HCFC-225)  
hydrochlorofluorocarbon-226 (HCFC-226)  
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hydrochlorofluorocarbon-242 (HCFC-242)  
hydrochlorofluorocarbon-243 (HCFC-243)  
hydrochlorofluorocarbon-244 (HCFC-244)  
hydrochlorofluorocarbon-251 (HCFC-251)  
hydrochlorofluorocarbon-252 (HCFC-252)  
hydrochlorofluorocarbon-253 (HCFC-253)  
hydrochlorofluorocarbon-261 (HCFC-261)  
hydrochlorofluorocarbon-262 (HCFC-262)  
hydrochlorofluorocarbon-271 (HCFC-271)

#### 1.3.11.1 Universal Waste

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

#### 1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section [01 33 00 SUBMITTAL PROCEDURES](#):

[SD-01 Preconstruction Submittals](#)

[Preconstruction Survey](#)

[Solid Waste Management Plan and Permit](#)

Regulatory Notifications

Environmental Management Plan

Storm Water Pollution Prevention Plan

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

Dirt and Dust Control Plan

Contractor Hazardous Material Inventory Log

SD-06 Test Reports

Laboratory Analysis

Disposal Requirements

Erosion and Sediment Control Inspection Reports

Storm Water Inspection Reports for General Permit

Contractor 40 CFR employee training records

Solid Waste Management Report; G

SD-11 Closeout Submittals

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

Storm Water Pollution Prevention Plan compliance notebook

Waste Determination Documentation

Disposal Documentation for Hazardous and Regulated Waste

Contractor 40 CFR Employee Training Records

Solid Waste Management Permit

Solid Waste Management Report

Contractor Hazardous Material Inventory Log

Hazardous Waste/Debris Management

Regulatory Notifications

1.5 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required

to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

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

#### 1.5.1 Conformance with the Environmental Management System

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

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

### 1.6 QUALITY ASSURANCE

#### 1.6.1 Preconstruction Survey

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

#### 1.6.2 [Regulatory Notifications](#)

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. In cases where must also provide public notification (such as stormwater permitting), the Contractor must coordinate with the COR. The Contractor shall submit copies of all regulatory notifications to the COR prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation,

NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

#### 1.6.3 Environmental Brief

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

Prior to initiating any work on site, meet with the COR and activity environmental staff to discuss the proposed Environmental Management Plan. Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, required permits, permit requirements, and other measures to be taken.

#### 1.6.4 Environmental Manager

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

#### 1.6.5 Contractor 40 CFR Employee Training Records

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. The Contractor will ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with Federal, State and local regulatory requirements for RCRA Large Quantity Generator. The Contractor will provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description will include training requirements as defined in 40 CFR 265 for a Large Quantity Generator facility. Submit these training records to the COR at the conclusion of the project, unless otherwise directed.

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

## 3.1 ENVIRONMENTAL MANAGEMENT PLAN

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

## a. Description of the Environmental Management Plan

## 1. General overview and purpose

(a) A brief description of each specific plan required by environmental permit or elsewhere in this contract.

(b) The duties and level of authority assigned to the person(s) on the job site that oversee environmental compliance.

(c) A copy of any standard or project specific operating procedures that will be used to effectively manage and protect the environment on the project site.

(d) Communication and training procedures that will be used to convey environmental management requirements to contractor employees and subcontractors.

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

## 2. General site information

## b. Management of Natural Resources

## 1. Land resources

## 2. Tree protection

## 3. Replacement of damaged landscape features

## 4. Temporary construction

## 5. Stream crossings

## 6. Fish and wildlife resources

## 7. Wetland areas

## c. Protection of Historical and Archaeological Resources

## 1. Objectives

## 2. Methods

- d. Storm Water Management and Control
  1. Ground cover
  2. Erodible soils
  3. Temporary measures
    - (a) Mechanical retardation and control of runoff
    - (b) Vegetation and mulch
  - (4) Effective selection, implementation and maintenance of Best Management Practices (BMPs).
- e. Protection of the Environment from Waste Derived from Contractor Operations
  1. Control and disposal of solid and sanitary waste. If Section 01 74 19.05 20 is included in the contract, submit the plan required by that section as part of the Environmental Management Plan.
  2. Control and disposal of hazardous waste (Hazardous Waste Management Section)

This item will consist of the management procedures for all hazardous waste to be generated. The elements of those procedures will coincide with the Activity Hazardous Waste Management Plan. As a minimum, include the following:

    - (a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;
    - (b) Sampling/analysis plan;
    - (c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);
    - (d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);
    - (e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);
    - (f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;
    - (g) Used oil management procedures in accordance with 40 CFR 279;
    - (h) Pollution prevention\hazardous waste minimization procedures;
    - (i) Plans for the disposal of hazardous waste by permitted facilities;
    - (j) Procedures to be employed to ensure all required employee

training records are maintained.

f. Prevention of Releases to the Environment

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

g. Regulatory Notification and Permits

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

3.1.1 Environmental Protection Plan Review

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

3.1.2 Licenses and Permits

The following permits will be obtained by the COR:

- a. Air permits
- b. Santa Clara County Permits (closures, installation, storage of hazardous materials, temporary fuel tanks for generators, air compressors, etc.)
- c. Storm water permits (Notice of Intent, Notice of Termination).
- d. Water discharge permits (discharges to the local publicly owned treatment works, POTW)
- e. Migratory bird permit (if required)

The Contractor must provide all necessary documentation for acquiring the necessary permits. For permits obtained by the COR, whether or not required by the permit, the Contractor is responsible for conforming to all permit requirements and performing all quality control inspections of the work in progress, and to submit notifications and certifications to the applicable regulatory agency via the COR. The Contractor is responsible for obtaining their own permits for their equipment used during construction.

3.2 PROTECTION OF NATURAL RESOURCES

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

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

specified.

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

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

The COR's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain COR'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 COR.

### 3.2.1 Erosion and Sediment Control Measures

#### 3.2.1.1 Burnoff

Burnoff of the ground cover is not permitted.

#### 3.2.1.2 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

#### 3.2.1.3 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

##### a. Mechanical Retardation and Control of Runoff

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

### 3.2.2 Erosion and Sediment Control Inspection Reports

Note erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports if applicable.

#### 3.2.2.1 Storm Water Notice of Intent for Construction Activities and Storm Water Pollution Prevention Plan

The Contractor shall submit a [Storm Water Notice of Intent \(for NPDES coverage under the general permit for construction activities\)](#) and a [Storm Water Pollution Prevention Plan \(SWPPP\)](#) for the project to the COR prior

and gain approval prior to the commencement of work. The SWPPP shall meet the requirements of the California State Water Resources Control Board's Construction General Permit (CAS000002). Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the COR, to the appropriate Federal or State agency (Notice of Intent and all applicable Permit Regulation Documents must be sent to California State Water Resources Control Board, along with appropriate fees) for approval, a minimum of 20 working days prior to the start of any land disturbing activities. The Contractor shall maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, reflecting current site conditions. California now requires an Annual Report to be submitted by September 1st; an annual fee is also required.

Coverage under this permit requires the contractor prepare a Storm Water Pollution Prevention Plan (SWPPP), prepare and submit a Registration Statement as a co-permittee with the Construction Officer, and provide the permit fee to the responsible state agency before any land disturbing activities begin. The Environmental Management Division shall file the Notice of Intent for permit coverage and shall file the Notice of Termination once construction is complete. The contractor shall provide all documentation required to complete these Notices.

Under the terms and conditions of the permit, the Contractor may be required to install, inspect, maintain best management practices (BMPs), and submit stormwater BMP inspection reports and stormwater pollution prevention plan inspection reports. The Contractor shall ensure construction operations and management are constantly in compliance with the terms and conditions of the general permit for storm water discharges from construction activities.

a. The SWPPP shall:

1. Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.
2. Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.
3. Ensure compliance with terms of the EPA or State general permit for storm water discharge.
4. Select applicable best management practices from EPA 833-R-060-04.
5. Include a completed copy of the Registration Statement, BMP Inspection Report Template and Notice of Termination except for the effective date.
6. Storm Water Pollution Prevention Measures and Notice of Intent 40 CFR 122.26, EPA 833-R-060-04, and California Construction General Permit. Provide a "Storm Water Pollution Prevention Plan" (SWPPP) for the project. The SWPPP will meet the requirements of the California State Water Resources Control Board Construction General Permit. Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the COR, to the appropriate Federal or State agency for approval, a minimum of 10 working days prior to the start of construction. A copy of the approved SWPPP will be kept at the

construction on-site office, and continually updated as regulations require reflecting current site conditions.

#### 3.2.2.2 Storm Water Pollution Prevention Plan Compliance Notebook

The contractor shall create and maintain a three binder of documents that demonstrate compliance with the Stormwater Construction Activity permit. The binder shall include a copy of the permit Registration Statement, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports, copies of correspondence with the State Water Resources Control Board and a copy of the permit Notice of Termination. At the completion of the project the folder shall become the property of the Government. The compliance notebook shall be provided to COR. An advance copy of the Registration Statement shall be provided to the COR immediately after the form is presented to the permitting agency.

#### 3.2.3 Stormwater Drainage and Construction Dewatering

There will be no discharge of excavation ground water to the sanitary sewer, storm drains, or to the river without prior specific authorization of the Environmental Division in writing. Discharge of hazardous substances will not be permitted under any circumstances.

Construction site runoff will be prevented from entering any storm drain or the river directly by the use of straw bales or other method suitable to the Environmental Division. Contractor will provide erosion protection of the surrounding soils.

Construction Dewatering shall not be discharged to the sanitary sewer. If the construction dewatering is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Authorization for any contaminated groundwater release shall be obtained in advance from the base Environmental Officer. Discharge of hazardous substances will not be permitted under any circumstances.

### 3.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

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

### 3.4 SOLID WASTE MANAGEMENT PLAN and PERMIT

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

#### 3.4.1 Solid Waste Management Report

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

solid waste.

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

#### 3.4.2 Control and Management of Solid Wastes

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

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

##### 3.4.2.1 Dumpsters

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

#### 3.5 WASTE DETERMINATION DOCUMENTATION

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

### 3.6 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

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

#### 3.6.1 Disposal Documentation for Hazardous and Regulated Waste

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

Submit a copy of the applicable EPA and or State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Hazardous or toxic waste manifest must be reviewed, signed, and approved by the Environmental Management Division's authorized personnel before the Contractor may ship waste. To obtain specific disposal instructions the Contractor must coordinate with the Activity environmental office.

### 3.7 POLLUTION PREVENTION/HAZARDOUS WASTE MINIMIZATION

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

### 3.8 WHM/HW MATERIALS PROHIBITION

No waste hazardous material or hazardous waste shall be disposed of on government property. No hazardous material shall be brought onto government property that does not directly relate to requirements for the performance of this contract. The government is not responsible for disposal of Contractor's waste material brought on the job site and not required in the performance of this contract. The intent of this provision is to dispose of that waste identified as waste hazardous material/hazardous waste as defined herein that was generated as part of this contract and existed within the boundary of the Contract limits and not brought in from offsite by the Contractor. Incidental materials used to support the contract including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive. The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or to the river or conduct waste treatment or disposal on government property without written approval of the COR.

### 3.9 HAZARDOUS MATERIAL MANAGEMENT

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

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

### 3.10 PETROLEUM PRODUCTS AND REFUELING

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. Manage all used oil generated on site in accordance with 40 CFR 279, State and Local regulations. Determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. Used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste.

#### 3.10.1 Oily and Hazardous Substances

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

#### 3.10.2 Inadvertent Discovery of Petroleum Contaminated Soil or Hazardous Wastes

If petroleum contaminated soil or suspected hazardous waste is found during construction that was not identified in the contract documents, the contractor shall immediately notify the COR. The contractor shall not disturb this material until authorized by the COR.

### 3.11 FUEL TANKS

Petroleum products and lubricants required to sustain up to 30 days of construction activity may be kept on site. Storage and refilling practices shall comply with 40 CFR Part 112. Secondary containment shall be provided

and be no less than 110 percent of the tank volume plus five inches of free-board. All fuel tanks with a fuel tank capacity of 10 or more gallons which will be on site for 72 hours or more must have a Temporary Fuel Tank Permit from Santa Clara County Department of Environmental Health Hazardous Materials Division. If a secondary berm is used for containment then the berm shall be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Drips pans are required and the tanks must be covered during inclement weather.

### 3.12 RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the NASA Ames Research Center Dispatch and the COR. Call 911 from any NASA desk phone or (650)604-5555 from a mobile phone to reach NASA Ames Dispatch. If the contractor's response is inadequate, the NASA Ames Research Center may respond. If this should occur, the contractor will be required to reimburse the government for spill response assistance and analysis.

Contain and clean up these spills without cost to the Government. If Government assistance is requested or required, the Contractor will reimburse the Government for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 15 working days.

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

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

### 3.13 CONTROL AND MANAGEMENT OF HAZARDOUS WASTES

#### 3.13.1 Facility Hazardous Waste Generator Status

NASA Ames Research Center is designated as a Large Quantity Generator. All work conducted within the boundaries of this activity must meet the regulatory requirements of this generator designation. The Contractor will comply with all provisions of Federal, State and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of all construction derived wastes.

3.13.2 Hazardous Waste/Debris Management

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

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

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

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

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

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

Location of the Site: \_\_\_\_\_  
(Attach Site Plan to the Request)

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

"DANGER OR CAUTION - UNAUTHORIZED PERSONNEL KEEP OUT"

3.13.2.2 Sampling and Analysis of HW

NASA Ames Research Center Environmental Management Division Hazardous Waster Program.

3.13.2.3 Hazardous Waste Disposal

No hazardous, toxic, or universal waste shall be disposed or hazardous

material abandoned on government property. And unless otherwise otherwise noted in this contract, the government is not responsible for disposal of Contractor generated waste material. The disposal of incidental materials used to accomplish the work including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive.

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

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

a. Responsibilities for Contractor's Disposal

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

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

Contractor Disposal Turn-In Requirements

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

- a. Drums compatible with waste contents and drums meet DOT requirements for 49 CFR 173 for transportation of materials.
- b. Drums banded to wooden pallets. No more than three (3) 55 gallon drums

to a pallet, or two (2) 85 gallon over packs.

- c. Band using 1-1/4 inch minimum band on upper third of drum.
- d. Recovery materials label (provided by Code 106.321) located in middle of drum, filled out to indicate actual volume of material, name of material manufacturer, other vendor information as available.
- e. Always have three (3) to five (5) inches of empty space above volume of material. This space is called 'outage'.

