NAVFAC MIDLANT, Public Works Department, Maine

eProjects No: 1364311

SPECIFICATIONS

Final Submission

DD#2 VA Class Propulsor Enclosure

At the

Portsmouth Naval Shipyard

PREPARED BY:

Colby Company Engineering, LLC
47A York Street
Portland, ME 04101

Construction Contract No: N40085-XX-X-XXXX
AE Contract No: N40085-14-D-0021

REQUEST FOR PROPOSAL PREPARED BY:

Architectural:	Don Dyer, RA	Electrical:	Ben Townsend, PE
Civil:	N/A	Fire Protection:	N/A
Structural:	Brian Beaulieu, PE	Environmental:	N/A
Mechanical:	Allen Saucier, PE	Estimating:	N/A

Amin Bahrour, PE
Approved By: Signature: Date

Ian Bodwell, PE
Design Manager: Signature: Date

PROJECT TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 15 LIST OF DRAWINGS
00 41 00 BID SCHEDULES

DIVISION 01 - GENERAL REQUIREMENTS

01 11 00 SUMMARY OF WORK
01 14 00.00 22 WORK RESTRICTIONS (PWD ME)
01 20 00.00 20 PRICE AND PAYMENT PROCEDURES (PWD ME)
01 30 00 ADMINISTRATIVE REQUIREMENTS (PWD ME)
01 32 17.00 25 NETWORK ANALYSIS SCHEDULES (NAS) (PWD ME)
01 33 00 SUBMITTAL PROCEDURES
01 35 26.00 22 GOVERNMENTAL SAFETY REQUIREMENTS (PWD ME)
01 42 00 SOURCES FOR REFERENCE PUBLICATIONS
01 45 00.00 20 QUALITY CONTROL (PWD ME)
01 50 00.00 22 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS (PWD ME)
01 57 19.00 22 TEMPORARY ENVIRONMENTAL CONTROLS - PORTSMOUTH NAVAL SHIPYARD (PWD ME)
01 74 19.00 22 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT (PWD ME)
01 78 00.00 22 CLOSEOUT SUBMITTALS (PWD ME)
01 78 23 OPERATION AND MAINTENANCE DATA
01 91 13 GENERAL COMMISSIONING REQUIREMENTS (PWD ME)

DIVISION 05 - METALS

05 12 00 STRUCTURAL STEEL
05 21 19 OPEN WEB STEEL JOIST FRAMING
05 30 00 STEEL DECKS
05 50 13 MISCELLANEOUS METAL FABRICATIONS
05 51 00 METAL STAIRS
05 51 33 METAL LADDERS
05 52 00 METAL RAILINGS
05 59 10 RETRACTABLE ROOF

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 42 63 FABRICATED WALL PANEL ASSEMBLIES
07 60 00 FLASHING AND SHEET METAL

DIVISION 08 - OPENINGS

08 11 13 STEEL DOORS AND FRAMES
08 33 23 OVERHEAD COILING DOORS - (EXTERIOR MOUNTED)
08 34 16.10 STEEL SLIDING HANGAR DOORS
08 34 16.20 VERTICAL LIFT FABRIC DOORS
08 71 00 DOOR HARDWARE

DIVISION 09 - FINISHES

09 97 13.26 COATING OF STEEL WATERFRONT STRUCTURES

DIVISION 13 - SPECIAL CONSTRUCTION

13 34 21 TEMPORARY ROLLING ROOF ENCLOSURE

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING

23 05 15 COMMON PIPING FOR HVAC
23 31 13.00 40 METAL DUCTS

DIVISION 26 - ELECTRICAL

26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS
26 20 00 INTERIOR DISTRIBUTION SYSTEM
26 29 23 VARIABLE FREQUENCY DRIVE SYSTEMS UNDER 600 VOLTS
26 51 00 INTERIOR LIGHTING

DIVISION 40 - PROCESS INTEGRATION

40 95 00 ROOF CONTROL

-- End of Project Table of Contents --

SECTION TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

DOCUMENT 00 01 15

LIST OF DRAWINGS

02/11

PART 1 GENERAL

1.1 SUMMARY
1.2 CONTRACT DRAWINGS
1.3 SUPPLEMENTARY INFORMATION

-- End of Section Table of Contents --

DOCUMENT 00 01 15

LIST OF DRAWINGS
02/11

PART 1 GENERAL

1.1 SUMMARY

This section lists the drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings, Maps and Specifications."

1.2 CONTRACT DRAWINGS

Contract drawings are as follows:

NOTE: THIS WILL BE UPDATED FOR THE FINAL SUBMISSION.

PAGE No.	SHEET NO.	SUBMISSION TITLE
1	G-001	COVER SHEET
2	G-101	GENERAL CONDITIONS PLAN
3	G-102	PROPULSOR STORAGE PLAN
4	G-103	DIAGRAMMATIC SITE PLAN
5	A-001	ARCHITECTURAL LEGEND AND NOTES
6	A-101	ARCHITECTURAL FLOOR PLAN LEVEL 1
7	A-102	ARCHITECTURAL FLOOR PLAN LEVEL 2
8	A-103	ARCHITECTURAL FLOOR PLAN LEVEL 3
9	A-104	ARCHITECTURAL FLOOR PLAN LEVEL 4
10	A-105	ARCHITECTURAL FLOOR PLAN LEVEL 5
11	A-106	ARCHITECTURAL PLAN AT BOTTOM OF ROOF
12	A-107	ARCHITECTURAL PLAN AT TOP OF ROOF
13	A-112	ARCHITECTURAL FLOOR PLAN - AFT TOWER LEVEL 2
14	A-113	ARCHITECTURAL FLOOR PLAN - AFT TOWER LEVEL 3
15	A-114	ARCHITECTURAL FLOOR PLAN - AFT TOWER LEVEL 4
16	A-121	AFT AREA PLAN AT LEVEL 1 (BASE)

17	A-122	AFT AREA PLAN AT LEVEL 2 (MIDDLE)
18	A-123	AFT AREA PLAN AT LEVEL 3 (UPPER)
19	A-124	AFT AREA PLAN AT LEVEL 4 (UPPER)
20	A-125	AFT AREA PLAN AT ROOF
21	A-126	AFT AREA PLAN AT ROOF AND SCAFFOLDING
22	A-201	ARCHITECTURAL NORTH ELEVATION
23	A-202	ARCHITECTURAL EAST AND WEST ELEVATIONS
24	A-203	ARCHITECTURAL SOUTH ELEVATION
25	A-211	ARCHITECTURAL SOUTH ELEVATION AFT TOWER
26	A-221	AFT AREA ELEVATION - SCAFFOLDING
27	A-222	AFT AREA END ELEVATION
28	A-223	AFT AREA FRONT ELEVATION
29	A-301	ARCHITECTURAL BUILDING SECTION
30	A-302	ARCHITECTURAL BUILDING SECTION AT STAIRS
31	A-321	AFT AREA SECTION AT STAIRS
32	A-322	AFT AREA SECTION AT SAFE DECK
33	A-401	SLIDING DOOR PARTIAL ELEVATION AND DETAILS
34	A-501	ARCHITECTURAL SECTIONS AND DETAILS
35	A-601	DOOR SCHEDULE AND DETAILS
36	S-001	GENERAL AND STRUCTURAL STEEL NOTES
37	S-100	EXISTING STAIR MODIFICATION PLAN
38	S-101	COLUMN BASE PLAN
39	S-102	FRAMING PLAN LEVEL 2
40	S-103	FRAMING PLAN LEVEL 3
41	S-104	FRAMING PLAN LEVEL 4
42	S-105	FRAMING PLAN LEVEL 5
43	S-106	FRAMING PLAN LOW ROOF

44	S-107	FRAMING PLAN ROOF
45	S-108	FRAMING PLAN MOVABLE ROOF CLOSED
46	S-109	FRAMING PLAN MOVABLE ROOF OPEN
47	S-111	FRAMING PLAN - HLT JACKING LEVEL
48	S-112	AFT TOWER FRAMING PLAN - LEVEL 2
49	S-113	AFT TOWER FRAMING PLAN LEVEL 3
50	S-114	AFT TOWER FRAMING PLAN LEVEL 4
51	S-201	FRAMING ELEVATION-NORTH
52	S-202	FRAMING ELEVATIONS-EAST AND WEST
53	S-203	FRAMING ELEVATION -SOUTH
54	S-204	INTERIOR FRAMING ELEVATIONS AT 2 LINE & 4 LINE
55	S-211	FRAMING ELEVATIONS-NORTH, SOUTH, EAST, AND WEST
56	S-401	PARTIAL FRAMING PLAN LEVEL 5
57	S-501	STRUCTURAL SECTIONS AND DETAILS
58	S-502	STRUCTURAL SECTIONS AND DETAILS
59	S-503	STRUCTURAL SECTIONS AND DETAILS
60	S-504	STRUCTURAL SECTIONS AND DETAILS
61	S-505	MOVABLE ROOF SECTIONS AND DETAILS
62	S-506	STRUCTURAL SECTIONS AND DETAILS
63	S-507	DROP DOWN PLANS AND SECTIONS
64	S-508	STAIR SECTIONS
65	S-901	SUGGESTED RIGGING & LIFTING PLAN
66	S-902	SUGGESTED ROOF RIGGING AND LIFTING PLAN
67	S-903	SUGGESTED AFT TOWER RIGGING AND LIFTING PLAN
68	M-001	MECHANICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES
69	M-101	LEVEL 1 MECHANICAL PLAN
70	M-102	LEVEL 2 MECHANICAL PLAN

71	M-103	LEVEL 3 MECHANICAL PLAN
72	M-104	LEVEL 4 MECHANICAL PLAN
73	M-105	LEVEL 5 MECHANICAL PLAN
74	M-106	BOTTOM OF ROOF MECHANICAL PLAN
75	M-501	MECHANICAL DETAILS
76	M-502	MECHANICAL DETAILS
77	M-503	CONTROL NETWORK SCHEMATIC
78	M-504	CONTROL PANEL DETAILS
79	M-601	MECHANICAL SCHEDULES
80	E-001	ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES
81	EP-101	LEVEL 1 POWER PLAN
82	EP-102	LEVEL 2 POWER PLAN
83	EP-103	LEVEL 3 POWER PLAN
84	EP-104	LEVEL 4 POWER PLAN
85	EP-105	LEVEL 5 POWER PLAN
86	EL-101	LEVEL 1 LIGHTING PLAN
87	EL-102	LEVEL 2 LIGHTING PLAN
88	EL-103	LEVEL 3 LIGHTING PLAN
89	EL-104	LEVEL 4 LIGHTING PLAN
90	EL-105	LEVEL 5 LIGHTING PLAN
91	E-201	ELECTRICAL ELEVATION
92	E-501	ELECTRICAL DIAGRAMS
93	E-601	ELECTRICAL SCHEDULES

1.3 SUPPLEMENTARY INFORMATION

These supplementary drawings may not be a part of the contract but are included with the drawings for information.