### 3.13.3 Class I and II ODS Prohibition

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

Heating and air conditioning technicians must be certified through an EPA-approved program. Copies of certifications shall be maintained at the employees' place of business and be carried as a wallet card by the technician, as provided by environmental law. Accidental venting of a refrigerant is a release and shall be reported to the COR.

#### 3.13.3.1 Universal Waste/e-Waste Management

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

### 3.14 DUST CONTROL

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

#### 3.14.1 [Dirt and Dust Control Plan](#)

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

### 3.15 ABRASIVE BLASTING

#### 3.15.1 Blasting Operations

The use of silica sand is prohibited in sandblasting.

Blasting operations must follow the requirements of the Bay Area Air

Quality Management District Regulation for Sandblasting, Regulation 12, Rule 4.

### 3.15.2 Disposal Requirements

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

### 3.16 NOISE

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

### 3.17 MERCURY MATERIALS

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. Immediately report to the Environmental Office and the COR instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the COR.

Cleanup of a mercury spill shall not be recycled and shall be managed as a hazardous waste for disposal.

-- End of Section --

## SECTION 01 74 19

## CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for the management of non-hazardous construction and demolition waste materials.

## 1.2 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. A minimum of 50 percent by weight of total project solid waste shall be diverted from the landfill.

## 1.3 MANAGEMENT

Develop and implement a waste management program. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. The Environmental Manager, as specified in Section 01 35 40.00 20 Environmental Management, shall be responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the project. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor is responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained from salvage or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by Federal, State, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

## 1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan

SD-11 Closeout Submittals

## Records

## 1.5 WASTE MANAGEMENT PLAN

A Waste Management Plan shall be submitted within 15 **calendar** days after notice to proceed and not less than 10 **calendar** days before the pre-construction meeting. The plan shall demonstrate how the project waste diversion goal shall be met and shall include the following:

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.
- c. Description of the regular meetings to be held to address waste management.
- d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.
- e. Characterization, including estimated types and quantities, of the waste to be generated.
- f. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.
- g. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity. Include the name, location, and phone number for each reuse facility to be used, and provide a copy of the permit or license for each facility.
- h. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Recycling facilities that will be used shall be identified by name, location, and phone number, including a copy of the permit or license for each facility.
- i. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the COR.
- j. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.
- k. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).
- l. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Revise and resubmit Plan as required by the COR. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste Management Plan to each subcontractor, the Quality Control Manager, and the COR.

#### 1.6 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Quantities may be measured by weight or by volume, but must be consistent throughout. List each type of waste separately noting the disposal or diversion date. Identify the landfill, recycling center, waste processor, or other organization used to process or receive the solid waste. Provide explanations for any waste not recycled or reused. With each application for payment, submit updated documentation for solid waste disposal and diversion, and submit manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. The records shall be made available to the COR during construction, and a copy of the records shall be delivered to the COR upon completion of the construction.

#### 1.7 REPORTS

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

#### 1.8 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials. Clean contaminated materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 35 40.00 20 ENVIRONMENTAL MANAGEMENT. Separate materials by one of the following methods:

##### 1.8.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling

process). Separate materials into the following category types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

- a. Land clearing debris.
- b. Asphalt.
- c. Concrete and masonry.
- d. Metal (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).
  1. Ferrous.
  2. Non-ferrous.
- e. Wood (nails and staples allowed).
- f. Debris.
- g. Glass (colored glass allowed).
- h. Paper.
  1. Bond.
  2. Newsprint.
  3. Cardboard and paper packaging materials.
- i. Plastic.
  1. Type 1: Polyethylene Terephthalate (PET, PETE).
  2. Type 2: High Density Polyethylene (HDPE).
  3. Type 3: Vinyl (Polyvinyl Chloride or PVC).
  4. Type 4: Low Density Polyethylene (LDPE).
  5. Type 5: Polypropylene (PP).
  6. Type 6: Polystyrene (PS).
  7. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.
- j. Gypsum.
- k. Non-hazardous paint and paint cans.
- l. Carpet.
- m. Ceiling tiles.

- n. Insulation.
- o. Beverage containers.

1.8.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.8.3 Other Methods.

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

1.9 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the COR and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.9.1 Reuse

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered.

1.9.2 Recycle

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling. All fluorescent lamps, HID lamps, and mercury-containing thermostats removed from the site shall be recycled. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

1.9.3 Compost

Consider composting on site if a reasonable amount of compostable material will be available. Compostable materials include plant material and sawdust. COR shall be contacted to discuss compositing options with Plant Engineering before composting.

1.9.4 Waste

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

1.9.5 Return

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

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used. -- End of Section --

## SECTION 01 78 00

CLOSEOUT SUBMITTALS  
Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for closeout submittals including: revised project documents, warranty management, testing, adjusting and balancing, O & M manuals, and final cleaning.

## 1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## ASTM INTERNATIONAL (ASTM)

## ASTM E 1971

Stewardship for the Cleaning of Commercial and Institutional Buildings

## 1.3 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-03 Product Data

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

## SD-08 Manufacturer's Instructions

Preventative Maintenance  
Condition Monitoring (Predictive Testing)  
Inspection  
Posted Instructions

## SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

## SD-11 Closeout Submittals

Record Drawings  
Certification of EPA Designated Items

## List of Warranties

### 1.4 PROJECT RECORD DOCUMENTS

#### 1.4.1 Record Drawings

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

##### 1.4.1.1 Government Furnished Plans

The Government will supply 2 full size sets of the contract drawings to the Contractor for use in the record drawings **as needed**.

In cases where shop drawings are to be approved prior to construction a full-sized set of the approved shop drawings are to be maintained on site. This set will be considered to be part of the "Working Record" and "Final Record Drawings".

##### 1.4.1.2 Working Record and Final Record Drawings

Revise 1 set of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Prepare final record (as-built) drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final record (as-built) drawings will be jointly reviewed for accuracy and completeness by the COR and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final record drawings as specified herein, the COR will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the record drawings. This monthly deduction will continue until an agreement can be reached between the COR and the Contractor regarding the accuracy and completeness of updated drawings. Show on the working and final record drawings, but not limited to, the following information:

- a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.
- b. The location and dimensions of any changes within the building structure.
- c. Correct grade, elevations, cross section, or alignment of roads,

earthwork, structures or utilities if any changes were made from contract plans.

- d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
- f. Changes or modifications which result from the final inspection.
- g. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.
- h. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.
- i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.
- j. Modifications (include within change order price the cost to change working and final record drawings to reflect modifications) and compliance with the following procedures.
  1. Follow directions in the modification for posting descriptive changes.
  2. Place a Modification Delta at the location of each deletion.
  3. For new details or sections which are added to a drawing, place a Modification Delta by the detail or section title.
  4. For minor changes, place a Modification Delta by the area changed on the drawing (each location).
  5. For major changes to a drawing, place a Modification Delta by the title of the affected plan, section, or detail at each location.
  6. For changes to schedules or drawings, place a Modification Delta either by the schedule heading or by the change in the schedule.
  7. The Modification Delta size shall be 1/2 inch across unless the area where the circle is to be placed is crowded. Smaller size deltas shall be used for crowded areas.

#### 1.4.1.3 Drawing Preparation

Modify the record drawings as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints must be neat, legible and accurate. These drawings are part of the permanent records of this project and the original hardcopy must be returned to the COR after approval by the Government. Any drawings damaged or lost by the Contractor must be satisfactorily replaced by the Contractor

at no expense to the Government.

1.4.1.4 Payment

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

1.4.2 As-Built Record of Equipment and Materials

Submit the preliminary record of equipment and materials used on the project 10 working days prior to final inspection. Submit the final record of equipment and materials within 10 working days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

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

1.4.3 Final Approved Shop Drawings

Furnish final approved project shop drawings that show the as-built conditions 20 working days after transfer of the completed facility.

1.4.4 Construction Contract Specifications

Furnish final record (as-built) construction contract specifications, including modifications thereto, 20 working days after transfer of the completed facility.

1.4.5 Real Property Equipment

Furnish a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Furnish a draft list at time of transfer. Furnish the final list 20 working days after transfer of the completed facility.

1.5 SPARE PARTS DATA

Submit the Spare Parts Data list.

- a. Indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.
- b. Supply 2 of each part for spare parts inventory. Provision of spare parts does not relieve the Contractor of responsibilities listed under

the contract guarantee provisions.

#### 1.6 PREVENTATIVE MAINTENANCE

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

- a. Define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a signoff blank for the Contractor and COR for each test feature; e.g., [gpm](#), [rpm](#), [psi](#). Include a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventative maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize corrective maintenance and repair.
- b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

#### 1.7 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the [Certification of EPA Designated Items](#) as required by FAR 52.223-9, "Certification and Estimate of Percentage of Recovered Material Content for EPA Designated Items". Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials: 1) The product does not meet appropriate performance standards; 2) The product is not available within a reasonable time frame; 3) The product is not available competitively (from two or more sources); 4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product)." Record each product used in the project that has a requirement or option of containing recycled or biobased content in accordance with Section [01 62 35 RECYCLED/RECOVERED MATERIALS](#), noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, total value of biobased content, exemptions (1, 2, 3, or 4, as indicated), and comments. Recycled and biobased content values may be determined by weight or volume percent, but must be consistent throughout.

#### 1.8 WARRANTIES

At least 20 working days before the contract completion date submit a List of Warranties that includes the following information:

- a. Item Warranted
- b. Length of Warranty

c. Point of contact for each warranty

1.8.1 Warranty Response Time

For each warranty there is a 24 hour response time. If the warrantor does not respond within 24 hours for an issue covered by a warranty the Government has the right to fix the problem and charge the warrantor for the resources spent to fix the problem.

1.9 MECHANICAL TESTING AND BALANCING

All contract requirements of Section 23 05 93 TESTING, ADJUSTING AND BALANCING must be fully completed, including testing and inspection, prior to contract completion date, except as noted otherwise in Section 23 05 93. The time required to complete all work and testing as prescribed by Section 23 05 93 and is included in the allotted days for completion.

1.10 OPERATION AND MAINTENANCE MANUALS

Submit three hardcopies and one electronic copy of the project operation and maintenance manuals 20 working days prior to testing the system involved. Update and resubmit data for final approval no later than 20 working days prior to contract completion.

1.10.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Information shall be grouped by technical sections. Test data must be legible and of good quality. Organize data by separate index. Caution and warning indications must be clearly labeled.

1.10.2 Training and Instruction

Submit classroom and field instructions in the operation and maintenance of systems equipment where required by the technical provisions. These services must be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. COR will be given 5 working days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, such as lists, static exhibits, and visual aids, must be made available to the COR.

1.11 CLEANUP

Provide final cleaning in accordance with ASTM E 1971 and submit the listing of completed final clean-up items. Leave premises "broom clean." Use only nonhazardous cleaning materials, including natural cleaning materials, in the final cleanup. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean filters of operating equipment and comply with the Indoor Air Quality (IAQ) Management Plan. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Recycle, salvage, and return construction and demolition waste from project in accordance with the Waste Management Plan. Promptly

and legally transport and dispose of any trash. Do not burn, bury, or otherwise dispose of trash on the project site.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

## SECTION 01 78 23

## OPERATION AND MAINTENANCE DATA

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for operation and maintenance (O&M) data normally shipped by a manufacturer at the same time as his associated piece of equipment is shipped. The requirements specified herein are intended to require those items of O&M data normally expected from the manufacturer of the associated equipment.

## 1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## ASTM INTERNATIONAL (ASTM)

ASTM E 1971

Stewardship for the Cleaning of Commercial  
and Institutional Buildings

## 1.3 SUBMISSION OF OPERATION AND MAINTENANCE DATA

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

## 1.3.1 Package Quality

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

## 1.3.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the

content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 4. Commissioned items with a Data Package 1 or 2 requirement shall use instead Data Package 3.

#### 1.3.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the COR for final acceptance of submitted data, shall be submitted by the Contractor within 20 working days of the notification of this change requirement.

#### 1.3.4 Review and Approval

The Government shall review the commissioned systems and equipment submittals for completeness and applicability. The Government shall verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. This work shall be in addition to the normal review procedures for O&M data.

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

#### 1.4.1 Operating Instructions

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

##### 1.4.1.1 Safety Precautions

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

##### 1.4.1.2 Operator Prestart

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

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

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

##### 1.4.1.4 Normal Operations

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

##### 1.4.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent

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

#### 1.4.1.6 Operator Service Requirements

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

#### 1.4.1.7 Environmental Conditions

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

#### 1.4.2 Preventive Maintenance

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

##### 1.4.2.1 Lubrication Data

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

- a. A table showing recommended lubricants for specific temperature ranges and applications.
- b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- c. A Lubrication Schedule showing service interval frequency.

##### 1.4.2.2 Preventive Maintenance Plan and Schedule

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

##### 1.4.2.3 Cleaning Recommendations

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

#### 1.4.3 Corrective Maintenance (Repair)

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

impacts of recommended maintenance procedures and materials.

#### 1.4.3.1 Troubleshooting Guides and Diagnostic Techniques

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

#### 1.4.3.2 Wiring Diagrams and Control Diagrams

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

#### 1.4.3.3 Maintenance and Repair Procedures

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

#### 1.4.3.4 Removal and Replacement Instructions

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

#### 1.4.3.5 Spare Parts and Supply Lists

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

#### 1.4.4 Corrective Maintenance Work-Hours

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

#### 1.4.5 Appendices

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

##### 1.4.5.1 Product Submittal Data

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

#### 1.4.5.2 Manufacturer's Instructions

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

#### 1.4.5.3 O&M Submittal Data

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

#### 1.4.5.4 Parts Identification

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

#### 1.4.5.5 Warranty Information

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

#### 1.4.5.6 Personnel Training Requirements

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

#### 1.4.5.7 Testing Equipment and Special Tool Information

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

#### 1.4.5.8 Testing and Performance Data

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

#### 1.4.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and

telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

#### 1.5 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES

Include Data Package 5 and the following for control systems:

- a. Narrative description on how to perform and apply all functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.
- b. Full as-built sequence of operations.
- c. Copies of all checkout tests and calibrations performed by the Contractor (not Cx tests).
- d. Full points list. A listing of rooms shall be provided with the following information for each room:
  1. Floor
  2. Room number
  3. Room name
  4. Air handler unit ID
  5. Reference drawing number
  6. Air terminal unit tag ID
  7. Heating and/or cooling valve tag ID
  8. Minimum cfm
  9. Maximum cfm
- e. Full print out of all schedules and set points after testing and acceptance of the system.
- f. Electronic copy of the entire as-built program for this facility.
- g. Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

#### 1.6 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

##### 1.6.1 Data Package 1

- a. Safety precautions
- b. Cleaning recommendations

- c. Maintenance and repair procedures
- d. Warranty information
- e. Contractor information
- f. Spare parts and supply list

1.6.2 Data Package 2

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

1.6.3 Data Package 3

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Environmental conditions
- g. Lubrication data
- h. Preventive maintenance plan and schedule
- i. Cleaning recommendations
- j. Troubleshooting guides and diagnostic techniques
- k. Wiring diagrams and control diagrams

- l. Maintenance and repair procedures
- m. Removal and replacement instructions
- n. Spare parts and supply list
- o. Product submittal data
- p. O&M submittal data
- q. Parts identification
- r. Warranty information
- s. Testing equipment and special tool information
- t. Testing and performance data
- u. Contractor information

#### 1.6.4 Data Package 4

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Operator service requirements
- g. Environmental conditions
- h. Lubrication data
- i. Preventive maintenance plan and schedule
- j. Cleaning recommendations
- k. Troubleshooting guides and diagnostic techniques
- l. Wiring diagrams and control diagrams
- m. Maintenance and repair procedures
- n. Removal and replacement instructions
- o. Spare parts and supply list
- p. Corrective maintenance man-hours
- q. Product submittal data
- r. O&M submittal data
- s. Parts identification

- t. Warranty information
- u. Personnel training requirements
- v. Testing equipment and special tool information
- w. Testing and performance data
- x. Contractor information

1.6.5 Data Package 5

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

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

## SECTION 01 86 12.07 40

## RELIABILITY CENTERED ACCEPTANCE FOR MECHANICAL SYSTEMS

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for Reliability Centered Building and Equipment Acceptance for Mechanical systems.

## 1.2 SYSTEM DESCRIPTION

This specification establishes acceptance requirements to ensure building equipment and systems installed by the Contractor have been installed properly and contain no identifiable defects that will shorten the design life of the equipment. These requirements utilize Predictive Testing & Inspection (PT&I) technologies and are essential elements in the Government's Reliability Centered Building and Equipment Acceptance Program.

This specification is not intended to limit the inspection and acceptance process to the use of PT&I techniques. This guide is intended to supplement comprehensive and detailed commissioning and quality control specifications.

## 1.3 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

## RCBEA GUIDE

NASA Reliability Centered Building and  
Equipment Acceptance Guide

## 1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-01 Preconstruction Submittals

Quality Control Plan

Material, Equipment, and Fixture Lists

## SD-02 Shop Drawings

Connection Diagrams

Bearing Layout

Fabrication Drawings

Installation Drawings

SD-03 Product Data

Manufacturer's Catalog Data

Equipment Foundation Data

Specific Equipment Data

Spare Parts List

Warranty

SD-05 Design Data

Design Analysis and Calculations

SD-06 Test Reports

Alignment Test

Balancing Test

Code and Requirements Verification Test

Cold Starting Test

Ductwork Leakage Test

Flux Analysis Test

High Voltage Test

Hydraulic Oil Test

Hydrostatic Test

Infrared Thermography Test

Insulation Power Factor Test

Insulation Resistance Test

Motor Circuit Evaluation Test

Thermodynamic Performance Test

Ultrasonic (Airborne) Test

Ultrasonic (Pulse) Test

Vibration Analysis Test

Visual Inspection

Warranty Test

SD-07 Certificates

Certificates

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

SD-10 Operation and Maintenance Data

Operations and Maintenance Manuals

SD-11 Closeout Submittals

Record Drawings

Acceptance Documentation

#### 1.5 DESIGN DATA

Submit applicable [design analysis and calculations](#) for the equipment listed below as instructed to by the project specification.

- a. Blowers
- b. Boilers
- c. Gearboxes
- d. Fans
- e. Fluid Piping
- f. Heat Exchangers
- g. HVAC Ducts
- h. Miscellaneous Safety Wash
- i. Motors
- j. Pumps
- k. Valves
- l. Steam Traps

#### 1.6 QUALITY ASSURANCE

Submit a Quality Control plan outlining the intended methods of receiving, testing, and installing equipment. The [RCBEA GUIDE](#) specifies minimum test equipment requirements. Use trained and adequately certified personnel in the appropriate acceptance testing PT&I technologies to ensure that the results are accurate and consistent. Submit the following as part of the [quality control plan](#) for all required acceptance testing:

- a. List of all test equipment used, including its manufacturer, model number, calibration date, certificate of calibration, and serial number.
- b. Certificates of test personnel qualifications and certifications.

#### 1.7 WARRANTY

Furnish workmanship and performance [warranty](#) for the work performed for a period not less than 1 year from the date of Government acceptance of the work; issued directly to the Government. Perform corrective action that becomes necessary because of defective materials and workmanship while system is under warranty [5 working](#) days after notification, unless additional time is approved by the COR. Failure to perform repairs within the specified period of time constitutes grounds for having the corrective action and repairs performed by others and the cost billed to the Contractor. Provide a 1 year minimum contractor installation warranty.

### PART 2 PRODUCTS

#### 2.1 PRODUCT DATA

Submit [material, equipment, and fixture lists](#) for all equipment, materials, and fixtures planned for use to complete the job before commencing work. Include at a minimum, the item's description, quantity, manufacturer's style or catalog numbers, and specification and drawing reference numbers. Provide a complete list of construction equipment to be used.

##### 2.1.1 Manufacturer Product Data

Submit [fabrication drawings](#) for equipment and specialties consisting of fabrication and assembly details to be performed in the factory. Show cutaway and sectional views in gearbox fabrication drawings.

Submit data for all equipment listed in the paragraph entitled, "Product Data," of this section. Include manufacturer's standard catalog data, at least 5 weeks prior to the purchase or installation of a particular component, highlighted to show material, size, options, equipment performance data charts and curves, etc. in adequate detail to demonstrate compliance with contract requirements. Include manufacturer's recommended installation instructions and procedures. If vibration isolation is specified for a unit, include vibration isolator literature containing catalog cuts and certification that the isolation characteristics of the isolators provided meet the manufacturer's recommendations. Submit for each specified component.

Submit [bearing layout](#) drawings detailing the type, size, and orientation of bearings for equipment containing bearings, such as motors, pumps, fans, cranes, gearboxes, etc.

Submit for all equipment listed in the paragraph entitled, "Product Data," of this section. Include plan dimensions of foundations and relative elevations, equipment weight and operating loads, horizontal and vertical loads, horizontal and vertical clearances for installation, and size and location of anchor bolts.

Submit [manufacturer's catalog data](#) and [equipment foundation data](#) for the following equipment:

- a. Blowers
- b. Boilers
- c. Fans
- d. Fluid Piping
- e. Heat Exchangers
- f. HVAC Ducts
- g. Miscellaneous Safety Wash
- h. Motors
- i. Pumps
- j. Valves
- k. Steam Traps

#### 2.1.2 Certification Data

Submit applicable [certificates](#) for the equipment listed below showing conformance with test requirements, laboratory certifications, etc. as instructed by the project specification.

- a. Blowers
- b. Boilers
- c. Fans
- d. Fluid Piping
- e. Heat Exchangers
- f. HVAC Ducts
- g. Miscellaneous Safety Wash
- h. Motors
- i. Pumps
- j. Valves
- k. Steam Traps

#### 2.1.3 Specific Equipment Data

Submit the following information for all equipment listed below: location of installation, [AIR FORCE ARMY NASA NAVY](#) Identification number, date of installation (required or actual acceptance date), and applicable [AIR FORCE ARMY NASA NAVY](#) reference drawing number. Unless explicitly stated in submitted manufacturer's literature, provide and submit the following [specific equipment data](#):

- a. Blowers
  - 1. Blower type
  - 2. Number of rotating vanes
  - 3. Number of stationary vanes
  - 4. Rotating Speed(s)
  - 5. Number of belts (if belt driven)
  - 6. Belt lengths - measured at the pitch line (if belt driven)
  - 7. Diameter of the drive sheave at the drive pitch line (if belt driven)
  - 8. Diameter of the driven sheave at the drive pitch line (if belt driven)
- b. Boilers
  - 1. Boiler type
- c. Fans
  - 1. Fan type
  - 2. Number of rotating fan blades/vanes
  - 3. Number of stationary fan blades/vanes
  - 4. Rotating Speed(s)
  - 5. Number of belts (if belt driven)
  - 6. Belt lengths - measured at the pitch line (if belt driven)
  - 7. Diameter of the drive sheave at the drive pitch line (if belt driven)
  - 8. Diameter of the driven sheave at the drive pitch line (if belt driven)
- d. Fluid Piping
  - 1. Pipe material
  - 2. Pipe size and schedule
- d. Heat Exchangers
  - 1. Heat Exchanger type
- e. HVAC Ducts
  - 1. Type of duct installed
- f. Miscellaneous Safety Wash

1. Type
- g. Motors
1. Motor type
  2. Bearing information
  3. Frame size
  4. Motor class
  5. Full load and locked rotor current
  6. Winding resistance
  7. Winding inductance
  8. Cooling fan blades
  9. Number of rotor bars
  10. Number of stator slots
  11. SCR firing sequence
- h. Pumps
1. Pump type
  2. Number of stages
  3. Number of vanes per stage
  4. Number of gear teeth on each pump gear
  5. Type of impeller or gear
  6. Rotating speed
  7. Number of volutes
  8. Number of diffuser vanes
- i. Steam Traps
1. Steam trap type
- j. Valves
1. Valve type
- 2.1.4 Extra Materials

Submit [spare parts list](#) data for each different item of material and equipment specified, after approval of detail drawings and not later than 2 months prior to the date of project acceptance. Include in the data a complete list of parts and supplies, with current unit prices and source of

supply, a recommended spare parts list for 12 months operation, and a list of the parts recommended by the manufacturer to be replaced after 5 year(s) of service.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Submit [installation drawings](#) for all installed equipment consisting of equipment layouts including assembly, applicable [manufacturer's instructions](#), installation details and electrical connection diagrams; layout and installation details including support structures, piping and related system components. Include on the drawings any information required to demonstrate that the system has been coordinated and will properly function within the HVAC or boiler plant system, and show equipment relationship to other parts of the work, including clearances required for operation and maintenance.

Submit [connection diagrams](#) for equipment, pipes, valves and specialties indicating the relations and connections of devices and apparatus by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.

Submit [record drawings](#), at least [10 working](#) days after completion of equipment installation and acceptance testing. Update mechanical system drawings to reflect final record as-built conditions after all related work is completed.

#### 3.2 EXAMINATION

Perform [visual inspection](#) on the equipment listed below. Correct all abnormalities or defects as directed by the COR.

- a. Blowers
- b. Boilers
- c. Fans
- d. Fluid Piping
- e. Heat Exchangers
- f. HVAC Ducts
- g. Miscellaneous Safety Wash
- h. Motors
- i. Pumps
- j. Valves
- k. Steam Traps

#### 3.3 FIELD QUALITY CONTROL AND ACCEPTANCE TESTING

Deliver equipment and services that meet the contract requirements and

specifications. The Government desires that all such equipment be free of latent manufacturing and installation defects, and acceptance criteria is defined to ensure, to the maximum extent possible within economic reason, that these criteria are met. Perform acceptance testing as defined in this specification and the **RCBEA GUIDE**, using both traditional and PT&I technologies. The Government will observe and monitor the acceptance testing, analysis and documentation as part of the Government's Quality Assurance Program. Not until the requirements of acceptance are met will the equipment or facility be accepted by the Government.

### 3.3.1 Predictive Testing and Inspection

Perform the following PT&I Tests in accordance with the requirements and criteria established in the **RCBEA GUIDE**. Include test point locations in all submitted reports.

Provide final test reports to the COR. Provide reports with a cover letter/sheet clearly marked with the System name, Date, and the words "Final Test Report Data - Forward to the Predictive Testing Group for inclusion in the Maintenance Information Database".

- a. Perform **alignment test** for:
  1. Blowers (laser preferred)
  2. Fans (laser preferred)
  3. Motors (laser preferred)
  4. Pumps (laser preferred)
- b. Perform **balancing test** for:
  1. Blowers
  2. Fans
  3. Motors
  4. Pumps
- c. Perform **code and requirements verification test** for:
  1. Miscellaneous Safety Wash
- d. Perform **cold starting test** for:
  1. Motors
- e. Perform **ductwork leakage test** for:
  1. HVAC Ducts
- f. Perform **flux analysis test** for:
  1. Motors
- g. Perform **high voltage test** for:

1. Motors
- h. Perform [hydraulic oil test](#) for:
  2. Pumps
- i. Perform [hydrostatic test](#) for:
  1. Boilers
  2. Fluid Piping
  3. Heat Exchangers
  4. Valves
- j. Perform [infrared thermography test](#) for:
  1. Fans
  2. HVAC Ducts
  3. Pumps
  4. Boilers
  5. Fluid Piping
  6. Heat Exchangers
  7. Motors
  8. Valves
- k. Perform [insulation power factor test](#) for:
  1. Motors
- l. Perform [insulation resistance test](#) for:
  1. Motors
- m. Perform [lubricating oil test](#) for:
  1. Blowers
  2. Fans
  3. Motors
  4. Pumps
- n. Perform [motor circuit evaluation test](#) for:
  1. Motors
- o. Perform [thermodynamic performance test](#) for:
  1. Blowers

2. Boilers
  3. Fans
  4. Fluid Piping
  5. Heat Exchangers
  6. HVAC Ducts
  7. Pumps
  8. Valves
- p. Perform **ultrasonic (airborne) test** for:
1. Boilers
  2. Fans
  3. HVAC Ducts
  4. Motors
  5. Pumps
  6. Steam Traps
- q. Perform **ultrasonic (pulse) test** for:
1. Fluid Piping
  2. Heat Exchangers
- z. Perform **vibration analysis test** for:
1. Blowers
  2. Fans
  3. Motors
  4. Pumps
- 3.4 OPERATIONS AND MAINTENANCE
- Submit manufacturer's **operations and maintenance manuals** for the following equipment:
- a. Blowers
  - b. Boilers
  - c. Fans
  - d. Fluid Piping
  - e. Heat Exchangers

- f. HVAC Ducts
- g. Miscellaneous Safety Wash
- h. Motors
- i. Pumps
- j. Valves
- k. Steam Traps

Submit six complete copies of operations and maintenance manuals in bound 8-1/2 by 11 inch booklets listing step-by-step procedures required for system startup, operation, abnormal shutdown, emergency shutdown, and normal shutdown. Include the manufacturer's name, model number, parts list, routine maintenance procedures, possible breakdowns and repairs, trouble shooting guide, and a brief description of all equipment and their basic operating features. Include piping and equipment layouts and simplified wiring and control diagrams of the system as installed. Where available, provide technical manuals in electronic format with Standard Graphics Markup Language. When electronic format publications are provided, only three copies of the document are required. Submit operations and maintenance manuals 30 calendar days prior to testing any equipment.