-- End of Document --

SECTION TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

DOCUMENT 00 41 00

BID SCHEDULES

01/07

PART 1 GENERAL

1.1 BASIS OF BIDS
1.1.1 Bid Items

-- End of Section Table of Contents --

DOCUMENT 00 41 00

BID SCHEDULES
01/07

PART 1 GENERAL

1.1 BASIS OF BIDS

1.1.1 Bid Items

This contract will be solicited with bid items and unit prices required for specifically selected work. A description of the bid items and schedule of the unit price work is contained in Standard Form 1442, "Solicitation, Offer and Award." See Contract Clauses, "FAR 52.212-11, Variation in Estimated Quantity" and "FAR 52.236-16, Quantity Surveys."

Bid Items with Unit Prices Form

(i) Basis of Bid for Items shall be the Total Amount for the Item, but not including the work indicated or specified to be provided under any other Bid Item.

Item	Description	Estimated Quantity	Unit	Unit Price	Amount
0001	General Conditions : All work associated with the Division 1 specifications, including, but not limited to mobilization, documentation, and shipment/barging of units to PNSY.	1	LS	$	$
0002	Concrete: All work associated with concrete for the project as indicated in the drawings and specs.	1	LS	$	$
0003	Metals: All work associated with metals for the project as indicated in the drawings and specs. Sleeves for removable railings (Bid Option #0002) as well as railing layout and detailing is included in this base bid line item.	1	LS	$	$
0004	Thermal and Moisture Protection: All work associated with thermal and moisture protection as indicated in the drawings and specs.	1	LS	$	$

Bid Items with Unit Prices Form					
0005	Openings: All work associated with openings as indicated in the drawings and specs.	1	LS	$	$
0006	Finishes: All work associated with finishes as indicated in the drawings and specs.	1	LS	$	$
0007	Equipment/Movable Roof: All work associated with equipment and the movable roof as indicated in the drawings and specs.	1	LS	$	$
0008	Mechanical: All work associated with mechanical systems as indicated in the drawings and specs.	1	LS	$	$
0009	Electrical: All work associated with electrical systems as indicated in the drawings and specs.	1	LS	$	$
Total Amount for Base Bid Item 0001 through Base Bid Item 0009:					$
Bid Options:					
Item	Description	Estimated Quantity	Unit	Unit Price	Amount

Bid Items with Unit Prices Form					
0001	Aft Work Area Enclosure: All work associated with the Aft Work Area Enclosure as indicated in the drawings and specs. Drawings include A-121 through A-126, A-221 through A-223, and A-321 through A-322.	1	LS	$	$
0002	Removable Railings: All work associated with providing/fabricating the removable railings included in the drawings and specifications.	1	LS	$	$
0003	On-Site Construction: All work associated with fabrication and construction performed on site at the Portsmouth Naval Shipyard. An area, exact location to be determined, will be provided for the Contractor's use. The area available can be assumed to be 100' x 100' located outside the CIA.	1	LS	$	$

Bid Items with Unit Prices Form					
0004	All work associated with reducing the contract completion duration by 60 calendar days from 365 calendar days to 305 calendar days. All other elements of the project scope and requirements are unaffected with the duration reduction.	1	LS	$	$
Total Amount for Bid Option 0001 through 0004:					

-- End of Document --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 11 00

SUMMARY OF WORK

08/11

PART 1 GENERAL

1.1 SUBMITTALS
1.2 WORK COVERED BY CONTRACT DOCUMENTS
1.2.1 Project Description
1.2.2 Location
1.3 WORK RESCHEDULING
1.4 PROJECT ENVIRONMENTAL GOALS
1.5 OCCUPANCY OF PREMISES
1.6 EXISTING WORK
1.7 GOVERNMENT-INSTALLED WORK
1.8 SPECIAL INSPECTIONS

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 11 00

SUMMARY OF WORK
08/11

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aft Area Enclosure Scaffolding; G

SD-03 Product Data

Aft Area Enclosure Scaffolding; G

SD-07 Certificates

DD#2 Fitup Test; G
Movable Roof Test; G
Load Test of Padeyes; G

SD-10 Operation and Maintenance Data

Aft Area Enclosure Scaffolding; G

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

The intent of the project is to construct a portable enclosure for use at Dry Dock #2 at the Portsmouth Naval Shipyard. The enclosure will be located at the caisson end of the dock and utilized to support Virginia Class propuslor repair work.

The general work components are included:

1) Aft Tower

2) Starboard Propulsor Enclosure

3) Port Propulsor Enclosure

4) Propulsor Roof Enclosure including Movable Roof System

5) Aft Area Enclosure (Bid Option)

The starboard and port enclosures are to be contained within the limits of the roof enclosure and will be located around the propulsor of the submarine.

The aft tower will be located on the south of the propulsor enclosure to enclose the back aft section of the dock for shaft work and transporter operations.

The aft area enclosure provides a weather protected covering over the work area between the propulsor and caisson. A manual roof system is provided for lifting materials/equipment in and out of this work area.

All components of the enclosures shall be portable/modular with the capability to relocate and install at mutiple locations around the yard in a timely fashion.

1.2.2 Location

The work shall be located at the Portsmouth Naval Shipyard in Kittery, ME, as indicated on the drawings.

Due to the limited space available at the shipyard, the contractor shall construct the enclosures off-site and transport on-site. The contractor will have full responsibility for shipping and handling from off-site work area to the shipyard. The contractor shall not be allowed the use of any government owned cranes nor will the government perform any handling operations for the contractor throughout the project duration.

1.3 WORK RESCHEDULING

Not Applicable.

1.4 PROJECT ENVIRONMENTAL GOALS

Contractor shall distribute copies of the Environmental Goals to each subcontractor and the Contracting Officer. 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.

1.5 OCCUPANCY OF PREMISES

The site will be occupied during performance of work under this Contract.

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

1.6 EXISTING WORK

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

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

1.7 GOVERNMENT-INSTALLED WORK

Not Applicable

1.8 SPECIAL INSPECTIONS

The government, at their leisure, shall be allowed to perform inspections while the project is being constructed on government property and the Contractor's property.

In addition to the inspection requirements specifially indicated in the specifications package, the government requires inspections for each of the following milestones outlined below.

The Contractor shall provide the government with a 21 day advanced notice for each milestone inspection. These milestone inspections shall be incoporated in the overall project schedule.

Special Inspections:

DD#2 Fitup Test
DD#2 Fitup Test: The Contractor shall demonstrate and perform a complete fitup of the entire assembly prior to shipment of the units to PNSY. The demonstration shall include all trades and will include the aft area enclsoure.

Movable Roof Test
Movable Roof Test: The Contractor shall provide a demonstration of the complete movable roof assembly prior to shipment of the unit to PNSY. This demonstration shall include all motors/controls in addition to interfaces/seals at the movable roof to the fixed enclosure. The demonstration shall include an inspection by the Government.

Load Test of Padeyes
Speical Test 3: The Contractor shall perform load testing of padeyes in the presence of Government Witnesseses. The testing of padeyes shall be performed in accordance with the Portsmouth Naval Shipyard Lifting and Handling Manual, attached to this specification.

PART 2 PRODUCTS

Aft Area Enclosure Scaffolding: The contractor shall provide a system as required on the drawings consisting of Excel scaffolding. No other products or manufacturers will be accepted. The Contractor shall provide shop drawings, product data, O&M information, and a fitup test demonstrating the complete system installation.

PART 3 EXECUTION

Not used.

Attachments: Portsmouth Naval Shipyard Lifting and Handling Manual

-- End of Section --

CH 11 DATE 26 FEB 2015

LIFTING AND HANDLING MANUAL

PORTSMOUTH NAVAL SHIPYARD
PORTSMOUTH, NEW HAMPSHIRE

THIS CHAPTER, IN ITS ENTIRETY, IS PNS LOCAL REQUIREMENTS ONLY

VOLUME III – CHAPTER 4

PADEYES/INTEGRAL LIFTING ATTACHMENTS, DESIGN, TESTING, AND INSPECTION

TABLE OF CONTENTS PAGE

1. PURPOSE 1
2. SCOPE 1
3. RESPONSIBILITIES 1
   3.1 Cognizant Technical Codes 1
   3.2 Facilities Engineering Branch 1
   3.3 Lifting and Handling Department 1
4. PROCEDURE 2
   4.1 An Integral Lifting Attachment Consists of a Lift Point that is Permanently Attached to, or Part of, the Item 2
   4.2 Vendor (OEM) Supplied Equipment 2
   4.3 Design Criteria for Padeyes/Integral Lifting Attachments 2
   4.4 Minimum Requirements for Inspection/Testing of Lifting Attachments 5
   4.5 Periodic Inspection of Integral Lifting Attachments 5
   4.6 Marking 5
5. APPENDIX 6
   5.1 General Specification for Design & Installation of Integral Lifting Attachments (Sample) 7

THIS PAGE INTENTIONALLY LEFT BLANK

LIFTING AND HANDLING MANUAL

VOLUME III – CHAPTER 4

PADEYES/INTEGRAL LIFTING ATTACHMENTS, DESIGN, TESTING, AND INSPECTION

1. PURPOSE. This chapter provides the minimum requirements for the design, installation and inspection of shipyard padeyes/integral lifting attachments.

2. SCOPE

2.1 The policies and procedures of this chapter apply to temporary and permanent padeyes/integral lifting attachments manufactured for use by naval shipyard personnel.

2.2 Temporary and permanent shipboard padeyes are not within the scope of this chapter (refer to UIPI 6111-451 for temporary padeye procedures).

2.3 Bolt-on padeyes or lifting attachments are not within the scope of this chapter. These items are considered below the hook lifting devices per NAVFAC P-307 (see American Society of Engineers [ASME] BTH-1 standard).

3. RESPONSIBILITIES

3.1 Cognizant Technical Codes

3.1.1 Design cognizant shipyard padeyes/integral lifting attachments.

3.1.2 Provide instructions in a Technical Work Document (TWD) for the installation, marking, inspection, testing, and removal of shipyard installed integral lifting attachments, as necessary.

3.1.3 Procure items with padeyes/integral lifting attachments that meet the requirements of this chapter, using the sample specification found in Appendix 5.1.

3.2 Facilities Engineering Branch. Develop or concur on instructions that install integral lifting attachments on the structure of shipyard buildings to ensure that the structure is capable of supporting intended loads.

3.3 Lifting and Handling Department

3.3.1 Technical Division, Code 710. When necessary, provide guidance to technical codes designing, installing, and removing integral lifting attachments and approve deviations from the requirements of this chapter.

3.3.2 Rigging and Equipment Operations Division, Code 740. Inspect, test, mark, and certify padeyes/integral lifting attachments per the requirements of this chapter.

4. PROCEDURE

4.1 An integral lifting attachment consists of a lift point that is permanently attached to, or part of, the item, such as:

4.1.1 A padeye

4.1.2 A hole cut in the structure

4.1.3 A threaded hole

4.2 Vendor (OEM) Supplied Equipment

4.2.1 Integral lifting attachments provided with commercially available vendor supplied equipment (i.e., off-the-shelf item) do not require testing, certification, or marking. These integral lifting attachments require a pre-use visual inspection. Notify Code 710 of any deficiencies.