### 3.5 ACCEPTANCE DOCUMENTATION

Upon completion of the project and acceptance testing the COR will provide [acceptance documentation](#) to the Contractor. Complete, sign and date this documentation and submit back to the COR for processing and approval.

-- End of Section --

## SECTION 01 86 26.07 40

## RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers the requirements for Reliability Centered Building and Equipment Acceptance for Electrical systems.

## 1.2 SYSTEM DESCRIPTION

This specification establishes acceptance requirements to ensure building equipment and systems installed by the Contractor have been installed properly and contain no identifiable defects that will shorten the design life of the equipment. These requirements utilize Predictive Testing & Inspection (PT&I) technologies and are essential elements in the Government's Reliability Centered Building and Equipment Acceptance Program.

This specification is not intended to limit the inspection and acceptance process to the use of PT&I techniques. This guide is intended to supplement comprehensive and detailed commissioning and quality control specifications.

## 1.3 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

## RCBEA GUIDE

NASA Reliability Centered Building and  
Equipment Acceptance Guide

## 1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-01 Preconstruction Submittals

Quality Control Plan

Material, Equipment, and Fixture Lists

## SD-02 Shop Drawings

Connection Diagrams

Fabrication Drawings

Installation Drawings

SD-03 Product Data

Manufacturer's Catalog Data

Equipment Foundation Data

Specific Equipment Data

Spare Parts List

Warranty

SD-05 Design Data

Design Analysis and Calculations

SD-06 Test Reports

Air Compressor Performance Test

Breaker Timing Test

Contact Resistance Test

Continuity Test

Fall of Potential Test

General Battery Test

General Charger Test

Insulation Resistance Test

Overpotential Test

Point to Point Test

Power Factor Test

Turns Ratio Test

Visual Inspection

SD-07 Certificates

Certificates

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

SD-10 Operation and Maintenance Data

## Operations and Maintenance Manuals

## SD-11 Closeout Submittals

## Acceptance Documentation

## Record Drawings

## Baseline Data Report

## 1.5 DESIGN DATA

Submit applicable [design analysis and calculations](#) for the equipment listed below as instructed to by the project specification.

- a. Breakers:
  - 1. General
- B. Cables:
  - 1. General
  - 2. Low Voltage (600V Maximum)
  - 3. Medium Voltage (600V-33,000V)
- c. Electric Buss
- d. Electrical Control Panels
- e. Electrical Distribution Panels
- f. Electrical Grounding Grid
- g. Electrical Lightning Protection
- h. Electrical Power Centers
- i. Electrical Power Supplies
- j. Electrical Relays
- k. Electrical Starters
  - 1. Motor Control Centers
- m. Switchboard
- n. Transformers

## 1.6 QUALITY ASSURANCE

Submit a Quality Control plan outlining the intended methods of receiving, testing, and installing equipment. The [RCBEA GUIDE](#) specifies minimum test equipment requirements. Use trained and adequately certified personnel in the appropriate acceptance testing PT&I technologies to ensure that the results are accurate and consistent. Submit the following as part of the [quality control plan](#) for all required acceptance testing:

- a. List of all test equipment used, including its manufacturer, model number, calibration date, certificate of calibration, and serial number.
- b. Certificates of test personnel qualifications and certifications.

#### 1.7 WARRANTY

Furnish workmanship and performance **warranty** for the work performed for a period not less than 1 years from the date of Government acceptance of the work; issued directly to the Government. Perform corrective action that becomes necessary because of defective materials and workmanship while system is under warranty **5 working days** after notification, unless additional time is approved by the COR. Failure to perform repairs within the specified period of time constitutes grounds for having the corrective action and repairs performed by others and the cost billed to the Contractor. Provide a 1 year minimum contractor installation warranty.

### PART 2 PRODUCTS

#### 2.1 PRODUCT DATA

Submit **material, equipment, and fixture lists** for all equipment, materials, and fixtures planned for use to complete the job before commencing work. Include at a minimum, the item's description, quantity, manufacturer's style or catalog numbers, and specification and drawing reference numbers. Provide a complete list of construction equipment to be used.

##### 2.1.1 Manufacturer Product Data

Submit **fabrication drawings** for equipment and specialties consisting of fabrication and assembly details to be performed in the factory. Show connection diagrams and assemblies in switchgear fabrication drawings

Submit for all equipment listed. Include manufacturer's standard catalog data, at least 5 weeks prior to the purchase or installation of a particular component, highlighted to show material, size, options, equipment performance data charts and curves, etc. in adequate detail to demonstrate compliance with contract requirements. Include manufacturer's recommended installation instructions and procedures. If vibration isolation is specified for a unit, include vibration isolator literature containing catalog cuts and certification that the isolation characteristics of the isolators provided meet the manufacturer's recommendations. Submit for each specified component.

Submit **manufacturer's catalog data** and **equipment foundation data** (as applicable) for the following equipment:

Include plan dimensions of foundations and relative elevations, equipment weight and operating loads, horizontal and vertical loads, horizontal and vertical clearances for installation, and size and location of anchor bolts.

- a. Breakers:
  1. General
- b. Cables:
  1. General

2. Low Voltage (600V Maximum)
3. Medium Voltage (600V-33,000V)

- c. Electric Buss
- d. Electrical Control Panels
- e. Electrical Distribution Panels
- f. Electrical Grounding Grid
- g. Electrical Lightning Protection
- h. Electrical Power Centers
- i. Electrical Power Supplies
- j. Electrical Relays
- k. Electrical Starters
- l. Motor Control Centers
- m. Switchboard
- n. Transformers

#### 2.1.2 Certification Data

Submit applicable [certificates](#) for the equipment listed below showing conformance with test requirements, laboratory certifications, etc. as instructed by the project specification.

- a. Breakers:
  1. General
- b. Cables:
  1. General
  2. Low Voltage (600V Maximum)
  3. Medium Voltage (600V-33,000V)
- c. Electric Buss
- d. Electrical Control Panels
- e. Electrical Distribution Panels
- f. Electrical Grounding Grid
- g. Electrical Lightning Protection
- h. Electrical Power Centers

- i. Electrical Power Supplies
- j. Electrical Relays
- k. Electrical Starters
- l. Motor Control Centers
- m. Switchboard
- n. Transformers

### 2.1.3 Specific Equipment Data

Submit the following information for all equipment listed below: location of installation, AIR FORCE ARMY NASA NAVY Identification number, date of installation (required or actual acceptance date), and applicable AIR FORCE ARMY NASA NAVY reference drawing number. Unless explicitly stated in submitted manufacturer's literature, provide and submit the following specific equipment data:

- a. Breakers- General, Air Blast, Air Magnetic, Oil, SF6 Gas, and Vacuum Types
  - 1. Breaker type
  - 2. Breaker Specifications (including current transformer ratios)
- b. Cables- Low, Medium, and High Voltage
  - 1. Power cable type
- c. Electric Buss
  - 1. Buss Type
  - 2. Buss Specifications (including current and load capacity)
- d. Electrical Control Panel
  - 1. Electrical Control Panel Type (NEMA enclosure type)
  - 2. Voltage configuration (120/240 VAC, 12/24 VDC, etc.)
  - 3. Amperage
  - 4. Dimensions
  - 5. Weight
  - 6. UL certification
  - 7. EMI levels (if applicable)
- d. Electrical Distribution Panel
  - 1. Electrical Control Panel Type (NEMA enclosure type)
  - 2. Voltage configuration (120/240 VAC, 12/24 VDC, etc.)

- 3. Amperage (panel main bus maximum)
- 4. Dimensions
- 5. Weight
- 6. UL certification
- 7. EMI levels (if applicable)
- 8. Number of circuit breaker positions (outputs)
- 9. Electrical Distribution Panel impedance
- e. Electrical Grounding Grid
  - 1. Grid Identification (Type)
- f. Electrical Lightning Protection
  - 1. Electrical Lightning Protection for Type I or II building structures
  - 2. Class I Type Structures (Buildings below 75 feet in height)
  - 3. Class I & Class II Type Structures where the structural steel will be used in lieu of downlead or vertical cables
  - 4. Electrical Lightning Protection Specifications: UL certification - "Master Label" rating by a UL inspector
  - 5. Installation configuration
- g. Electrical Power Centers
  - 1. Electrical power center type (NEMA enclosure type)
  - 2. Voltage configuration (120/240 VAC, 12/24 VDC, etc.)
  - 3. Amperage (panel main bus maximum)
  - 4. Dimensions
  - 5. Weight
  - 6. UL certification
  - 7. EMI levels (if applicable)
  - 8. Number of circuit breaker positions (outputs)
  - 9. Electrical power center impedance
- g. Electrical Power Supplies
  - 1. Electrical power supply type
  - 2. DC Output ratings

3. Dimensions, Weight
4. UL certification, EMI levels (if applicable)
5. Electrical Power Supply impedance
- h. Electrical Relays
  1. Electrical relay type (NEMA enclosure type)
  2. Voltage configuration
  3. Time over current curves (time delay curves)
  4. Phase and ground operating curves (shapes)
  5. Dimensions, Weight
  6. UL certification, EMI levels (if applicable)
  7. Number and types of output relays
  - 8 Current loading
- i. Electrical Starters
  1. Electrical Starter Type (NEMA enclosure type)
  2. Amperage and voltage configuration (25A-60A, <600V and ¼-50HP, etc.)
  3. Overload settings
  4. Dimensions, Weight
  5. UL certification, EMI levels (if applicable)
- j. Electric Switch, All Types
  1. Switch type
  2. Switch specifications
- k. Motor Control Center
  1. Motor control center type
  2. Motor control center specifications
- l. Switchgear
  1. Switchgear type
  2. Switchgear specification data (voltage rating)
- m. Transformers
  1. Transformer Type

2. Winding resistance
3. Current transformer ratios
4. Transformer impedance
5. Load loss at rated voltage and current
6. Current loading

#### 2.1.4 Extra Materials

Submit [spare parts list](#) data for each different item of material and equipment specified, after approval of detail drawings and not later than 2 months prior to the date of beneficial occupancy. Include in the data a complete list of parts and supplies, with current unit prices and source of supply, a recommended spare parts list for 12 months operation, and a list of the parts recommended by the manufacturer to be replaced after 1 year of service.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Submit [installation drawings](#) for all installed equipment consisting of equipment layouts including assembly, applicable [manufacturer's instructions](#), installation details and electrical connection diagrams; layout and installation details including support structures, conduit and related system components. Include on the drawings any information required to demonstrate that the system has been coordinated and will properly function within the electrical system, and show equipment relationship to other parts of the work, including clearances required for operation and maintenance.

Submit [connection diagrams](#) for electrical equipment, panels, conduit, and specialties indicating the relations and connections of devices and apparatus by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.

Submit [record drawings](#), at least 14 days after completion of equipment installation and acceptance testing. Update electrical system drawings to reflect final record as-built conditions after all related work is completed.

#### 3.2 EXAMINATION

Perform [visual inspection](#) on the equipment listed below. Correct all abnormalities or defects as directed by the COR.

##### a. Breakers:

1. General
2. Air Blast
3. Air Magnetic

- b. Cables:
  - 1. General
  - 2. Low Voltage (600V Maximum)
  - 3. Medium Voltage (600V-33,000V)
- c. Electric Buss
- d. Electrical Control Panels
- e. Electrical Distribution Panels
- f. Electrical Grounding Grid
- g. Electrical Lightning Protection
- h. Electrical Power Centers
- i. Electrical Power Supplies
- j. Electrical Relays
- k. Electrical Starters
- l. Motor Control Centers
- m. Switchboard
- n. Transformers

### 3.3 FIELD QUALITY CONTROL AND ACCEPTANCE TESTING

Deliver equipment and services that meet the contract requirements and specifications. Ensure all equipment is free of latent manufacturing and installation defects, and acceptance criteria are met. Perform acceptance testing as defined in this specification and the [RCBEA GUIDE](#), using both traditional and PT&I technologies. The Government will observe and monitor the acceptance testing, analysis and documentation as part of the Government's Quality Assurance Program. Not until the requirements of acceptance are met will the equipment or facility be accepted by the Government.

#### 3.3.1 Predictive Testing and Inspection Tests

Perform the following PT&I Tests in accordance with the requirements and criteria established in the [RCBEA GUIDE](#). Include test point locations in all submitted reports.

Provide final test reports to the COR. Provide reports with a cover letter/sheet clearly marked with the System name, Date, and the words "Final Test Report Data - Forward to the Predictive Testing Group for inclusion in the Maintenance Information Database.