4.2.2 Other items that are contracted by the shipyard for construction by a contractor must be built per the design requirements of this chapter. See Appendix 5.1 for integral lifting attachment contract specifications.

4.3 Design Criteria for Padeyes/Integral Lifting Attachments

4.3.1 The technical code will normally specify the use of a standard padeye per Production Engineering Drawing 589.

4.3.2 If non-standard padeyes/integral lifting attachments are used, the cognizant technical code must provide the design.

4.3.3 For integral attachments made of non-metallic materials, Code 710 approval is required.

4.3.4 Use a minimum 5 to 1 factor of safety based on material ultimate strength, or 3:1 factor of safety based on material yield strength, whichever is more conservative.

4.3.5 Other design considerations include:

4.3.5.1 Shear in base material, weld, and padeye hole.

4.3.5.2 Tensile at minimum cross section.

4.3.5.3 Bearing of padeye hole based on minimum pin diameter.

4.3.5.4 Worst case bending in padeye and weld area.

4.3.5.5 Threaded hole depth shall be a minimum of 1 ½ times the thread diameter for steel or 2 times the thread diameter for aluminum. For threaded holes in other materials or depths less than those specified, Code 710 approval is required.

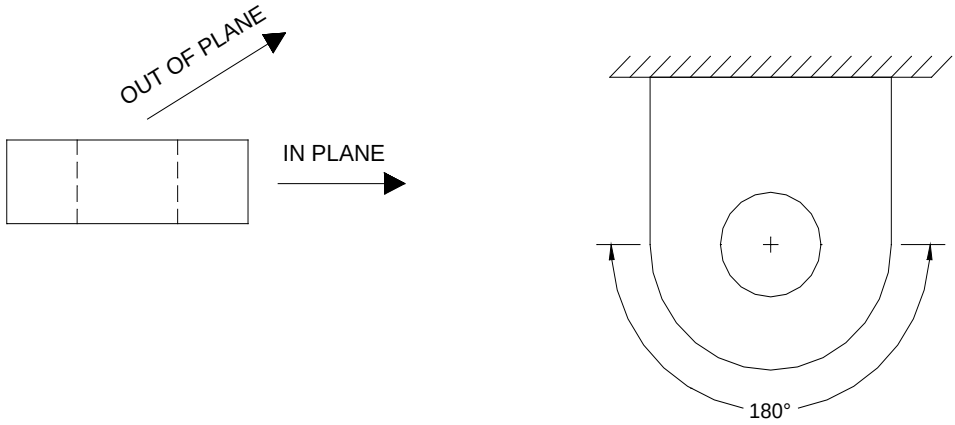
4.3.5.6 If a block of material is attached via a weldment specifically for adding a threaded hole, treat the block as a padeye.

4.3.5.7 Padeyes must be able to withstand a 180° loading in the plane of the eye, at minimum. If the padeyes are intended to be loaded beyond this range, the padeyes must be analyzed for that loading. See Figure 1.

4.3.5.8 Padeyes must be able to withstand a 5-degree sideload out of the plane of the eye, at minimum. If padeyes must be used more than 5 degrees out of plane, they must be designed to withstand this type of loading. See Figure 1.

4.3.5.9 Attach integral lifting attachments to the base material following established weld procedures.

Figure 1: Padeye Loading



4.3.5.10 Locate integral lifting attachments over stiffeners or structure capable of supporting the load without overstressing the base material.

4.3.5.11 Size to provide margin between actual load to be lifted and integral attachment Working Load Limit (WLL) [e.g., do not provide a 2,000 lb. WLL to lift a 2,000 lb. item]. See Table 1 for minimum margin requirements. Additional margins should be considered for integral attachments subjected to situations with the potential for increased loading (e.g., binding or hang-ups due to seals or tight tolerances, additional weight in buildings/enclosures, or fluid filled voids, etc.).

Table 1: Minimum required margins between WLL and actual load weight

Total Item Weight (lb.)	WLL of Integral Attachment[1]
Less than 1,000	+200 lb.[2] OR 200% (whichever is greater)
1,000 – 10,000	150%
10,001 – 100,000	125%[3]
Greater than 100,000	115%

NOTES: 1. Percentages shown are of expected load exerted on the integral attachment.
2. Total Item Weight + 200 lb.
3. Percentage may be reduced to 115 percent IF the weight of the item is known (not estimated) AND the potential for binding or added weight does not exist.

4.3.6 Design lifting attachments for worst-case loading (i.e., sling angle considered). On a structure with 2, 3 or 4 lifting attachments, each lifting attachment must be capable of supporting half the load. For items having more than 4 lifting attachments, Code 710 approval is required.

4.3.7 If an item is symmetrical, with 3 lifting attachments equally spaced about the CG (120 degrees apart), the attachment points carry the load equally.

4.3.8 Rigging Configuration. Consider the rigging configuration that will be used. For example:

4.3.8.1 Padeyes/integral lifting attachments aligned in the direction of pull.

4.3.8.2 Sling angle, sling angle stress, rigging equipment interference (e.g., worst-case sling angle 60 degrees from vertical).

4.3.8.3 Center of gravity (CG) location.

4.3.8.4 Available shipyard rigging equipment (standard commercially available equipment, unless specialty rigging equipment is to be provided by the contractor).

4.3.8.5 Location of the lifting attachments (above the CG to ensure a stable lifting arrangement).

4.3.8.6 Minimize the need for spreader bars, or special lifting attachments (e.g., angle padeyes, in plane, towards the central lifting point).

4.3.9 Design lifting attachments to accept standard rigging hardware or handling equipment (ASME B30.26 equipment). Attachment points on components that are part of a larger system (e.g., multiple components that form an enclosure) shall be sized such that one set of standard rigging equipment can be used to lift all components of the system.

4.3.10 If the integral attachment cannot meet the design considerations of this chapter, use limitations must be clearly marked (e.g., maximum sling angle 45 degrees, vertical pull only, etc.).

4.4 Minimum Requirements for Inspection/Testing of Integral Lifting Attachments

4.4.1 Integral lifting attachments with a WLL of 6,000 lbs. or less (100 lbs. or less for Special Purpose Service [SPS]) only require a formal (certified) acceptance visual inspection. Visually inspect padeye and padeye weld for completeness, cracks, deformation, or any other damage.

4.4.2 Integral lifting attachments attached via weldments (padeyes, threaded blocks, etc.) with a WLL greater than 6,000 lbs. (greater than 100 lbs. for SPS) require a proof test to 200% of WLL and post load test visual inspection per paragraph 4.4.1.

4.4.3 General Purpose Service (GPS) threaded holes and holes cut in structures not attached via weldments do not require a proof test, only a formal (certified) acceptance visual inspection. Visually inspect threads for any obvious defects and for suitable depth to allow thread engagement or hole for damage and/or deformation. Install eyebolt/hoist ring and ensure that it threads in without binding, and fits snugly.

4.4.4 SPS threaded holes require proof testing. See paragraph 4.4.2 for test load requirements.

4.4.5 The tolerance of test loads shall be +5/-0% of the nominal test load. If certified test weights are not used, then the equipment used shall be in current calibration and the minimum accuracy shall be 2% of full scale or 10% of the actual applied load, whichever is less. Unless otherwise specified, this results in a useable range on the dial face/readout of 20% to 100% of full scale. For example, a 20,000 lb. dynamometer or jack assembly will have a useable range of 4,000 lbs. to 20,000 lbs.

4.4.6 Test duration shall be no less than 2 minutes for GPS lifting attachments and no less than 10 minutes for SPS lifting attachments.

4.4.7 SPS padeyes/integral lifting attachments require Non-Destructive Testing (NDT) inspections. See Volume III Chapter 5 for requirements.

4.4.8 Any additional inspection attributes will be specified on a TWD.

4.5 Periodic (Certified) Inspection of Integral Lifting Attachments

4.5.1 None unless specified otherwise in a TWD for GPS.

4.5.2 See Volume III Chapter 5 for SPS requirements.

4.6 Marking

4.6.1 Mark integral lifting attachments with WLL and inspection or test date. Mark with due date if periodic inspection/testing is applicable.

4.6.2 Any integral lifting attachment used for lifting items 100 lbs. or less may be used with Code 740 supervisor (or above) approval; marking is not required.

5. APPENDIX

5.1 General Specification for Design & Installation of ILA's (Sample). This appendix is intended to be used as a template by technical codes who are procuring items that have integral lifting attachments. The use of the sample specification as part of a procurement contract ensures that all requirements of this chapter are met.

5.1 GENERAL SPECIFICATION FOR DESIGN & INSTALLATION OF ILA'S (Sample)

5.1.1 PURPOSE. The lifting and handling specifications herein shall control the design, documentation and certification of general purpose service equipment being manufactured for PNSY. This specification is derived primarily from the requirements of the Lifting & Handling Manual for integral lifting attachments.

5.1.2 DEFINITIONS

5.1.2.1 Integral Lifting Attachment (ILA): A lifting point that is permanently attached to or part of the Unit being lifted such as a padeye, lifting eye, integrally mounted ring, threaded hole, or a hole in a structural element, etc.

5.1.2.2 Unit: The item or load being lifted to which ILAs are permanently mounted.

5.1.2.3 PNSY: Portsmouth Naval Shipyard

5.1.2.4 Contractor: The entity fabricating the Unit.

5.1.2.5 Designer: The qualified engineer or entity designing the Unit including the ILA installation to the Unit.

5.1.2.6 Base of Support: That portion of the Unit's structure that contacts the ground and supports the Unit when the Unit is on the ground (i.e., footprint).

5.1.2.7 Qualified Engineer: An engineer who is competent in the practice of structural and/or mechanical engineering as a result of education and experience.

5.1.2.8 Working Load Limit (WLL): The maximum allowable load that can be applied to a designed structural component without infringing on its safety factors defined herein, aka: design capacity.

5.1.3 GENERAL

5.1.3.1 Any deviations to this specification that pertain to ILAs or other crane lifting and handling related functions must be approved in writing by PNSY, with concurrence from the PNSY Lifting and Handling Department Technical Division (Code 710).

5.1.3.2 A lifting plan that includes a diagram for lifting the Unit shall be provided by the Designer/Contractor and must be approved by PNSY prior to fabrication of the unit. This plan shall include the Unit's weight (empty weight and full weight, if applicable), center of gravity location, ILA details and the locations of each ILA. The plan shall also include any basic lifting restrictions and any special allowances, including, but not limited to, minimum sling length, minimum sling capacity, or allowance for out-of-plane pulling on padeyes (if applicable), etc.

5.1.3.3 Lifting plans and ILA designs require written approval from PNSY Lifting and Handling Department Technical Division (C710) for any Unit which weighs 96,000 lbs. or greater.

5.1.3.4 Threaded holes intended to be used as ILAs shall not be lubricated and shall be protected by removable threaded plugs or similar when not in use.

5.1.3.5 The padeye is the preferred ILA and it should be used when possible, provided it can be incorporated into the design of the Unit in a practical way. Examples of padeyes and the preferred rigging configuration using padeyes are provided in Figures 1 and 2.

5.1.3.6 Material used for the purposes of manufacturing an ILA shall be steel or aluminum.

Figure 1: Typical Padeyes

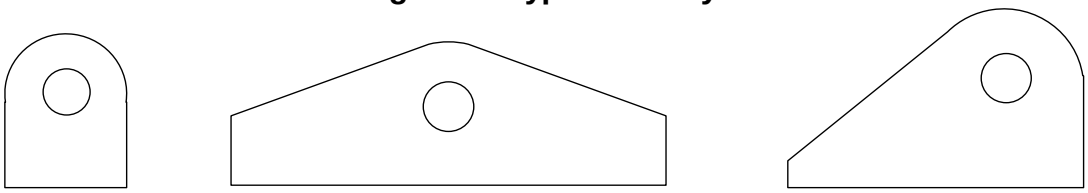
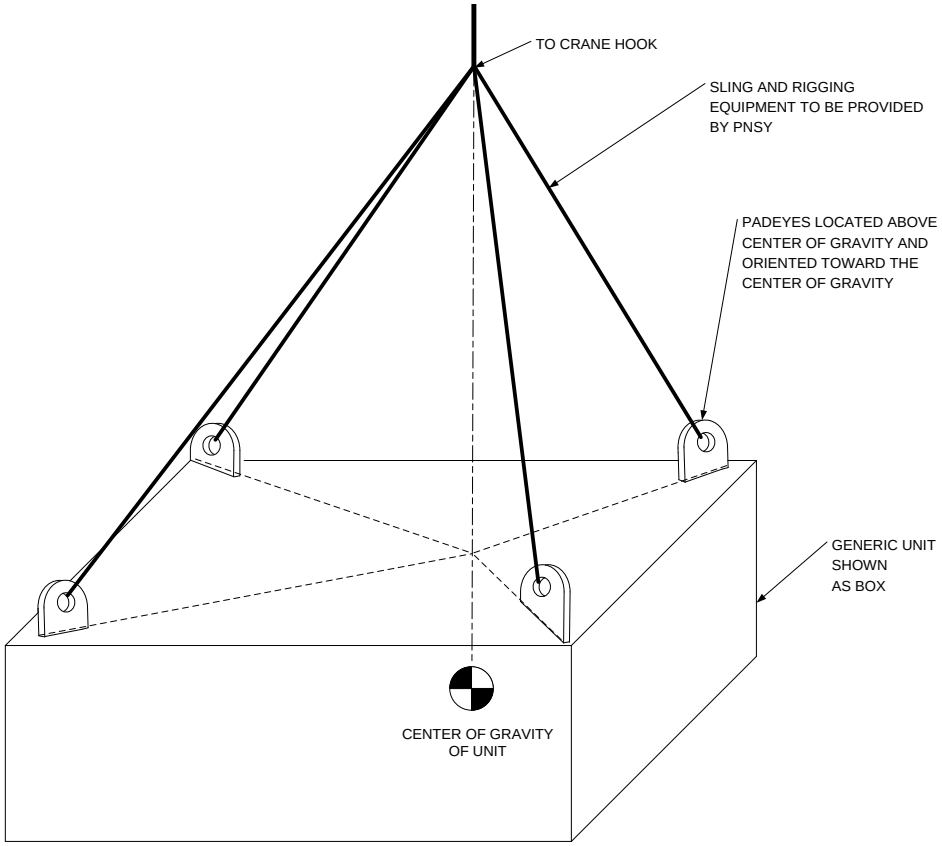


Figure 2: Standard (Preferred) Lifting Configuration



5.1.4 MARKING

5.1.4.1 The total weight (empty and full, if applicable) of the Unit shall be permanently marked on each side of the Unit with 2-inch high lettering (or larger) with a contrasting color from the Unit (yellow unacceptable).

5.1.4.2 Each ILA shall be permanently identified with its Working Load Limit (WLL), [e.g., WLL=10,000 LB] by stamping, etching or by placing on a permanently attached label plate.

5.1.4.3 Any ILA receiving a load test shall also be permanently marked with the test date (i.e., by stamping, etching or by placing on a permanently attached label plate).

5.1.4.4 The lifting plan with diagram shall be displayed on an 8in x 10in minimum sized placard attached to the unit.

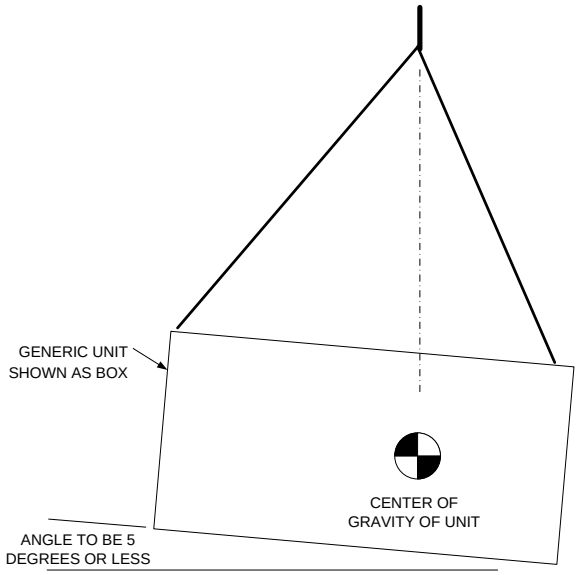
5.1.5 PLACEMENT

5.1.5.1 ILAs shall not be located below the Unit's center of gravity or in any condition which could result in an unstable lift.

5.1.5.2 It must be possible to lift the Unit by crane using no more than 4 and no less than 2 ILAs.

5.1.5.3 The ILAs shall be located on the Unit so that the Unit can be lifted in a level fashion. The Unit's Base of Support must not form an angle greater than 5 degrees from horizontal when lifted. See Figure 3.

Figure 3: Maximum Allowable Tilt in Lift



5.1.5.4 The ILAs must be situated/located on the Unit so that the item can be lifted using standard rigging equipment such as shackles, swivel hoist rings and slings. Lifting arrangements which require strongbacks, spreader beams, non–standard (metric) threads, eyebolts, or other unique lifting gear in order to be lifted by crane must be approved in writing per paragraph 5.1.3.1.

5.1.5.5 ILAs must be designed to allow for the proper connection of standard rigging gear as provided by ASME B30.26. ILAs shall not be solely designed for direct connection into a hook without written approval per paragraph 5.1.3.1.

5.1.5.6 ILAs must be oriented so that the worst case forces that result when the Unit is lifted do not cause stresses that exceed the allowable stresses provided herein. Specifically, if padyes are used as ILAs they should be oriented on the Unit so that the resulting direction of pull exerted by the rigging equipment lies within 5 degrees (10 degrees included angle) of the plane formed by the padeye plate. If the designed or intended use of padeye requires the applied load to be directed out of plane with the padeye plate (greater than 5 degrees), the padeye must be designed so that such loading (under worst case conditions) does not result in stresses which exceed the allowable stresses described herein (see ILA Design section) and marking/documentation provided to indicate that out of plane loading is acceptable.

5.1.6 ILA DESIGN

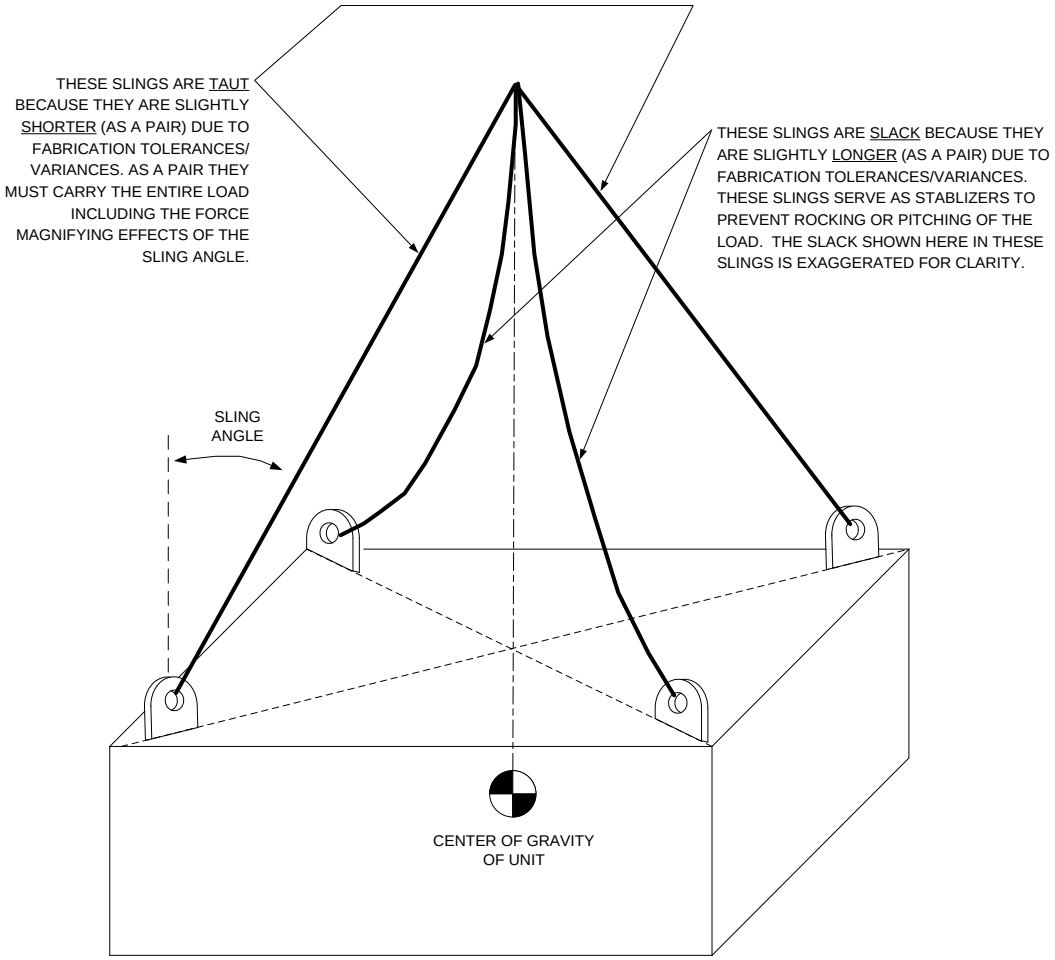
5.1.6.1 The Designer of the ILAs shall be a Qualified Engineer.

5.1.6.2 All calculations shall be reviewed by a Qualified Engineer other than the Designer.

5.1.6.3 Design lifting attachments to accept standard rigging hardware or handling equipment (ASME B30.26 equipment). Attachment points on components that are part of a larger system (e.g., multiple components which form an enclosure) shall be sized such that one set of standard rigging equipment can be used to lift all components of the system.