- a. Perform [Breaker Timing Test](#) for:
  - 1. Breakers- General optional

2. Breakers- Air Blast optional
  3. Breakers- Air Magnetic optional
- b. Perform [Contact Resistance Test](#) for:
1. Breakers- General
  2. Electric Buss
  3. Electrical Control Panel
  4. Electrical Distribution Panel
  5. Electrical Power Centers
  6. Electrical Power Supplies
  7. Electric Switch, Low Voltage Air
  8. Electrical Relays
  9. Electrical Starters
  10. Switchboard
  11. Transformers optional
- c. Perform [Continuity Test](#) for:
1. Electrical Lightning Protection
- d. Perform [Fall of Potential Test](#) for:
1. Electrical Grounding Grid
- e. Perform [Infrared Thermography Test](#) for:
1. Electrical Control Panels
  2. Electrical Distribution Panel
  3. Electrical Power Centers
  4. Electrical Power Supplies
  5. Electrical Starters
  6. Motor Control Center
  7. Switchboard
  8. Transformers
  9. Breakers- General optional
  10. Electric Buss optional
  11. Electric Switch, Low Voltage Air optional

- f. Perform [Insulation Oil Test](#) for:
  - 1. Breakers- General
- g. Perform [Insulation Resistance Test](#) for:
  - 1. Breakers- General
  - 2. Cables (General)
  - 3. Cables- Low Voltage (600V Maximum)
  - 4. Cables- Medium Voltage (600V-33,000V)
  - 5. Electric Buss
  - 6. Electrical Relays
  - 7. Switchboard
  - 8. Electrical Control Panel
  - 9. Electrical Distribution Panel
  - 10. Electrical Lightning Protection
  - 11. Electrical Power Centers
  - 12. Electrical Power Supplies
  - 13. Electrical Starters
  - 14. Motor Control Centers
  - 15. Transformers
- h. Perform [Overpotential Test](#) for:
  - 1. Capacitor, Dry-Type
  - 2. Electric Buss
- i. Perform [Point to Point Test](#) for:
  - 1. Electrical Grounding Grid
- j. Perform [Power Factor Test](#) for:
  - 1. Transformers
  - 2. Breakers- General
  - 3. Cables (General)
  - 4. Cables- Medium Voltage (600V-33,000V)
  - 5. Electrical Control Panel

6. Electrical Distribution Panel
  7. Electrical Power Centers
  8. Electrical Power Supplies
  9. Switchboard
- k. Perform [Turns Ratio Test](#) for:
1. Transformers
- l. Perform [Ultrasonic \(Airborne\) Test](#) for:
1. Electrical Control Panel
  2. Electrical Distribution Panel
  3. Electrical Power Centers
  4. Electrical Starters
  5. Motor Control Centers
  6. Switchboard
  7. Transformers
  8. Breakers- General
  9. Cables (General)
  10. Cables- Low Voltage (600V Maximum)
  11. Cables- Medium Voltage (600V-33,000V)
  12. Electric Buss

### 3.3.2 Baseline Data from Verification Testing

Upon completion of all PT&I tests submit [baseline data report](#) to the COR. Include a summary of all performance data, set points, operating parameters and PT&I test results obtained for equipment and building systems.

### 3.4 OPERATIONS AND MAINTENANCE

Submit manufacturer's [operations and maintenance manuals](#) for the following equipment:

- a. Breakers:
  1. General
- b. Cables:
  1. General
  2. Low Voltage (600V Maximum)

3. Medium Voltage (600V-33,000V)
  - c. Electric Buss
  - d. Electrical Control Panels
  - e. Electrical Distribution Panels
  - f. Electrical Grounding Grid
  - g. Electrical Lightning Protection
  - h. Electrical Power Centers
  - i. Electrical Power Supplies
  - j. Electrical Relays
  - k. Electrical Starters
  - l. Motor Control Centers
  - m. Switchboard
  - n. Transformers

Submit six complete copies of operations and maintenance manuals in bound 8-1/2 by 11 inch booklets listing step-by-step procedures required for system startup, operation, abnormal shutdown, emergency shutdown, and normal shutdown. Include the manufacturer's name, model number, parts list, routine maintenance procedures, possible breakdowns and repairs, trouble shooting guide, and a brief description of all equipment and their basic operating features. Include piping and equipment layouts and simplified wiring and control diagrams of the system as installed. Where available, provide technical manuals in electronic format with Standard Graphics Markup Language. When electronic format publications are provided, only two copies of the document are required. Submit operations and maintenance manuals 30 calendar days prior to testing any equipment.

### 3.5 ACCEPTANCE DOCUMENTATION

Upon completion of the project and acceptance testing the COR will provide [acceptance documentation](#) to the Contractor. Complete, sign and date this documentation and submit back to the COR for processing and approval.

-- End of Section --

SECTION 05 12 00

STRUCTURAL STEEL

Revision 1 - 05/15/2013

PART 1 GENERAL

1.1 SUMMARY

This section covers the requirements for structural steel used in building construction.

1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 201	AISC Certification Program for Structural Steel Fabricators
AISC 303	Code of Standard Practice for Steel Buildings and Bridges
AISC 325	Steel Construction Manual
AISC 326	Detailing for Steel Construction
AISC 810	Design Guide 10: Erection Bracing of Low-Rise Structural Steel Buildings
ANSI/AISC 341	Seismic Provisions for Structural Steel Buildings
ANSI/AISC 360	Specification for Structural Steel Buildings

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B46.1	Surface Texture, Surface Roughness, Waviness and Lay
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ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A143/A143M	Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A325M	Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric)
ASTM A36/A36M	Standard Specification for Carbon Structural Steel
ASTM A500/A500M	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts
ASTM A572/A572M	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A6/A6M	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A780/A780M	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A992/A992M	Standard Specification for Structural Steel Shapes
ASTM C 1107/C 1107M	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C827/C827M	Change in Height at Early Ages of

	Cylindrical Specimens from Cementitious Mixtures
ASTM F 1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F 436	Hardened Steel Washers
ASTM F 844	Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 959	Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6/NACE No.3	Commercial Blast Cleaning
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.756	Steel Erection; Beams and Columns
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1.3 SYSTEM DESCRIPTION

Provide the structural steel system, including shop primer galvanizing, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with ANSI/AISC 360 and ANSI/AISC 341 except as modified in this contract.

1.4 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Erection Plan, including description of temporary supports

Fabrication drawings including description of connections

SD-03 Product Data

Shop primer (also coordinate with Section 09 90 00)

Welding electrodes and rods

Load indicator washers

Non-Shrink Grout

Load indicator bolts

Include test report for Class B primer.

SD-06 Test Reports

Class B coating

### Bolts, nuts, and washers

Supply the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

### SD-07 Certificates

#### Steel

#### Bolts, nuts, and washers

Galvanizing (also coordinate with Section 09 90 00)

#### AISC Quality Certification

#### Welding procedures and qualifications

### 1.5 AISC QUALITY CERTIFICATION

Work shall be fabricated in an AISC certified Category Std fabrication plant.

### 1.6 SEISMIC PROVISIONS

The structural steel system shall be provided in accordance with ANSI/AISC 341.

### 1.7 QUALITY ASSURANCE

#### 1.7.1 Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326 and AISC 325. Fabrication drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Double connections that require an erection seat to comply with OSHA 29 CFR 1926.756(c)(1) shall be shown on the shop drawings, reviewed and approved by the Government. Use AWS A2.4 standard welding symbols. Shoring and temporary bracing shall be designed and sealed by a registered professional engineer licensed in the State of California and submitted for record purposes as part of the drawings. Member substitutions of details shown on the contract drawings shall be clearly highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

#### 1.7.2 Certifications

##### 1.7.2.1 Erection Plan

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing.

##### 1.7.2.2 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the

qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate shall be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in [AWS D1.1/D1.1M](#).

## PART 2 PRODUCTS

### 2.1 STEEL

#### 2.1.1 Structural Steel

[ASTM A36/A36M](#).

#### 2.1.2 High-Strength Structural Steel

##### 2.1.2.1 Low-Alloy Steel

[ASTM A572/A572M](#), Grade 50. [ASTM A992/A992M](#) Grade 50.

#### 2.1.3 Structural Shapes for Use in Building Framing

Wide flange shapes, [ASTM A992/A992M](#).

#### 2.1.4 Structural Steel Tubing

[ASTM A500/A500M](#), Grade B.

#### 2.1.5 Steel Pipe

[ASTM A53/A53M](#), Type E or S, Grade B, weight class STD (Standard).

### 2.2 BOLTS, NUTS, AND WASHERS

Provide the following unless indicated otherwise.

#### 2.2.1 Structural Steel, Steel Pipe

##### 2.2.1.1 Bolts

[ASTM A307](#), Grade A; [ASTM A325](#), Type 1. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

##### 2.2.1.2 Nuts

[ASTM A563](#), Grade and Style for applicable ASTM bolt standard recommended.

##### 2.2.1.3 Washers

[ASTM F 844](#) washers for [ASTM A307](#) bolts, and [ASTM F 436](#) washers for [ASTM A325](#) bolts.

## 2.2.2 High-Strength Structural Steel and Structural Steel Tubing

### 2.2.2.1 Bolts

ASTM A325, Type 1.

### 2.2.2.2 Nuts

ASTM A563, Grade and Style as specified in the applicable ASTM bolt standard.

### 2.2.2.3 Washers

ASTM F 436, plain carbon steel.

## 2.2.3 Foundation Anchorage

### 2.2.3.1 Anchor Bolts

ASTM F 1554.

### 2.2.3.2 Anchor Nuts

ASTM A563, Grade A, hex style.

### 2.2.3.3 Anchor Washers

ASTM F 844.

### 2.2.3.4 Anchor Plate Washers

ASTM A36/A36M.

### 2.2.4 Load Indicator Washers

ASTM F 959.

### 2.2.5 Load Indicator Bolts

ASTM A325, Type 1; with a manufactured notch between the bolt tip and threads. The bolt shall be designed to react to the opposing rotational torques applied by the installation wrench, with the bolt tip automatically shearing off when the proper tension is obtained.

## 2.3 STRUCTURAL STEEL ACCESSORIES

### 2.3.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

### 2.3.2 Non-Shrink Grout

ASTM C 1107/C 1107M, with no ASTM C827/C827M shrinkage. Grout shall be nonmetallic.

### 2.3.3 Welded Shear Stud Connectors

AWS D1.1/D1.1M.

## 2.4 SHOP PRIMER

Shop prime structural steel -- see Section 09 90 00. Primer shall conform to Federal, State, and local VOC regulations. If flash rusting occurs, re-clean the surface prior to application of primer.

## 2.5 GALVANIZING

ASTM A123/A123M or ASTM A153/A153M, as applicable, unless specified otherwise galvanize after fabrication where practicable.

## 2.6 FABRICATION

### 2.6.1 Markings

Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

### 2.6.2 Shop Primer

Shop prime structural steel per Section 09 90 00, except as modified herein. Do not prime steel surfaces embedded in concrete, galvanized surfaces, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking is to be welded). Slip critical surfaces shall be primed with a Class B coating. Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the COR.

#### 2.6.2.1 Cleaning

SSPC SP 6/NACE No.3. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

#### 2.6.2.2 Primer

Apply primer to a minimum dry film thickness of 2.0 mil except provide the Class B coating for slip critical joints in accordance with the coating manufacturer's recommendations. Repair damaged primed surfaces with an additional coat of primer.

### 2.6.3 Epoxy Coated Surfaces

Surfaces to receive epoxy coatings shall be cleaned and prepared in accordance with the manufacturer's recommendations.

## 2.7 DRAINAGE HOLES

Adequate drainage holes shall be drilled to eliminate water traps. Hole diameter shall be 1/2 inch and location shall be indicated on the detail drawings. Hole size and location shall not affect the structural integrity.

## PART 3 EXECUTION

### 3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of [AISC 325](#). Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the [AISC 201](#) for Category conventional steel building structures structural steelwork.

Compression joints depending on contact bearing shall have a surface roughness not in excess of [500 micro inch](#) as determined by [ASME B46.1](#), and ends shall be square within the tolerances for milled ends specified in [ASTM A6/A6M](#).

Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with endorsement "P" of [AISC 201](#) and primed with the specified paint.

Shop splices of members between field splices will be permitted only where indicated on the Contract Drawings. Splices not indicated require the approval of the COR.

### 3.2 ERECTION

For low-rise structural steel buildings ( [60 feet](#) tall or less and a maximum of 2 stories), the erection plan shall conform to [AISC 303](#) and the structure shall be erected in accordance with [AISC 810](#).

Provide for drainage in structural steel. After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

#### 3.2.1 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

### 3.3 CONNECTIONS

Except as modified in this section, connections not detailed shall be designed in accordance with [ANSI/AISC 360](#). Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member. Holes shall not be cut or enlarged by burning. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

#### 3.3.1 Common Grade Bolts

[ASTM A307](#) bolts shall be tightened to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the COR for further instructions.

### 3.3.2 High-Strength Bolts

Provide load indicator bolts or washers in all [ASTM A325M](#) bolted connections, except provide only load indicator washers for slip critical connections. Direct tension indicator tightening, shall be the only acceptable tightening methods. Use only direct tension indicator tightening for slip critical connections. Bolts shall be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts shall then be fully tensioned, progressing from the most rigid part of a connection to the free edges.

#### 3.3.2.1 Installation of Load Indicator Washers (LIW)

[ASTM F 959](#). Where possible, the LIW shall be installed under the bolt head and the nut shall be tightened. If the LIW is installed adjacent to the turned element, provide a flat [ASTM F 436](#) washer between the LIW and nut when the nut is turned for tightening, and between the LIW and bolt head when the bolt head is turned for tightening.

### 3.4 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the COR.

### 3.5 WELDING

[AWS D1.1/D1.1M](#) Provide [AWS D1.1/D1.1M](#) qualified welders, welding operators, and tackers.

The Contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

#### 3.5.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

### 3.6 SHOP PRIMER REPAIR

Repair shop primer in accordance with the paint manufacturer's recommendation for surfaces damaged by handling, transporting, cutting, welding, or bolting.

#### 3.6.1 Field Priming

Field priming of steel exposed to the weather, or located in building areas without HVAC for control of relative humidity. After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

### 3.7 GALVANIZING REPAIR

Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using [ASTM A780/A780M](#)

zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.8 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing, except that electric power for field tests will be furnished as set forth in Division 1. The COR shall be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of weld inspection.

3.8.1 Welds

3.8.1.1 Visual Inspection

**AWS D1.1/D1.1M.** Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

3.8.1.2 Nondestructive Testing

**AWS D1.1/D1.1M.** Test locations shall be selected by the COR. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested by radiographic or ultrasonic testing, as approved by the COR. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

Testing frequency: Provide the following types and number of tests:

<u>Test Type</u>	<u>Number of Tests</u>
Radiographic (complete penetration welds)	100%
Ultrasonic (complete penetration welds)	100%
Magnetic Particle (fillet welds)	25%
Dye Penetrant (fillet welds)	25%

3.8.2 Load Indicator Washers

3.8.2.1 Load Indicator Washer Compression

Load indicator washers shall be tested in place to verify that they have been compressed sufficiently to provide the 0.015 inch gap when the load indicator washer is placed under the bolt head and the nut is tightened, and to provide the 0.005 inch gap when the load indicator washer is placed under the turned element, as required by **ASTM F 959**.

3.8.3 High-Strength Bolts

3.8.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill

certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in ANSI/AISC 360, depending on bolt size and grade. The bolt tension shall be developed by tightening the nut. A representative of the manufacturer or supplier shall be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements.

#### 3.8.3.2 Inspection

Inspection procedures shall be in accordance with ANSI/AISC 360. Confirm and report to the COR that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

Inspection by the Government will include proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use; and calibration of torque wrenches for high-strength bolts.

The Contractor shall inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use; and calibration of torque wrenches for high-strength bolts.

#### 3.8.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations shall be selected by the COR. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, shall be tested. Retest new bolts after installation.

#### 3.8.4 Testing for Embrittlement

ASTM A143/A143M for steel products hot-dip galvanized after fabrication.