5.1.6.4 The WLL of each ILA shall be sized based on the worst case loading that it may be required to resist, based on the location of a ILA relative to the Unit's center of gravity and the other ILAs, on the maximum angle from vertical formed by the lifting slings, and on the ability for the connected rigging gear to equalize between structurally redundant connections (when 4 slings are used to lift the Unit). In arrangements where 4 ILAs are used, each ILA must be designed so that either pair of diagonally opposed ILAs are capable of supporting the entire load of the Unit (with the force magnifying effects of sling angles being considered) without infringing on the safety factors stipulated herein. See Figure 4.

Figure 4: Worst Case Loading When 4 ILAs are Used



5.1.6.5 The WLL of each ILA shall be sized to provide a margin between the WLL and the actual (expected) loading. See Table 1 for minimum margin requirements. Additional margins should be considered for integral attachments subjected to situations with the potential for increased loading (e.g., binding or hang-ups due to seals of tight tolerances, additional weight in buildings/enclosures or fluid filled voids, etc.).

Table 1: **Minimum Required Margins Between WLL And Actual Load Weight**

Total Item Weight (lb.)	WLL of Integral Attachment[1]
Less than 1,000	+200 lb.[2] OR 200% (whichever is greater)
1,000 – 10,000	150%
10,001 – 100,000	125%[3]
Greater than 100,000	115%

NOTES:
1. Percentages shown are of expected load exerted on the integral attachment.
2. Total Item Weight + 200 lb.
3. Percentage may be reduced to 115 percent IF the weight of the item is known (not estimated) AND the potential for binding or added weight does not exist.

5.1.6.6 ILAs shall be designed using an allowable stress which is the lower of the two values resulting from a safety factor of 3.0 with respect to yield strength (F_Y) or 5.0 with respect to ultimate strength of the material (F_U). A factor of 0.6 shall be applied to any allowable shear stress. For example, the allowable stress for double shear plane tear-out of a padeye hole would be either $(0.6)(F_Y)/3.0$ or $(0.6)(F_U)/5.0$, whichever is more restrictive.

5.1.6.7 Any welds shall be designed per American Welding Society (AWS) Specification D1.1 with the following exceptions: Welds shall be designed with a safety factor of 5.0 with respect to the ultimate strength of the weld metal or base metal as applicable. A factor of 0.6 shall be applied to any allowable shear stress. For example, the allowable stress of a fillet weld shall be $(0.6)(F_u)/5.0$, since fillet welds are generally assumed to fail in shear, where F_u is the ultimate strength of the weld filler material or the base metal as applicable. The allowable stresses provided here apply only to the failure modes, which directly relate to the ILA and the connecting weld joint. These allowable stresses do not apply to any adjacent surrounding structure; however, such surrounding structure may be required to resist a one-time applied load equal to 210 percent of the WLL of the ILA in the cases where 200 percent load tests are required as provided herein.

5.1.6.8 Any ILAs (excluding threaded or through-holes installed directly into a structural element of the Unit) are to be connected to the Unit using a welded joint which meets the requirements of paragraph 5.1.6.7. Welded joints connecting ILAs to the Unit structure shall be designed using a continuous weld around the exterior of the joint (as a minimum) in order to prevent the entry of moisture into any interior un-bonded portion of the joint that may exist. Bolted joints that directly connect an ILA to the Unit are not permitted. This does not apply to bolted joints placed elsewhere in the structure of the Unit that do not serve as a structural connection directly between the ILA and the Unit.

5.1.6.9 Threaded holes used as ILAs may only be installed on Units which are primarily intended for in-door use. Where threaded holes are used as the ILA (e.g., for use with swivel hoist rings or eyebolts), the length of threaded holes must be at least 1.5 times the nominal thread diameter for steel, or 2.0 times the nominal thread diameter for aluminum.

5.1.6.9.1 Only standard imperial (non-metric) UNC - Class 2B threads may be used as threaded holes intended for use as ILAs.

5.1.6.9.2 Threaded holes intended for use as an ILA must be located to allow for 360-degree rotation and 180-degree pivot of a standard swivel hoist ring bail.

5.1.6.9.3 Threaded holes intended for use as an ILA must be located on the structural element so that the seating surface of a mounted swivel hoist ring does not overhang the edge of the structural element and the mating face of the structural element is flat to match that of a standard swivel hoist ring.

5.1.6.10 All surfaces of an ILA which could be subjected to moisture, corrosion, or wear due to movement must be accessible for inspection without disassembly.

5.1.6.11 Any ILA attached via a weldment with a capacity greater than 6000 lbs. must receive a one-time 200 percent load test, which shall be administered by the contractor prior to delivery of the Unit.

5.1.6.12 The applied test load shall be 200 percent of the design capacity (WLL) with a tolerance of +5%/-0% of the test load. In other words, the applied test load shall be a minimum of 200 percent and a maximum of 210 percent of the design capacity (WLL) of the ILA. The test load shall be maintained for a period no less than 2 minutes.

5.1.6.13 The test load can be applied to each ILA individually or to multiple ILAs at once provided it can be shown through basic mechanics that each tested ILA received the proper test load value. Applied test load should mimic the as-used/as designed configuration to the maximum extent practicable, with alternate loading configurations approved by the designer.

5.1.6.14 Written documentation shall be provided by the contractor, which documents the completion of this test for each ILA listing the ILAs tested, actual applied load, test date, 2-minute test duration and signature of person performing the test.

THIS PAGE INTENTIONALLY LEFT BLANK

5. GENERAL SPECIFICATION FOR DESIGN AND INSTALLATION OF ILA'S

1. PURPOSE

1.1. The lifting and handling specifications herein shall control the design, documentation and certification of general purpose service equipment being manufactured for PNSY. This specification is derived primarily from the requirements of the Lifting & Handling Manual for integral lifting attachments.

2. DEFINITIONS

2.1. Integral Lifting Attachment (ILA): A lifting point that is permanently attached to or part of the Unit being lifted such as a padeye, lifting eye, integrally mounted ring, threaded hole, or a hole in a structural element, etc.

2.2. Unit: The item or load being lifted to which ILAs are permanently mounted.

2.3. PNSY: Portsmouth Naval Shipyard

2.4. Contractor: The entity fabricating the Unit.

2.5. Designer: The qualified engineer or entity designing the Unit including the ILA installation to the Unit.

2.6. Base of Support: That portion of the Unit's structure which contacts the ground and supports the Unit when the Unit is on the ground (i.e. footprint).

2.7. Qualified Engineer: An engineer who is competent in the practice of structural and/or mechanical engineering as a result of education and experience.

2.8. Working Load Limit (WLL): The maximum allowable load that can be applied to a designed structural component without infringing on its safety factors defined herein, aka: design capacity.

3. GENERAL

3.1. Any deviations to this specification which pertain to ILAs or other crane lifting and handling related functions must be approved in writing by PNSY, with concurrence from the PNSY Lifting and Handling Department Technical Division (Code 710).

3.2. A lifting plan which includes a diagram for lifting the Unit shall be provided by the Designer/Contractor and must be approved by PNSY prior to fabrication of the unit. This plan shall include the Unit's weight (empty weight and full weight, if applicable), center of gravity location, ILA details and the locations of each ILA. The plan shall also include any basic lifting restrictions and any special allowances, including but not limited to, minimum sling length, minimum sling capacity, or allowance for out-of-plane pulling on padeyes (if applicable), etc.

3.3. Lifting plans and ILA designs require written approval from PNSY Lifting and Handling Department Technical Division (C710) for any Unit which weighs 96,000 lbs. or greater.

3.4. Threaded holes intended to be used as ILAs shall not be lubricated and shall be protected by removable threaded plugs or similar when not in use.

3.5. The padeye is the preferred ILA and it should be used when possible, provided it can be incorporated into the design of the Unit in a practical way. Examples of padeyes and the preferred rigging configuration using padeyes are provided in Figures 1 and 2 below.

3.6. Material used for the purposes of manufacturing an ILA shall be steel or aluminum.

Figure 1: Typical Padeyes

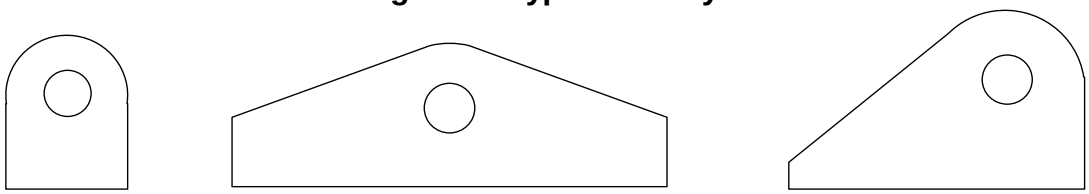
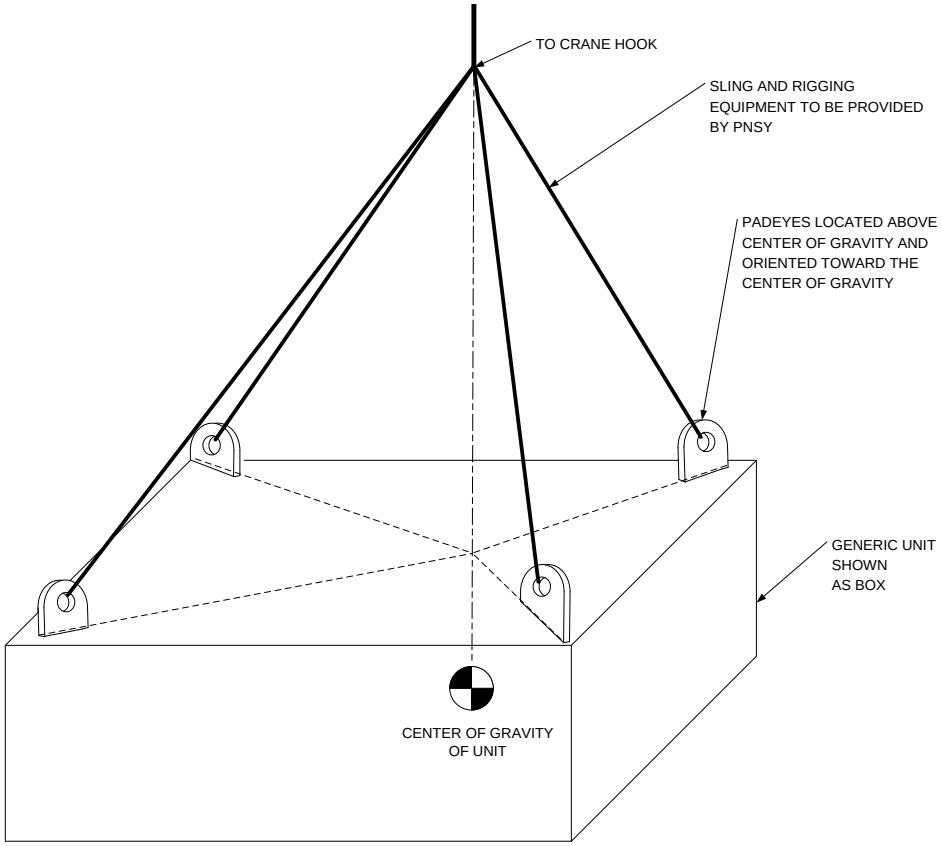


Figure 2: Standard (Preferred) Lifting Configuration



4. <u>MARKING</u>

4.1. The total weight (empty and full, if applicable) of the Unit shall be permanently marked on each side of the Unit with 2-inch high lettering (or larger) with a contrasting color from the Unit (yellow unacceptable).