-- End of Section --

## SECTION 22 31 00

## WATER SOFTENERS, CATION-EXCHANGE (SODIUM CYCLE)

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers fully automatic, semi-automatic, and manual water softening equipment.

## 1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA 10084	Standard Methods for the Examination of Water and Wastewater
AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings for Water
AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115/A21.15	Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA D102	Coating Steel Water-Storage Tanks

## ASME INTERNATIONAL (ASME)

ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B16.3	Malleable Iron Threaded Fittings, Classes 150 and 300
ASME B16.39	Standard for Malleable Iron Threaded Pipe Unions; Classes 150, 250, and 300
ASME B40.100	Pressure Gauges and Gauge Attachments
ASME BPVC SEC VIII D1	BPVC Section VIII-Rules for Construction of Pressure Vessels Division 1

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM D 1785	Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 3299	Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks
ASTM E 100	ASTM Hydrometers
ASTM E 126	Inspection and Verification of Hydrometers
ASTM F 593	Stainless Steel Bolts, Hex Cap Screws, and Studs

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation
MSS SP-69	Pipe Hangers and Supports - Selection and Application (ANSI Approved American National Standard)
MSS SP-70	Gray Iron Gate Valves, Flanged and Threaded Ends
MSS SP-80	Bronze Gate, Globe, Angle and Check Valves

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	Standard for Industrial Control and Systems: General Requirements
NEMA MG 1	Motors and Generators

### 1.3 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

##### Installation

Drawings showing complete wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

#### SD-03 Product Data

##### Softening Equipment

A complete list of equipment and material, including manufacturer's descriptive and technical literature; performance charts and curves; catalog cuts; and installation instructions.

##### Spare Parts

Spare parts data for each different item of material and equipment, as specified.

##### Field Instructions

Proposed diagrams, instructions, and other sheets, prior to posting. Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the systems.

#### SD-06 Test Reports

##### Softening Equipment Piping

Test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall indicate the final position of controls.

#### SD-10 Operation and Maintenance Data

##### Operating and Maintenance Instructions

Six complete copies of operating instructions outlining the

step-by-step procedures required for system startup, operation and shutdown. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operation features. Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. The instructions shall include simplified wiring, layout, and control diagrams of the system as installed.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Protect all equipment delivered and placed in storage from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

#### 1.5 EXTRA MATERIALS

- a. Submit **spare parts** data for each different item of material and equipment, after approval of the detail drawings and not later than 1 month prior to the date of beneficial occupancy. Data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 1 and 3 years of service.
- b. Provide, for each type of equipment furnished, special tools necessary for adjustment, operation, maintenance, and disassembly; a grease gun or other lubricating device for each type of grease required; and one or more steel cases mounted on the wall complete with flat key locks, two keys, and clips or hooks to hold each tool in a convenient location. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type. Tools shall be delivered at the same time as the equipment and handed over on completion of the work.

### PART 2 PRODUCTS

#### 2.1 STANDARD PRODUCTS

- a. Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of the products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the COR, reasonably convenient to the site.
- b. Pumps and motors shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

#### 2.2 SOFTENING EQUIPMENT

Softener battery shall consist of not more than 3 (i.e., 1, 2, or 3) water-softener units. Performance specified shall refer to each unit and not to the battery as a whole. Preference is for a single unit system, if possible.

##### 2.2.1 Equipment Capacity

Each of the units shall be a semi-automatic downflow pressure-type water softener, having a capacity to soften **362,388/n gallons** of water with a

maximum influent total hardness of 110 milligrams per liter (mg/L) during the interval between successive regenerations, to a maximum effluent total hardness of 0.42 mg/L. Intervals between successive generations shall be 1 week.

Each unit shall have the capacity to handle a peak rate of 25,468/n gph. All units are in service at the same time.3 Typical water properties are as follows:

<u>Component</u>	<u>Concentration mg/L</u>	<u>Component</u>	<u>Concentration mg/L</u>
Total Solids	Unknown	Alkalinity	Unknown
Total Dissolved Solids	39-203	Methyl Orange as Calcium Carbonate	Unknown
Calcium	3-26	Phenolphthalein as Calcium Carbonate	Unknown
Sodium and Potassium	3-29	Total Hardness as Calcium Carbonate	110 (14-100)
Total Iron	Unknown	Carbonate Hardness as Calcium Carbonate	Unknown
Ferric Iron	Unknown	Noncarbonate Hardness as Calcium Carbonate	Unknown
Ferrous Iron	Unknown	Free Carbon Dioxide Calcium Carbonate	Unknown
Manganese	Unknown	Turbidity in Nethlometric Turbidity units	0.06-0.3
Copper	Unknown	Color by Platinum Standard Comparison	Unknown
Silica	5-7.7	Residual Chlorine	0.02-2.15
Sulphate	1-34.9	Dissolved Oxygen	Unknown
Chlorides	4-15	Conductivity pH	8.5-9.2
Nitrates	Unknown		

2.2.2 Softener Tank

Softener tank shall be a minimum of 48 inches in diameter by TBD inches straight shell (tangent line to tangent line). Tank shall be of butt welded steel construction conforming to the ASME BPVC SEC VIII D1. Shell shall be designed for a working pressure of 100 psi. Tank shall be lined with

nontoxic epoxy or rubber conforming to AWWA D102. The upper head of each tank shall be provided with an access opening 11 inches by 15 inches or larger. Lower side shell of each tank shall be provided with an access opening 4 by 6 inches or larger. Tank shall have angle leg orskid supports of cast-iron or steel.

### 2.2.3 Underdrain System

A system shall be provided within the softener tank for collecting softened water and distributing backwash water. The system shall be hub-lateral or header-lateral distributor head type. Underdrain system shall distribute the backwash water uniformly over the entire filter area, and at such velocities that will prevent the channeling of the filter bed.

#### 2.2.3.1 Header-Lateral-Distributor Head Type

A hub-lateral or header-lateral distributor is acceptable.

Header-lateral-distributor head type shall consist of a central manifold or header, connected to laterals provided with strainer heads or strainers with openings placed radially so as to discharge horizontally or downward. System shall be supported by a steel plate or steel angles conforming to ASTM A666 with rubber or nontoxic epoxy linings. Where the system will permit the loss of the exchange material during the filtering cycle, the system shall be provided with a gravel bed. All bolts and attaching hardware shall be stainless steel, conforming with ASTM F 593. Headers and laterals shall be polyvinyl chloride, conforming to ASTM D 1785 or ASTM D 2241. Strainer heads and strainers shall be manufactured of materials compatible with the header-lateral system, and shall be brass or stainless steel. Laterals and strainer heads, after being placed, shall not protrude into the header or laterals.

#### 2.2.4 Gravel Bed

Supporting bed shall be placed above the underdrain systems. Gravel shall be free from clay, loam, dirt, and calcareous or other foreign materials and shall be free of flat or elongated particles. Gravel bed shall be properly graduated to distribute the backwash water, to prevent loss of exchange materials, and to prevent migration of the material in the gravel bed during operation and backwashing. Gravel bed shall not be less than 9 inches in depth. Where the void size of the top layer of gravel is greater than the smallest particle size of the exchange material, a 3 inch layer of ilmenite or garnet sand shall be added to the gravel bed.

#### 2.2.5 Exchange Material

Exchange material shall be of styrene-resinous type, washed, processed, graded, and suitable for water softening purposes. All granules shall be clean and hard, and the material shall be free from defects that affect the serviceability and appearance of the finished product. Exchange material shall not require dosing or the adding of any chemical mixture or solution to the water to be or to the water used for backwashing or regeneration other than sodium chloride, except for a cleaner additive recommended by the Exchange Material Manufacturer. Material shall conform to the following:

- a. Working exchange capacity not less than 30,000 grains pcf.
- b. Approximate shipping weight of 50-55 pcf, backwashed and drained volume.

- c. Effective size not less than 0.45 millimeters.
- d. Uniformity coefficient not greater than 2.0.
- e. Not more than 1 percent by weight to pass 50-mesh US standard screen.

Bed depth shall not be less than 30 inches. Application rate shall not exceed 2 gpm per cubic foot of exchange material. Minimum freeboard above exchanger bed shall be not less than 50 percent of bed depth.

### 2.3 BRINE APPLICATION SYSTEM

A brine application system, comprising one tank, shall be provided for each installation. Single tank units shall serve as a combined salt saturator and brine tank. Minimum capacity of the system shall be such as to provide sufficient salt storage for the weekly regeneration cycles or 24-hour operation, whichever is greater.

#### 2.3.1 Tanks

Each saturator, brine or combined-purpose tank shall be fabricated from polyethylene, or steel conforming to ASTM D 3299. Comply with EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Each tank shall be equipped with an underdrain system manufactured from polyvinyl chloride conforming to ASTM D 1785 or ASTM D 2241 and provided with a layer of graded gravel or screens for filtering the brine. Screens shall be manufactured from polyvinyl chloride, or stainless steel. Saturator tank or combined-purpose tank shall be equipped with a water inlet valve float-operated. Water inlet valves and switches shall be mounted externally. Floats and probes may be mounted internally or externally, in such a manner that the stored salt shall not interfere with their operation. All devices in contact with or subject to splashing of brine solution shall be fabricated from polyvinyl chloride.

#### 2.3.2 Hydraulic System

A hydraulic ejector of all bronze construction with valves, piping, and connections shall be provided for lifting brine from the brine or combined tank. Ejector shall have sufficient capacity to permit a 2 to 1 variation in the concentrated brine rate of flow. Hydraulic ejector system shall be equipped with a manual rate-set valve and a check valve on the suction side of the ejector. Where the brine tank or combination tank is emptied during each regeneration period, the suction side of the ejector system shall be provided with a device to prevent the entrance of air into the system. Hydraulic ejector system shall be capable of automatically flushing out the dilute brine piping system or completion of the brine cycle. The dilution water supply shall be protected from inflow of brine by means of back flow prevention device.

### 2.4 CONTROLS

#### 2.4.1 Valves

Transfer of water and brine solution to and from the water softener shall be accomplished by a single-unit multiple-port valve or by a package-type valve nest for semiautomatic operation. Design of the valve mechanisms shall be such that gradually increasing flows will be attained as ports are opened and initial surges and sudden inrushes of water or brine are

avoided. A dial pointer shall indicate each step of the operation.

#### 2.4.1.1 Multiple-Port Valve

Multiple-port valve shall consist of an assembly of nonsticking, nonleaking, water-lubricated valve ports that connect to the hard-water inlet, soft-water outlet, backwash inlet and outlet, and brine inlet, all enclosed in a single casing. Design shall permit the various steps of operation service, backwash, brine flow, and rinse to be accomplished by the rotation of a shaft that drives the mechanism causing the opening and closing of ports in correct sequence.

#### 2.4.1.2 Package-Type Valve

Package-type valve nest shall consist of a pilot valve connected with fittings as may be required to each one of a nest of valves hydraulically or pneumatically operated. Nest of valves shall have connections to hard-water inlet, soft-water outlet, backwash inlet and outlet, and brine inlet.

#### 2.4.2 Operation

Control of softener regeneration shall be semiautomatic initiated manually by a pushbutton in response to an alarm with switch connected to an automatic hardness tester. Use of semiautomatic controls shall permit regeneration to proceed automatically with no manual assistance other than replenishment of salt storage. Controls shall be subject to convenient and accurate manual adjustment and shall be designed for manual operation in the event of failure of the electrical equipment. An interlocking system shall be provided to prevent regeneration of more than one unit at a time.

### 2.5 ELECTRICAL WORK

ON SYSTEM. Manual or automatic control and protective or signal devices required for the operation specified and any control wiring required for controls and devices, shall be provided.

### 2.6 BOLTS, NUTS, AND FASTENERS

All bolts, anchor bolts, nuts, washers, plates, bolt sleeves, and all other types of supports necessary for the installation of the equipment shall be furnished with the equipment and shall be galvanized unless otherwise indicated. Expansion bolts shall have malleable-iron and lead composition elements. Unless otherwise specified, stud, tap, and machine bolts shall be of refined bar iron. All threads shall conform to ASME B1.1. Bolts, anchor bolts, nuts, and washers specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with ASTM A123/A123M or ASTM A153/A153M. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel. Where indicated, specified, or required, anchor bolts shall be provided with square plates at least 4 by 4 by 3/8 inch or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves.

### 2.7 AUXILIARY EQUIPMENT

#### 2.7.1 Water Meter

Each softener shall be provided with a displacement or turbine-type water meter reading in U.S. gallons. Meter shall be equipped with necessary

wiring and an alarm device to give notice when the unit has delivered 362,388/n gallons of water. Meter shall be installed in the soft-water line from the softener unit, and shall be so located as to be readily accessible for reading and setting. Meter contacts shall be infinitely adjustable over the range of the meter to permit setting to suit actual hardness of the water being treated. The purpose of the alarm is to notify that the capacity of the unit is being approached.

#### 2.7.2 Automatic Hardness Tester

A hardness tester for automatically testing the hardness of the water shall be installed in the soft-water line leading from each softener unit. Automatic hardness tester shall be wall mounted and shall be capable of carrying out intermittent tests on the softened water and of giving visual warning that the residual hardness present exceeds a predetermined limit. Tester shall be equipped with necessary wiring and an alarm device to give notice when the hardness of the water delivered by the softener unit exceeds 1.0 mg/l.

#### 2.7.3 Electric Motors

Motors shall be single-phase, suitable for operation on 115-volt, single-phase, 60 cycle, alternating current conforming to NEMA MG 1. Each motor shall be designed for operation in a 40-degree C ambient temperature. Motor controls shall conform to NEMA ICS 1.

#### 2.7.4 Piping

Pipe smaller than 4 inches in diameter, excluding the underdrain and brine collection systems, shall be fabricated from galvanized steel conforming to ASTM A53/A53M with malleable-iron fittings conforming to ASME B16.3. Pipe 4 inches in diameter and larger shall be flanged ductile-iron conforming to AWWA C115/A21.15 with ductile-iron fittings conforming to AWWA C110/A21.10 and AWWA C111/A21.11. Pipe hangers and supports conforming to MSS SP-58 and MSS SP-69 shall be used on all 1-1/2 inch diameter or smaller pipe with runs longer than 7 feet, and on all 2 inch diameter or larger pipe with runs longer than 9 feet. The pipe hanger and supports shall be fabricated from steel and shall be spaced not more than 7 to 9 feet as applicable.