4.2. Each ILA shall be permanently identified with its Working Load Limit (WLL), [e.g., WLL=10,000 LB] by stamping, etching or by placing on an abutting metal label plate.

4.3. Any ILA receiving a load test shall be also be permanently marked with the test date (i.e., by stamping, etching or by placing on a permanently attached label plate).

4.4. The lifting plan with diagram shall be displayed on an 8in x 10in minimum sized placard attached to the unit.

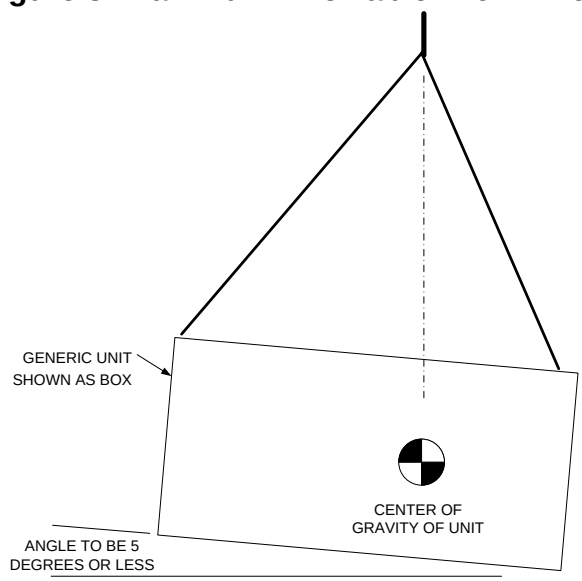
5. PLACEMENT

5.1. ILAs shall not be located below the Unit's center of gravity or in any condition which could result in an unstable lift.

5.2. It must be possible to lift the Unit by crane using no more than 4 and no less than 2 ILAs.

5.3. The ILAs shall be located on the Unit so that the Unit can be lifted in a level fashion. The Unit's Base of Support must not form an angle greater than 5 degrees from horizontal when lifted. See Figure 3 below.

Figure 3: Maximum Allowable Tilt in Lift



5.4. The ILAs must be situated/located on the Unit so that the item can be lifted using standard rigging equipment such as shackles, swivel hoist rings and slings. Lifting arrangements which require strongbacks, spreader beams, non–standard (metric) threads, eyebolts, or other unique lifting gear in order to be lifted by crane must be approved in writing per paragraph 2.1.

5.5. ILAs must be designed to allow for the proper connection of standard rigging gear as provided by ASME B30.26. ILAs shall not be solely designed for direct connection into a hook without written approval per paragraph 2.1.

5.6. ILAs must be oriented so that the worst case forces that result when the Unit is lifted do not cause stresses that exceed the allowable stresses provided herein. Specifically, if padyes are used as ILAs they should be oriented on the Unit so that the resulting direction of pull exerted by the rigging equipment lies within 5 degrees (10 degrees included angle) of the plane formed by the padeye plate. If the designed or

intended use of padeye requires the applied load to be directed out of plane with the padeye plate (greater than 5 degrees), the padeye must be designed so that such loading (under worst case conditions) does not result in stresses which exceed the allowable stresses described herein (see ILA Design section) and marking/documentation provided to indicate that out of plane loading is acceptable.

6. ILA DESIGN

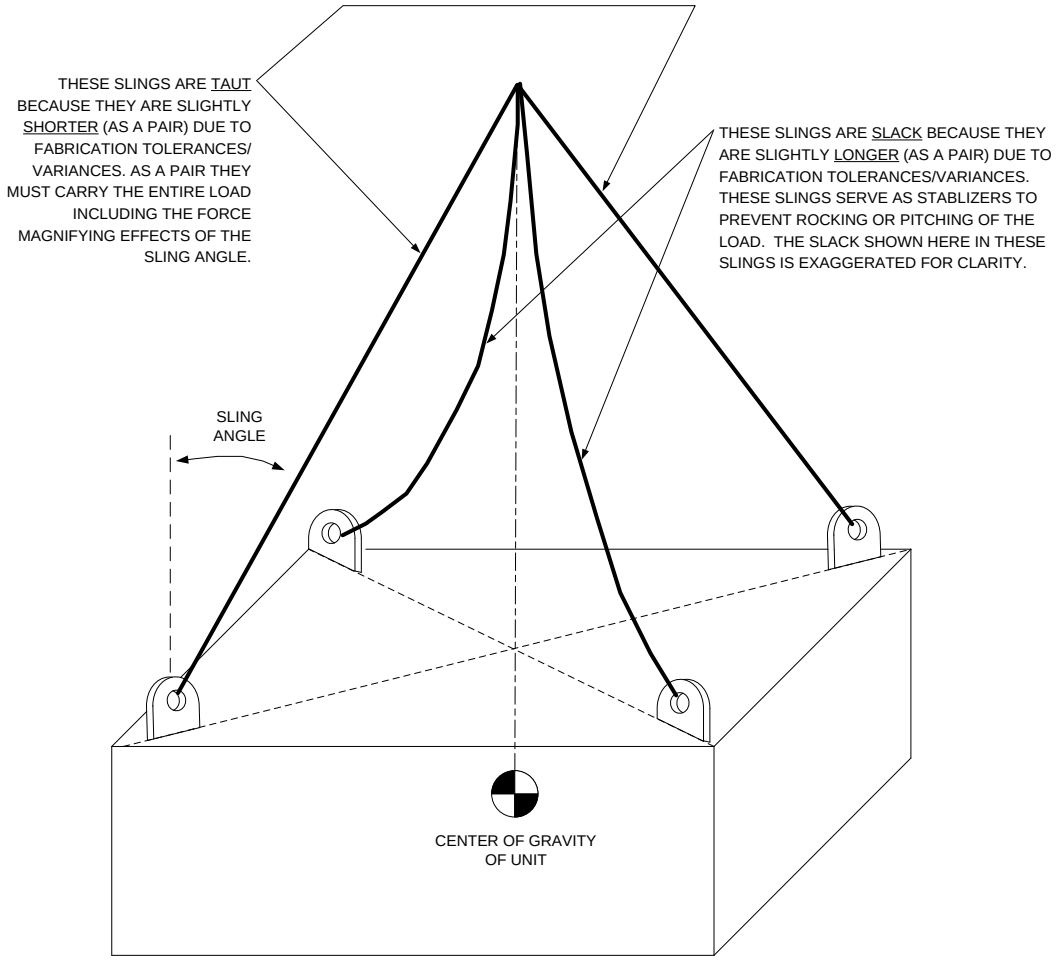
6.1. The Designer of the ILAs shall be a Qualified Engineer.

6.2. All calculations shall be reviewed by a Qualified Engineer other than the Designer.

6.3. Design lifting attachments to accept standard rigging hardware or handling equipment (ASME B30.26 equipment). Attachment points on components that are part of a larger system (e.g., multiple components which form an enclosure) shall be sized such that one set of standard rigging equipment can be used to lift all components of the system.

6.4. The WLL of each ILA shall be sized based on the worst case loading that it may be required to resist, based on the location of a ILA relative to the Unit's center of gravity and the other ILAs, on the maximum angle from vertical formed by the lifting slings, and on the ability for the connected rigging gear to equalize between structurally redundant connections (when 4 slings are used to lift the Unit). In arrangements where 4 ILAs are used, each ILA must be designed so that either pair of diagonally opposed ILAs are capable of supporting the entire load of the Unit (with the force magnifying effects of sling angles being considered) without infringing on the safety factors stipulated herein. See Figure 4 below.

Figure 4: Worst Case Loading When 4 ILAs are Used



6.5. The WLL of each ILA shall be sized to provide a margin between the WLL and the actual (expected) loading. See Table 1 for minimum margin requirements. Additional margins should be considered for integral attachments subjected to situations with the potential for increased loading (e.g., binding or hang-ups due to seals of tight tolerances, additional weight in buildings/enclosures or fluid filled voids, etc.).

Table 1: **Minimum Required Margins Between WLL And Actual Load Weight**

Total Item Weight (lb.)	WLL of Integral Attachment[1]
Less than 1,000	+200 lb.[2] OR 200% (whichever is greater)
1,000 – 10,000	150%
10,001 – 100,000	125%[3]
Greater than 100,000	115%

Notes: 1. Percentages shown are of expected load exerted on the integral attachment.
2. Total Item Weight + 200 lb.
3. Percentage may be reduced to 115 percent IF the weight of the item is known (not estimated) AND the potential for binding or added weight does not exist.

6.6. ILAs shall be designed using an allowable stress which is the lower of the two values resulting from a safety factor of 3.0 with respect to yield strength (F_Y) or 5.0 with respect to ultimate strength of the material (F_U). A factor of 0.6 shall be applied to any allowable shear stress. For example, the allowable stress for double shear plane tear-out of a padeye hole would be either $(0.6)(F_Y)/3.0$ or $(0.6)(F_U)/5.0$, whichever is more restrictive.

6.6.1. Any welds shall be designed per American Welding Society (AWS) Specification D1.1 with the following exceptions: Welds shall be designed with a safety factor of 5.0 with respect to the ultimate strength of the weld metal or base metal as applicable. A factor of 0.6 shall be applied to any allowable shear stress. For example, the allowable stress of a fillet weld shall be $(0.6)(F_u)/5.0$, since fillet welds are generally assumed to fail in shear, where F_u is the ultimate strength of the weld filler material or the base metal as applicable. The allowable stresses provided here apply only to the failure modes which directly relate to the ILA and the connecting weld joint. These allowable stresses do not apply to any adjacent surrounding structure, however, such surrounding structure may be required to resist a one-time applied load equal to 210 percent of the WLL of the ILA in the cases where 200 percent load tests are required as provided herein.

6.7. Any ILAs (excluding threaded or through-holes installed directly into a structural element of the Unit) are to be connected to the Unit using a welded joint which meets the requirements of paragraph 5.3 above. Welded joints connecting ILAs to the Unit structure shall be designed using a continuous weld around the exterior of the joint (as a minimum) in order to prevent the entry of moisture into any interior un-bonded portion of the joint that may exist. Bolted joints that directly connect an ILA to the Unit are not permitted. This does not apply to bolted joints placed elsewhere in the structure of the Unit that do not serve as a structural connection directly between the ILA and the Unit.

6.8. Threaded holes used as ILAs may only be installed on Units which are primarily intended for in-door use. Where threaded holes are used as the ILA (e.g., for use with swivel hoist rings or eyebolts), the length of threaded holes must be at least 1.5 times the nominal thread diameter for steel, or 2.0 times the nominal thread diameter for aluminum.