#### 2.7.5 Valves and Unions

Gate valves smaller than 4 inches shall be bronze with screwed ends, conforming to MSS SP-80 and valves 4 inches or larger shall be iron body with flanged ends, conforming to MSS SP-70. Valves shall open counterclockwise, and the operating wheel shall have an arrow, cast in the metal, indicating the direction of opening. Unions shall conform to ASME B16.39.

#### 2.7.6 Gauges and Cocks

Pressure gauges and sampling cocks shall be furnished on each softener unit connected to the hard-water inlet and soft-water outlet to indicate the pressure loss through the softener and its pipe, valve, and fitting assembly, and to sample the hard and soft water. A sampling cock shall also be provided on the brine system which will permit sampling of the dilute brine solution. Gauges shall be precision type with bronze Bourdon tube and phenolic case and an accuracy of plus or minus 1/2 percent conforming to ASME B40.100. Sampling cocks shall be of brass, ground key, lever handle, faucet type.

### 2.7.7 Water and Brine Testing Equipment

A complete water-testing set recommended by the manufacturer shall be provided with the softener. The set shall include complete instructions for conducting tests for hardness in accordance with [AWWA 10084](#). Two Baume hydrometers conforming to [ASTM E 100](#) and [ASTM E 126](#), and calibrated for the range necessary for testing saturated brine solution and three glass cylinders of heat-resistant glass to hold sufficient brine for testing shall also be provided.

### 2.8 FACTORY PAINTING

Factory painting shall conform to manufacturer's standard factory finish for the intended service.

## PART 3 EXECUTION

### 3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions in the field, and advise the COR of any discrepancy before performing the work.

### 3.2 INSTALLATION

#### 3.2.1 Softener and Brine Tanks

Softener and brine tanks shall be anchored to a concrete mat. Anchor brackets, anchor rods or straps shall be provided to hold the tank to the anchors in the mat.

#### 3.2.2 Valves

Install valves as nearly as possible in the position indicated consistent with convenience of operating the hand wheel. Carefully erect and support all valves in their respective position free from all distortion and strain on appurtenances during handling and installation. All material shall be carefully inspected for defects in workmanship and material, and debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced.

#### 3.2.3 Pumps

Pump and motor shall be mounted on a common monoblock. The monoblock shall be anchored to a concrete mat. Anchor brackets, anchor rods, or straps shall be provided to hold the monoblock to the anchors in the mat.

#### 3.2.4 Piping

Install piping to accurate lines and grades and, where possible, parallel to building walls. Where temporary supports are used, they shall be sufficiently rigid to prevent shifting or distortion of the pipe. Provision shall be made for expansion where necessary. All piping shall pitch toward low points, and provision shall be made for draining these low points. A sufficient number of unions or flanges shall be used to allow for the dismantling of all water pipe, valves, and equipment. Installation

of piping including cleaning, cutting, threading and jointing, shall be in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

### 3.3 MANUFACTURER'S SERVICES

#### 3.3.1 Manufacturer's Representative

Provide services by a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment specified. Representative shall supervise the installing, adjusting, and testing of equipment.

#### 3.3.2 Field Training

Conduct training course for operating staff as designated by the COR. The training period, for a total of 20 hours of normal working time, shall start after the system is functionally completed but prior to final acceptance tests. The [field instructions](#) shall cover all of the items contained in the [Operating and Maintenance Instructions](#).

### 3.4 TESTING AND PERFORMANCE

After installation of the water softener, operating tests shall be carried out to assure that the water softener system operates properly. If any deficiencies are revealed during any tests, such deficiencies shall be corrected and the tests reconducted.

#### 3.4.1 Softeners

Run each softener to exhaustion and regenerate it to full capacity in accordance with manufacturer's instructions before test is started. Softener shall be put through a complete cycle of operation at a constant flow rate of approximately  $424/n$  gpm for capacity test. During capacity test, the softened water shall be wasted to the sewer if necessary to maintain the required flow rate. Total grains of equivalent calcium carbonate removed shall be determined by test of the hard water at such intervals as will give a representative calcium carbonate content.

- a. After each run, the unit shall be regenerated using salt brine delivered from the measuring tank in the amount called for by operating instructions. Near the end of the brine rinse and beginning of production of zero soft-water, samples of the water shall be taken every 2.5 minutes, the meter read, and the reading recorded. Samples shall be titrated for chlorides, and zero soft-water production shall be considered to begin when chlorides, as chloride radicals, are not in excess of 20 milligrams per liter above the chloride content of the hard-water. When the required number of [gallons](#) of hard water of specified hardness have been run through the softener, a quart sample shall be taken of the softened water and tested.
- b. Results of the test shall be used in determining the capacity and performance of the softener. A sample of hard-water shall be taken and tested in a similar manner. A complete log of each test run shall be made, giving the following data: date, time or readings, total water softened, and pounds of salt used per regeneration. All samples shall be collected in clean, glass-stoppered bottles. Bottles shall be thoroughly rinsed with water being sampled, and all samples shall be plainly marked for identification.

- c. Supply the salt required for regeneration of the exchange material after each of the above test runs. Under actual operating conditions the exchange material shall not be washed out of the apparatus, the turbidity and color of the soft water shall not exceed the turbidity and color of the hard water, and during any softening run, slugs of dirty or turbid water shall not be delivered regardless of the change of demand rate up to the maximum on the apparatus. During the specified test of the softener, the soft-water sampling cock shall remain open and a stream of softened water shall be run through a rubber hose, discharging at the bottom of a wide mouth, 1 gallon glass jar or bottle set against a white background so that the color and turbidity may be under observation at all times. Amount of salt used for regeneration shall not exceed 1/2 pound per 1,000 grains hardness of equivalent calcium carbonate removed.

#### 3.4.2 Piping

After installation, test all pipelines for watertightness. For these tests furnish testing plugs or caps, all necessary pressure pumps, pipe connections, gauges, other equipment, and all labor required. Test pressures shall be indicated in the process pipe schedule shown. Test of joints of air lines shall be made using a soapy water solution to detect leaks. The obtaining of water, electric power and other utility items as well as the disposal of water drainage are also the responsibilities of Contractor.

#### 3.5 FIELD PAINTING

Equipment which did not receive a factory finish shall be painted as specified in Section 09 90 00 PAINTS AND COATINGS. Factory painted items requiring touching up in the field shall be thoroughly cleaned of all foreign material and shall be primed and top-coated with the manufacturer's standard factory finish.

-- End of Section --

SECTION 33 05 23.13

UTILITY HORIZONTAL DIRECTIONAL DRILLING

Revision 1 - 05/15/2013

PART 1 GENERAL

1.1 SUMMARY

This section covers directional drilling systems, equipment, piping and procedures.

1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

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

29 CFR 1926.652 Safety and Health Regulations for Construction; Subpart P, Excavations; Requirements for Protective Systems

1.3 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Statement of Qualifications and Records or previous similar jobs.

Submit Soil Test Data prior to commencement of drilling/excavation work.

SD-02 Shop Drawings

Record Drawings

SD-03 Product Data

Submit Manufacturer's Catalog Data for the polyethylene pipe.

SD-06 Test Reports

Soil Test Data

SD-07 Certificates

Drill Rod

## SD-08 Manufacturer's Instructions

Material Safety Data Sheets

Manufacturer's Catalog Data

## SD-11 Closeout Submittals

Work Complete Logs of Guided Directional Drill Operations

### 1.4 COMMENCEMENT, DELIVERY, STORAGE, AND HANDLING OF MATERIALS

Provide written documentation of conformance with 180ASTM D1557. Submit a complete list of all drilling fluids, additives, and mixtures to be used along with Material Safety Data Sheets.

Inspect materials delivered to the site for damage. All materials found during inspection or during the progress of work to have cracks, flaws, surface abrasions, or other defects will be rejected. Remove defective materials from the job site.

Disposal of fluids is the responsibility of the Contractor. Dispose of fluids in a manner that is in compliance with all permits and applicable federal, state, and local regulations. The Contractor may dispose of the drilling fluids on approved land owned by the Government subject to written approval from the COR. Spread the drilling slurry over the Government-approved disposal area and plow into the soil.

### 1.5 QUALIFICATIONS

Ensure that Contractor and his field supervisor assigned to this project are experienced in work of this nature and have successfully completed similar projects of similar length, pipe type, pipe size, and soil type using directional drilling in the last three (3) years. As part of the bid submission, submit a description of such project(s) which include, at a minimum, a listing of the location(s), date of project(s), owner, pipe type, size installed, length of installation, type, and manufacturer of equipment used, and other information relevant to the successful completion of the project.

### 1.6 SAFETY

Include in directional drilling equipment machine safety requirements a common grounding system to prevent electrical shock in the event of underground electrical cable strike. Ensure the grounding system connects all pieces of interconnecting machinery; the drill, mud mixing system, drill power unit, drill rod trailer, operators booth, worker grounding mats, and any other interconnected equipment to a common ground. Equip the drill with an "electrical strike" audible and visual warning system that notifies the system operators of an electrical strike.

## PART 2 PRODUCTS

### 2.1 DRILL ROD

Select the appropriate drill rod to be used. Submit certified statement that the drill rod has been inspected and is in satisfactory condition for its intended use.

## 2.2 PRODUCT

Install piping as indicated on the Drawings or as approved by the COR.

## 2.3 DRILLING FLUIDS

Use a high quality bentonite drilling fluid to ensure hole stability, cuttings transport, bit and electronics cooling, and hole lubrication to reduce drag on the drill pipe and the product pipe. Use only fluid with a composition which complies with all federal, state, and local environmental regulations.

Mix the bentonite drilling fluid with potable water (of proper pH) to ensure no contamination is introduced into the soil during the drilling, reaming, or pipe installation process. The Contractor is responsible for any required pH adjustments.

Disposal of the drilling fluids is the responsibility of the Contractor. Conduct disposal in compliance with all relative environmental regulations, right-of-way and work space agreements, and permit requirements.

Collect drilling fluid returns in the entrance pit, exit pit, or spoils recovery pit. Immediately clean up any drilling fluid spills or overflows from these pits.

## PART 3 EXECUTION

### 3.1 DRILL SET-UP AREA

The Contractor is responsible for design and construction of the drill entrance and exit pits.

### 3.2 DRILL ENTRANCE AND EXIT PITS

Drill entrance and exit pits are required. Maintain at minimum size to allow only the minimum amount of drilling fluid storage prior to transfer to mud recycling or processing system or removal from the site.

Do not allow drilling mud to flow freely on the site or around the entrance or exit pits. Remove spilled mud and restore ground to original condition. Provide shore pits in compliance with OSHA Standards, [29 CFR 1926.652](#).

When drilling near wetlands or water courses, provide secondary containment to prevent drilling fluids from entering the wetlands, and secure written approval of secondary containment plan from the COR .

### 3.3 DRILL ENTRANCE AND EXIT ANGLE

Ensure entrance and exit angles and elevation profile maintains adequate cover to reduce risk of drilling fluid breakouts and ground exit occurs as specified herein. Ensure that entrance and exit angles ensure pullback forces do not exceed 5 percent strain on the polyethylene pipe.

### 3.4 PILOT HOLE

The type and size of the pilot string cutting head and the diameter of the

drill pipe is at the Contractor's discretion.

Drill the pilot hole along the path shown on the plan and profile drawings. Pilot hole tolerances are as follows:

- a. Vertical Tolerance: Provide minimum cover below channel bottom as specified on the plans. The Contractor may go deeper if necessary to prevent breakout.
- b. Horizontal Tolerance: plus/minus - 60 inches from the centerline of the product pipe.
- c. Curve Radius: No curve is acceptable with a radius less than 1,000 feet.
- d. Entry Point Location: Make pilot hole entry point within plus/minus - 60 inches of the location shown on the drawings or as directed by the COR in the field.
- e. Exit Point Location: Make the exit point location within plus/minus - 60 inches of the location shown on the drawings or as directed by the COR in the field.
- f. The installed pipeline cover requirements as shown on the drawings or as specified is mandatory.

### 3.5 REAMING

Conduct reaming operations at the Contractor's discretion. Determine the type of back reamer to be utilized by the type of subsurface soil conditions that are encountered during the pilot hole drilling operation. The reamer type is at the Contractor's discretion.

### 3.6 PULL BACK

Fully assemble the entire pipeline to be installed via direction drill prior to commencement of pull back operations.

Support the pipeline during pullback operations in a manner to enable it to move freely and prevent damage. Install the pipeline in one continuous pull.

Minimize torsion stress by using a swivel to connect the pull section to the reaming assembly.

Maximum allowable tensile force imposed on the pull section is not to exceed 90 percent of the pipe manufacturer's safe pull (or tensile) strength. If the pull section is made up of multiple pipe size or materials, the lowest safe pull strength value governs and the maximum allowable tensile force is not to exceed 90 percent of this value.

Minimize external pressure during installation of the pullback section in the reamed hole. Replace damaged pipe resulting from external pressure at no cost to the Government. Buoyancy modification is at the discretion of the Contractor.

### 3.7 CONNECTION OF PRODUCT PIPE TO WATER LINE

After the product pipe has been successfully installed, allow the product pipe to recover for 24 hours prior to connection of the water line. The

Contractor is responsible for ensuring that a sufficient length of the product pipe has been pulled through the hole so that the pull-nose is not pulled back into bore hole due to stretch recovery of the product pipe.

### 3.8 GUIDANCE SYSTEMS

Walkover guidance systems are not acceptable for this project; use a magnetic survey tool locator installed behind the pilot string cutting head and an electric grid (tru-tracker) system for this project.

### 3.9 DOCUMENTATION

Maintain drilling logs that accurately provide drill bit location (both horizontally and vertically) at least every 2 inches along the drill path. In addition, keep logs that record, as a minimum the following, every 15 minutes throughout each drill pass, back ream pass, or pipe installation pass:

- a. Drilling Fluid Pressure
- b. Drilling Fluid Flow Rate
- c. Drill Thrust Pressure
- d. Drill Pullback Pressure
- e. Drill Head Torque

Make all instrumentation, readings, and logs available to the COR at all times during operation.

### 3.10 UTILITY LOCATING AND MARKING

Locate and clearly mark all utilities prior to start of excavation or drilling. The Contractor is responsible for damage to utilities, and repairs for such damages, at no cost to the Government.

### 3.11 CLEANUP AND FINAL CLOSEOUT

Immediately upon completion of work of this section, remove all rubbish and debris from the job site. Remove all construction equipment and implements of service leaving the entire area involved in a neat condition acceptable of the COR .

Immediately clean "blow holes" or "breakouts" of drilling fluid to the surface and return the surface area to its original condition. Dispose of all drilling fluids, soils, and separated materials in compliance with federal, state, and local environmental regulations.

Submit an electronic copy and three hard copies of the record drawings to the COR within five days after completing the pull back. Include in the record drawings a plan, profile, and all information recorded during the progress of the work. Clearly tie the record drawings to the project's survey control. Maintain and submit upon completion signed final work complete logs of guided directional drill operations.

-- End of Section --

## SECTION 40 17 26.00 20

## WELDING PRESSURE PIPING

Revision 1 - 05/15/2013

## PART 1 GENERAL

## 1.1 SUMMARY

This section covers welding of piping and piping system components which will contain fluids under pressure including hydraulic systems.

## 1.2 REFERENCES

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

All material, equipment, and workmanship, specified by the number, symbol or title of a referenced standard shall comply with the latest edition thereof and all amendments and supplements thereto in effect on the date of the Invitation to Bid, except where a particular edition or revision thereof is indicated in the reference.

## AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS A3.0M/A3.0	Standard Welding Terms and Definitions
AWS D1.1/D1.1M	Structural Welding Code - Steel
AWS Z49.1	Safety in Welding and Cutting and Allied Processes

## ASME INTERNATIONAL (ASME)

ASME B31.1	Power Piping
ASME B31.3	Process Piping
ASME BPVC SEC II-C	BPVC Section II-Materials Part C-Specifications for Welding Rods Electrodes and Filler Metals
ASME BPVC SEC IX	BPVC Section IX-Welding and Brazing Qualifications
ASME BPVC SEC V	BPVC Section V-Nondestructive Examination

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

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction

### 1.3 RELATED REQUIREMENTS

Section 23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS applies to this section with the additions and modifications specified herein.

### 1.4 DEFINITIONS

AWS A3.0M/A3.0 and applicable AMSE/ANSI piping documents.

### 1.5 SUBMITTALS

Government approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Welding pressure piping

Welding procedure specifications

#### SD-07 Certificates

Welding procedures qualification

Nondestructive examination (NDE) procedures

Nondestructive examination (NDE) records

NDE personnel certification procedures

ASME Section IX welder certification

Inspector certification

Submit inspector certification and NDE personnel certification for record. See drawings for certification submittal requirements.

#### SD-11 Closeout Submittals

Field Weld Drawings

Weld identifications

Weld Maps

Welding Procedures

Quality Control and Traveler's Records

### 1.6 QUALITY ASSURANCE

#### 1.6.1 Welding Pressure Piping

All pipe welding shall conform fully with the applicable piping code, Show location, length, and type of welds, and indicate postweld heat treatment and nondestructive testing as required.

### 1.6.2 Procedures

Develop and qualify procedures for welding metals included in the work. Do not start welding until welding procedures, welders, and welding operators have been qualified. Perform qualification testing by an approved testing laboratory, or by the Contractor if approved by the COR in accordance with the qualified procedures. Notify the COR at least 24 hours in advance of the time and place of the tests. When practicable, perform the qualification tests at or near the work site. Maintain current records of the test results obtained in welding procedure, welding operator/welder performance qualifications, and [nondestructive examination \(NDE\) procedures](#). These records shall be readily available at the site for examination by the COR. Qualify the procedures for making transition welds between different materials or between plates or pipes of different wall thicknesses. Applicable ASME code requirements for branch connections may be used in lieu of detailed designs. Unless otherwise specified, the choice of welding process shall be the responsibility of the Contractor.

#### 1.6.2.1 Previous Qualifications

Welding procedures, welders, and welding operators previously qualified by test may be accepted for the work without requalification provided that the following conditions are fulfilled:

- a. Copies of welding procedures, procedure qualification test records, and welder and welding operator performance qualification test records are submitted and approved in accordance with the paragraph entitled "Submittals."
- b. Testing was performed by an approved testing laboratory or technical consultant or by the Contractor's approved quality control organization.
- c. The welding procedures, welders, and welding operators were qualified in accordance with [ASME BPVC SEC IX](#) , AR-2 level; and base materials, filler materials, electrodes, equipment, and processes conformed to the applicable requirements of this specification.
- d. The requirements of paragraph entitled "Welder and Welding Operator Performance Qualification" for renewal of qualification were met, and records showing name of employer and period of employment using the process for which qualified are submitted as evidence of conformance.

#### 1.6.2.2 Performance

All pipe welding shall be performed by stamp holder(s) with stamp designation(s) applicable to this work. Steam boiler piping shall be S stamped and boiler external piping shall be PP stamped. B31.3 and non-boiler external B31.1 piping shall be fabricated by an ASME S, PP or U stamp holder under their ASME quality assurance program except for stamping, which is not required. The Contractor shall be responsible for the quality of joint preparation, welding, and examination. Clearly identify and record materials used in the welding operations. The examination and testing defined in this specification are minimum requirements. Provide additional examination and testing as necessary to achieve the quality required.

#### 1.6.3 [Welding Procedures Qualification](#)

Qualification of the welding procedures for each group of materials to be

welded is required as indicated in **ASME BPVC SEC IX**. Record in detail and qualify the "Welding Procedure Specifications" for every welding procedure proposed. Qualification for each welding procedure shall conform to the requirements of ASME Standards and to this specification. The welding procedures shall specify end preparation for welds, including cleaning, alignments, and root openings. Preheat, interpass temperature control, and postheat treatment of welds shall be as required by ASME Piping documents, unless otherwise indicated or specified. Describe the type of backing rings or consumable inserts, if used, and, if they are to be removed, the removal process. Welding procedure qualifications shall be identified individually and referenced on the shop drawings or suitably keyed to the contract drawings.

#### 1.6.4 Welder and Welding Operator Performance Qualification

Qualify each welder and welding operator assigned to work covered by this specification by performance tests using equipment, positions, procedures, base metals, and electrodes or bare filler wires from the same specification, classification, or group number that will be encountered on his assignment. Welders or welding operators who make acceptable procedure qualification tests will be considered performance-qualified for the welding procedure used. Determine performance qualification in accordance with **ASME BPVC SEC IX**, and applicable ASME code as listed on drawings

#### 1.6.5 Renewal of Qualification

Requalification of a welder or welding operator shall be required under one or any combination of the following conditions:

- a. When a welder or welding operator has not used the specific welding process for a period of 3 months. The period may be extended to 6 months if the welder has been employed on another welding process.
- b. There is specific reason to question the welder's ability to make welds that will meet the requirements of the specifications.
- c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract and a qualification test has not been taken within the preceding 12 months. Renewal of qualification under this condition need be made on only a single test joint or pipe of any thickness, position, or material to reestablish qualification for any thickness, position, or material for which the welder or welding operator had qualified previously.

#### 1.6.6 Qualification of Inspection and (NDE) Personnel

Qualification of Inspection and Nondestructive Examination (NDE) Personnel: Qualify inspection and nondestructive examination personnel in accordance with the following requirements:

##### 1.6.6.1 Inspector Certification

Qualify welding inspectors in accordance with **ASME BPVC SEC IX**.

##### 1.6.6.2 NDE Personnel Certification Procedures

Certify NDE personnel and establish a written procedure for the control and administration of NDE personnel training, examination, and certification.

### 1.6.6.3 Welding Procedures and Qualifications

- a. Specifications and Test Results: Submit copies of the welding procedure specifications and procedure qualification test results for each type of welding required. Approval of any procedure does not relieve the Contractor of the responsibility for producing acceptable welds. Submit this information on the forms printed in **ASME BPVC SEC IX** or their equivalent.
- b. Certification: Before assigning welders or welding operators to the work, submit their names, together with certification that each individual is performance qualified as specified. Do not start welding work prior to procedure qualification. The certification shall state the type of welding and positions for which each is qualified, the code and procedure under which each is qualified, date qualified, and the firm and individual certifying the qualification tests.

### 1.6.7 Symbols

Conform to **AWS A2.4**.

#### 1.6.7.1 Weld Identifications

Submit a list of the welders' names and symbol for each welder. To identify welds, submit written records indicating the location of welds made by each welder or welding operator.

### 1.6.8 Safety

Conform to **AWS Z49.1**, **29 CFR 1910**-SUBPART Q, "Welding, Cutting, and Brazing," **29 CFR 1926**-SUBPART J, "Welding and Cutting."

## 1.7 ENVIRONMENTAL

Do not perform welding when the quality of the completed weld could be impaired by the prevailing working or weather conditions. The COR will determine when weather or working conditions are unsuitable for welding.

## 1.8 DELIVERY AND STORAGE

Deliver filler metals, electrodes, fluxes and other welding materials to the site in manufacturers' original packages and store in a dry space until used. Label and design packages properly to give maximum protection from moisture and to assure safe handling.

## PART 2 PRODUCTS

### 2.1 WELDING MATERIALS

Comply with **ASME BPVC SEC II-C** and IX. Welding equipment, electrodes, welding wire, and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator using qualified welding procedures.

## PART 3 EXECUTION

### 3.1 WELDING

Do not deviate from applicable codes, approved procedures and approved shop

drawings without prior written approval from the COR. Materials or components with welds made off the site will not be accepted if the welding does not conform to the requirements of this specification unless otherwise specified. Assign each welder or welding operator an identifying number, letter, or symbol that shall be used to identify his welds. Each welder or welding operator shall apply his mark adjacent to his weld using a permanent metal stamping. For seam welds, place identification marks adjacent to the welds at 3 foot intervals. Confine identification by die stamps or electric etchers to the weld reinforcing crown, preferably in the finished crater.

### 3.2 WELDING OPERATORS

Perform welding in accordance with qualified procedures using qualified welders and welding operators.

### 3.3 SUPPORTS

Welding of hangers, supports, and plates to structural members shall conform to AWS D1.1/D1.1M.

### 3.4 EXAMINATIONS AND TESTS

Visual and nondestructive examinations shall be performed by the Contractor to detect surface and internal discontinuities in completed welds. Employ the services of a qualified commercial inspection or testing laboratory or technical consultant. Visually examine welds. Random NDE testing applies to ASME piping unless specified otherwise. When examination and testing indicates defects in a weld joint, a qualified welder shall repair the weld in accordance with the paragraph entitled "Corrections and Repairs" of this section.

#### 3.4.1 Random NDE Testing

Perform random NDE testing in accordance with applicable ASME piping code as listed on the drawings.

#### 3.4.2 Visual Examination

Visually examine welds as follows:

- a. Before welding -- for compliance with requirements for joint preparation, placement of backing rings or consumable inserts, alignment and fit-up, and cleanliness.
- b. During welding -- for conformance to the qualified welding procedure.
- c. After welding -- for cracks, contour and finish, bead reinforcement, undercutting, overlap, and size of fillet welds.

#### 3.4.3 Nondestructive Examination

NDE shall be in accordance with written procedures. Procedures for radiographic, liquid penetrant, magnetic particle, or ultrasonic tests and methods shall conform to ASME BPVC SEC V. The approved procedure shall be demonstrated to the satisfaction of the COR's QA personnel. In addition to the information required in ASME BPVC SEC V, the written procedures shall include:

- a. Timing of the nondestructive examination in relation to the welding operations.
- b. Safety precautions.

For radiographic testing program for welds, shop welds and field weld shall be considered separate lots for random examination. No less than one weld per welder shall have radiographic testing.

All butt and filler welds must be examined by magnetic particle test method or dye penetrant test method; and radiographic test as specified by applicable code and Table V.

Ultrasonic testing may not be used in lieu of radiographic testing unless approved in writing by the COR. Approval will require, but not be limited to, providing a permanent computer generated digital record of the raw ultrasonic data. A manually completed ultrasonic testing record will not suffice.

#### 3.4.4 Review of Examinations and Tests by the Government

Examinations and tests will conform to paragraphs "Visual Examination" and "Nondestructive Examination" of this section, except that destructive tests may be required also. When destructive tests are made, qualified welders or welding operators shall make repairs using welding procedures which will develop the full strength of the members cut. Welding shall be subject to examination and tests in the mill, shop, and field.

#### 3.5 CORRECTIONS AND REPAIRS

Remove defects and replace welds as specified in ASME Piping Standards, unless otherwise specified. Repair defects discovered between weld passes before additional weld material is deposited. Wherever a defect is removed, and repair by welding is not required, the affected area shall be blended into the surrounding surface eliminating sharp notches, crevices, or corners. After defect removal is complete and before rewelding, reexamine the area by the same test methods which first revealed the defect to ensure that the defect has been eliminated. After rewelding, reexamine the repaired area by the same test methods originally used for that area. For repairs to base material, the minimum examination shall be the same as required for butt welds. Indication of a defect shall be regarded as a defect unless reevaluation by NDE or by surface conditioning shows that no unacceptable indications are present. The use of foreign material to mask, fill in, seal, or disguise welding defects will not be permitted.

TABLE V  
 MANDATORY MINIMUM NONDESTRUCTIVE EXAMINATIONS FOR ASME B31.1 and ASME B31.3  
 PIPING

Weld Type	Temperature Above 350 degrees F	All Others
Buttwelds (Girth and Longitudinal)	RT for over NPS 2 and thicknesses over 3/4 inch  MT or PT for all sizes and thicknesses 3/4 inch or less (see Note 8 for random RT)	MT or PT for all sizes and thicknesses (see Note 8 for random RT)
Welded Branch Connections (Size indicated is Branch Size)	RT for branch pipes over NPS 4 and thickness over 3/4 inch  MT or PT for all sizes and thicknesses 3/4 inch or less (see Note 8 for random RT)	MT or PT for all sizes and thicknesses (see Note 8 for random RT)
Fillet, Socket Welds	MT or PT for all sizes and thicknesses	MT or PT for all sizes and thicknesses

NOTES:

1. Thickness refers to pressure boundary wall thickness (such as pipe wall, fitting wall, or nozzle wall thickness).
2. All welds must be given a visual examination in addition to type of specific nondestructive examination specified.
3. NPS-Nominal Pipe Size.
4. RT-Radiographic examination; MT-magnetic particle examination; PT-liquid penetrant examination.
5. RT of branch welds shall be performed before any nonintegral reinforcing material is applied.
6. The thickness of buttwelds is defined as the thicker of the two abutting ends after end preparation.
7. Temperatures and pressures shown are design.
8. In addition, provide 5 percent random RT for each lot of shop and field welds, and for each welder. Progressive sampling for examination rules per ASME B31.3, paragraph 341.3.4 shall apply.
9. For nondestructive examination, procedures, and requirements of the pressure retaining component and for acceptance criteria, refer to the standards listed in applicable code of construction or the manufacturing specifications.

-- End of Section --