6.8.1. Only standard imperial (non-metric) UNC - Class 2B threads may be used as threaded holes intended for use as ILAs.

6.8.2. Threaded holes intended for use as an ILA must be located to allow for 360-degree rotation and 180-degree pivot of a standard swivel hoist ring bail.

6.8.3. Threaded holes intended for use as an ILA must be located on the structural element so that the seating surface of a mounted swivel hoist ring does not overhang the edge of the structural element and the mating face of the structural element is flat to match that of a standard swivel hoist ring.

6.9. All surfaces of an ILA which could be subjected to moisture, corrosion, or wear due to movement must be accessible for inspection without disassembly.

6.10. Any ILA attached via a weldment with a capacity greater than 6000 lbs. must receive a one-time 200 percent load test, which shall be administered by the Contractor prior to delivery of the Unit.

6.10.1. The applied test load shall be 200 percent of the design capacity (WLL) with a tolerance of +5%/-0% of the <u>test load</u>. In other words, the applied test load shall be a minimum of 200 percent and a maximum of 210 percent of the <u>design capacity (WLL)</u> of the ILA. The test load shall be maintained for a period no less than two minutes.

6.10.2. The test load can be applied to each ILA individually or to multiple ILAs at once provided it can be shown through basic mechanics that each tested ILA received the proper test load value. Applied test load should mimic the as-used/as designed configuration to the maximum extent practicable, with alternate loading configurations approved by the Designer.

6.10.3. Written documentation shall be provided by the Contractor which documents the completion of this test for each ILA listing the ILAs tested, actual applied load, test date, two minute test duration and signature of person performing the test.

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 14 00.00 22

WORK RESTRICTIONS (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 SPECIAL SCHEDULING REQUIREMENTS (PNSY)
1.4 CONTRACTOR ACCESS AND USE OF PREMISES (PNSY)
1.5 CONTRACTOR ACCESS AND USE OF PREMISES (AOR)
1.5.1 Subcontractors and Personnel Contacts
1.5.2 Vehicle List
1.5.3 Identification Badges and Installation Access
1.6 STATION REGULATIONS
1.6.1 Radiological
1.6.1.1 Radiological Indoctrination (PNSY)
1.6.1.2 Yellow Materials (PNSY)
1.6.1.3 Smoke Detectors (PNSY)
1.6.1.4 Radioactive Sources (PNSY)
1.6.2 Laser Control
1.6.3 Energy Conservation
1.6.4 Fire Prevention (PNSY)
1.6.5 Identification and Control of Seamed (Welded) Pipe and Tubing (PNSY)
1.6.6 Pesticide and Herbicide Control
1.6.7 Smoking Policy
1.6.8 Portal Crane Clearance Zone (PNSY)
1.7 WORKING HOURS (PNSY)
1.7.1 Work Outside Regular Hours (PNSY)
1.8 WORK IN OCCUPIED BUILDING(S)
1.9 UTILITY CUTOVERS AND INTERRUPTIONS
1.10 CRANE AND RAILROAD TRACKAGE INTERRUPTIONS (PNSY)
1.11 WORK ADJACENT TO CIA SECURITY FENCING (PNSY)
1.12 WORK ADJACENT TO AN OVERHEAD CRANE
1.13 FIRE PROTECTION
1.13.1 Compliance (PNSY)
1.13.2 Fired Kettles
1.13.3 Notification of Fire (PNSY)
1.14 SECURITY REQUIREMENTS
1.14.1 General
1.14.2 Access to the Portsmouth Naval Shipyard (PNSY)
1.14.3 Application and Issue of Security Badges
1.14.4 Application and Issue of Vehicle Passes (PNSY)
1.14.5 Application and Issue of Vehicle Passes for Entry into Portsmouth Naval Shipyard's Controlled Industrial Areas (CIA)
1.14.6 Application and Issue of Crane Passes (PNSY)
1.14.7 Return of Badges and Vehicle Passes
1.14.8 Contractor Security Responsibilities (PNSY)
1.15 MARINE ACTIVITIES (PNSY)

1.16 CONSTRUCTION VEHICLES

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 14 00.00 22

WORK RESTRICTIONS (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2009) Standard for Safeguarding Construction, Alteration, and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

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

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel; G

Vehicle List; G

1.3 SPECIAL SCHEDULING REQUIREMENTS (PNSY)

a. The facility will remain in operation during the entire construction period. The Contractor shall conduct his/her operations so as to cause the least possible interference with normal operations of the Portsmouth Naval Shipyard.

b. Permission to interrupt any Portsmouth Naval Shipyard roads, railroads, and/or utility services shall be submitted to the Contracting Officer in writing a minimum of 15 calendar days prior to the desired date of interruption.

c. The project is located in and adjacent to security islands. The Contractor is not allowed in these areas without continuous Government escorts. Areas are as indicated on the Plans.

d. The project is located in and adjacent to special requirement areas that require special Shipyard coordination and briefing. The Contractor shall coordinate work in these areas with Shipyard

personnel. Areas are as indicated on the Plans.

e. Coordinate the work with the sequencing/phasing requirements outlined in Section 01 11 00 SUMMARY OF WORK.

1.4 CONTRACTOR ACCESS AND USE OF PREMISES (PNSY)

Deliveries to Portsmouth Naval Shipyard are limited to 13 foot widths. Notify the Contracting Officer 30 days in advance for any wide loads exceeding 13 feet. The Contractor shall contact the Contracting Officer to determine if there are other access limitations at the Portsmouth Naval Shipyard.

Ensure that Contractor personnel employed on the Portsmouth Naval Shipyard become familiar with and obey Portsmouth Naval Shipyard regulations. Keep within the limits of the work and avenues of ingress and egress. Do not enter restricted areas unless required to do so and until cleared for such entry.

All Contractors' equipment shall be conspicuously marked for identification.

1.5 CONTRACTOR ACCESS AND USE OF PREMISES (AOR)

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations. Keep within the limits of the work and avenues of ingress and egress. Do not enter restricted areas unless required to do so and until cleared for such entry.

All Contractors' equipment shall be conspicuously marked for identification.

1.5.1 Subcontractors and Personnel Contacts

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

1.5.2 Vehicle List

Submit an original list of vehicles to be utilized at the work site with the following information for each vehicle:

a. Make

b. Year

c. Model

d. License number

e. Registered owner

f. Current Base pass expiration date.

1.5.3 Identification Badges and Installation Access

a. Application for and use of badges will be as directed. Obtain access

to the installation by participating in the Navy Commercial Access Control System (NCACS) or by obtaining passes each day from the Station's Pass and Identification/Security Office.

Costs for obtaining passes through the NCACS are the responsibility of the Contractor. One-day passes, issued through the Station's Pass and Identification Office, will be furnished without charge. Furnish a completed EMPLOYMENT ELIGIBILITY VERIFICATION (DHS FORM I-9) form for all personnel requesting badges. This form is available at http://www.uscis.gov/portal/site/uscis by searching or selecting Employment Verification Form I-9. Report any instances of lost or stolen badges to the Contracting Officer immediately.

b. NCACS Program: NCACS is a voluntary program in which Contractor personnel who enroll, and are approved, are subsequently granted access to the installation for a period up to one year, or the length of the contract, whichever is less, and are not required to obtain a new pass from the Station Pass and Identification Office for each visit. The Government performs background screening and credentialing. Throughout the year the Contractor employee must continue to meet background screening standards. Periodic background screenings are conducted to verify continued NCACS participation and installation access privileges. Under the NCACS program, no commercial vehicle inspection is required, other than for Random Anti-Terrorism Measures (RAM) or in the case of an elevation of Force Protection Conditions (FPCON).

Information on costs and requirements to participate and enroll in NCACS is available at:

http://www.rapidgate.com/vendors/how-to-enroll

Or by calling 1-877-727-4342. Contractors should be aware that the costs incurred to obtain NCACS credentials, or costs related to any means of access to a Navy Installation, are not reimbursable. Any time invested, or price(s) paid, for obtaining NCACS credentials will not be compensated in any way or approved as a direct cost of any contract with the Department of the Navy.

c. All Contractors who possess a Navy Commercial Access Control (NCAC) System Card are required to present a second form of valid ID to the Gate Sentry, if requested, upon arrival at the Installation's Entrance Gate.

All Contractor personnel without CAC cards will need two forms of approved identification for access to the Installation.

See Attachment A for the list of acceptable identification documents.

d. One-Day Passes: Participation in the NCACS is not mandatory, and if the Contractor chooses to not participate, the Contractor's personnel will have to obtain daily passes, be subject to daily mandatory vehicle inspection, and will have limited access to the installation. The Government will not be responsible for any cost or lost time associated with obtaining daily passes or added vehicle inspections incurred by non-participants in the NCACS.

1.6 STATION REGULATIONS

1.6.1 Radiological

1.6.1.1 Radiological Indoctrination (PNSY)

All Contractors working at the Portsmouth Naval Shipyard are required to view a 15 minute video briefing on radiological postings and controls in use at the Portsmouth Naval Shipyard. The briefing will be given at the Pass Office prior to issue of security badges and vehicle passes.

Any Contractor employee, who disregards, alters, moves, or otherwise tampers with a radiological posting, or who disobeys a radiological instruction, may be removed from the Portsmouth Naval Shipyard and denied future access.

1.6.1.2 Yellow Materials (PNSY)

Contractors working at the Portsmouth Naval Shipyard shall not use yellow or orange-yellow colored materials for the following purposes: Protective clothing, hoods, sheeting, tarpaulins, polyethylene bottles or other containers, tapes, bags, banding, identification marks on tools, boundary markers, ribbons, vent ducts, temporary erosion control devices, survey ribbon, etc. The Contractor shall contact the Contracting Officer for a list of yellow items that have been approved for use on the Shipyard. Contractor generated yellow colored waste shall be disposed of by the Contractor off-yard. Shipyard refuse containers shall not be used for disposal of yellow colored waste materials. Yellow colored items such as described above are of special significance within the Shipyard and are subject to strict controls. Yellow colored contract generated debris shall be bagged in non-translucent containers, and promptly removed from Portsmouth Naval Shipyard.

1.6.1.3 Smoke Detectors (PNSY)

Ionization type smoke detectors and duct smoke detectors contain radioactive material and are prohibited from use on the Portsmouth Naval Shipyard. Photoelectric smoke detectors are the only type authorized for use on the Shipyard.

1.6.1.4 Radioactive Sources (PNSY)

All contracts involving radiation generating devices shall conform to the requirements listed in Section 01 35 26.00 22 GOVERNMENTAL SAFETY REQUIREMENTS (PWD ME) and U.S. Army Corps of Engineers Safety Manual EM 385-1-1. All requirements are to be submitted to the Contracting Officer at least 14 days prior to commencement of operations involving radiation generating devices. A requirements checklist will be provided by NAVFAC (COTs) Contractor Oversight Technician and also available on PWD Maine website:

https://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/mid-atlantic/pwd_maine/about_us/construction.html

1.6.2 Laser Control

Contractor shall comply with laser safety requirements under 21 CFR 1040 and ANSI 2136.1-1986 for any work under this contract utilizing lasers.

1.6.3 Energy Conservation

In cooperation with Government representatives, the Contractor shall participate in an active program directed toward the efficient use of energy. Government furnished utilities will not be provided for air conditioning of Contractor trailers or office areas.

1.6.4 Fire Prevention (PNSY)

Contractor shall familiarize and require all their employees to become familiar with fire prevention regulations within the Portsmouth Naval Shipyard to include the proper method of turning in a fire alarm, storage of flammable and combustible materials and control of combustible waste and trash. Any HOT WORK (welding, burning, grinding, cutting, etc.) requires a HOT WORK PERMIT prior to commencing such work. This permit is obtained from the Portsmouth Naval Shipyard's Fire Department via the Contracting Officer.

1.6.5 Identification and Control of Seamed (Welded) Pipe and Tubing (PNSY)

Submarine Safety regulations prohibit the use of seamed (welded) pipe or tubing within the Portsmouth Naval Shipyard, unless such pipe or tubing is identified and controlled so as to prevent its inadvertent substitution for seamless pipe or tubing. The following requirements apply and will be strictly enforced:

Any seamed (welded) copper-nickel, carbon steel, carbon-moly steel, stainless steel, nickel-chromium-iron alloy, or nickel-copper pipe or tubing the Contractor intends to use on the Shipyard shall be identified in the following manner PRIOR TO DELIVERY TO THE SHIPYARD:

Use a lead-free white paint, to mark a 24-inch long stripe and the word "welded" alternately along the entire length of the pipe or tubing. Apply a one-half inch wide stripe unless the size of the pipe or tubing requires use of a narrower stripe.

Contractor shall maintain positive control over seamed pipe or tubing until worked into place or removed from the Shipyard.

Seamless pipe or tubing may be substituted for any seamed (welded) pipe or tubing specified in the technical specifications.

The above requirements do not apply to square or rectangular tubing, copper or brass pipe or tubing, they also do not apply to piping or tubing which has been incorporated into equipment or fixtures prior to delivery to the Shipyard.

1.6.6 Pesticide and Herbicide Control

Contractor shall not apply pesticides nor herbicides unless specifically required by this contract. Where application of pesticides or herbicides is required, provide the submittals required by the specification and obtain written approval prior to any application. Contracting Officer will require review and approval of pesticides or herbicides submittals.

1.6.7 Smoking Policy

In accordance with NAVFAC policy, smoking is prohibited inside all buildings and other facilities except those areas specifically identified

as smoking areas (e.g., smoking shelters). Smoking is not permitted within 20 feet of air intakes, doorways or windows.

1.6.8 Portal Crane Clearance Zone (PNSY)

The Contractor shall ensure there is no construction debris or materials within the Crane Clearance Zone (i.e., between the painted yellow lines on each side of the rail) unless a rail outage has been approved.

1.7 WORKING HOURS (PNSY)

Regular working hours shall consist of a period established by the Contracting Officer between 7 AM and 3:30 PM, Monday through Friday, excluding Government holidays. The regular working hours shall be confirmed with the Contracting Officer.

1.7.1 Work Outside Regular Hours (PNSY)

Work outside regular working hours requires Contracting Officer approval. Provide written requests fifteen (15) Calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress and to allow scheduling of full time escorts in the building(s) if required. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer.

Contractors that utilize NCACs are responsible to coordinate for the correct access times with the Contracting Officer and the RAPID Gate Operations Center. If a contractors attempts access outside of their approved times, access to the Shipyard will be denied.

1.8 WORK IN OCCUPIED BUILDING(S)

Work under this contract may be located in an occupied building. Move unfixed furniture away from Contractor's working area as required to perform the work; protect; and replace in original locations upon completion of the work. Leave fixed equipment in place and protect against damage or temporarily disconnect, relocate, protect, and reinstall at completion of work. If determined necessary by the Contracting Officer, the Government will remove and relocate other Government property in the areas of the buildings scheduled to receive work. Allow 15 calendar days after written notification from the Contractor for the Government to relocate Government property.

1.9 UTILITY CUTOVERS AND INTERRUPTIONS

Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays as approved by the Contracting Officer. Conform to procedures required in the paragraph "Work Outside Regular Hours." Anticipated costs shall be included in the bid.

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

Interruption to Water, Sanitary Sewer, Storm Sewer, Telephone Service, Electric Service, Air Conditioning, Heating, Fire Alarm, Compressed Air, and other utilities shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours." This time limit includes time for deactivation and reactivation.

Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of control devices in the Station's utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer in writing within 15 calendar days when such operation is required depending on the utility.

1.10 CRANE AND RAILROAD TRACKAGE INTERRUPTIONS (PNSY)

Crane and railroad trackage are considered utilities, and as such are subject to strict scheduling approvals. Where the following contract work is planned, submit written requests for outages a minimum of 15 calendar days prior to the desired date of interruption to the Contracting Officer:

Any excavation, that is within 10 feet of a rail that will extend below the grade of the cross ties.

Any work performed that will penetrate a track foundation.

Any work involving trackage replacement or repair.

Any work affecting the load bearing capacity of the trackage.

No work shall be conducted in affected areas until the Contractor receives written approval to the request for outage.

1.11 WORK ADJACENT TO CIA SECURITY FENCING (PNSY)

Work adjacent to Portsmouth Naval Shipyard Controlled Industrial Area (CIA) fencing is strictly controlled to ensure security is maintained at all times.

Work which will breach CIA fencing is prohibited unless approval has been obtained from Head of Security Operations (Code 1720) and a Shipyard Police representative is at the worksite during the period that the fence has been breached.

A minimum of 30 calendar days prior to performing work which requires breaching the CIA security fence, arrange through the Contracting Officer to obtain Head of Security Operations approval and scheduling of the Shipyard Police representative. "Breaching the fence" is any repair, alteration, or other work which would allow access into the CIA either over, under, or through an opening in a CIA fence.

Conditions which breach the fence shall be eliminated during all non-work periods to the satisfaction of the Shipyard Police representative. Contractor shall not leave the worksite until such conditions are eliminated. All materials used to close openings in fencing and method of installation shall be the same type and construction as adjacent, undisturbed CIA fencing.

Except for temporary off-loading of materials, the 10-foot zone adjacent to CIA fencing shall remain clear of vehicles, materials, and equipment. Contractor personnel shall be at the site throughout the entire time of any off-loading.

1.12 WORK ADJACENT TO AN OVERHEAD CRANE

Provide a minimum vertical clearance of three (3) inches between the highest point of the crane and the lowest overhead obstruction. For buildings where truss sag becomes a factor, increase the clearance as necessary to maintain the minimum required clearance.

The horizontal clearance between the end of the crane and the building columns, knee braces or any other obstructions shall not be less than two (2) inches with the crane centered on the runway rails. Pipes, conduits, etc. shall not reduce this clearance.

The vertical clearance beneath a bridge crane is to be at least three (3) inches. This clearance is not applicable to the hook block unless it is in its up most position.

For work involving installation, adjustment, or replacement of rail fasteners (e.g. clips/bolts), the Contractor shall verify the existing crane envelope and clearance measurements around the rail head prior to beginning work. The Contractor shall notify the Government if the work will reduce the clearance between the bridge crane and rail fasteners and ensure newly installed items will not obstruct bridge crane travel.

The Contractor shall notify the Government to verify that crane clearance has been maintained when the work performed may have changed any physical dimensions of objects or structures adjacent to the crane (e.g., changing or servicing lighting fixtures/pendant assemblies, removal and reinstallation of pipes, conduits, junction boxes, etc.). If the crane is not available (e.g., undergoing maintenance, inspection, etc.), the Contractor shall verify crane clearance by taking measurements using reference points (e.g., vertical and horizontal distance from the top of crane rail with respect to the crane envelope, vertical distance from the floor with respect to the crane envelope, etc.).

1.13 FIRE PROTECTION

1.13.1 Compliance (PNSY)

The Contractor shall comply with COE EM 385-1-1, NFPA 241, NAVSHIPYD PTSMH INST 11320.6 (latest revision Fire Safety Manual and NAVSHIPYD PTSMH INST 11300.9 (Latest revision) for work at the Portsmouth Naval Shipyard, Utility and Facility Outages, and Portsmouth Naval Shipyard fire regulations. Obtain approval from the Portsmouth Naval Shipyard Fire Chief via the Contracting Officer prior to commencement of hot work operations.

1.13.2 Fired Kettles

Melt kettles for tar, asphalt, and similar materials shall not be closer than 25 feet to buildings or combustible materials. Provide a minimum of two 20 pound ABC all-purpose type extinguishers at the melting kettle and the area of hot material application. Equip kettles with proper heat controls and means of agitation to assure controlled uniform temperatures throughout contents to prevent spot heating. Do not heat contents above flash point.

1.13.3 Notification of Fire (PNSY)

Post the Portsmouth Naval Shipyard fire poster in conspicuous locations

and at telephones in construction shacks.

1.14 SECURITY REQUIREMENTS

1.14.1 General

Contractor employees and representatives performing work under this contract are required to be United States citizens. If naturalized, the individual shall present his naturalization papers to the Security Officer for inspection. Foreign born personnel shall present evidence of citizenship regardless of citizenship of parents, as required by immigration laws.

1.14.2 Access to the Portsmouth Naval Shipyard (PNSY)

Contract Clause "FAR 52.204-2, Security Requirements and Alternate II" and the following apply:

Access to areas designated as "Red Badge" will require the Contractor to be escorted by a "Red Badged" Government Representative. The Contractor shall notify the Contracting Officer at least 14 Calendar Days in advance of the date access is required.

Obtain security badges and vehicle passes to enter the Portsmouth Naval Shipyard at the Portsmouth Naval Shipyard's Pass/Security Office. Contractor must furnish proof that employees are U.S. citizens to obtain badges to enter the Portsmouth Naval Shipyard.

Contractor must have a completed Department of Homeland Security Form I-9; Employment Eligibility Verification for each employee and furnish proof that employees are U.S. citizens to obtain badges to enter Portsmouth Naval Shipyard.

1.14.3 Application and Issue of Security Badges

"Temporary" Security Badges will be issued to Contractor personnel requiring access for less than two (2) work days upon satisfactory proof of U.S. citizenship, in the form of an original or certified birth certificate, passport, or naturalization papers. A picture ID is required in addition to satisfactory proof of citizenship.

"Permanent" (photo) Standard Access Control Badges will be issued to Contractor personnel requiring access for two (2) or more work days. Contractor personnel will be required to complete an authorization application form for local record check, and a personal information sheet. The forms will be furnished to the Contractor following award of any contract resulting from this solicitation, at time of pre-performance or pre-construction conference.

In the event the Contractor requires access to contract work areas not permitted by the level of security badge issued, such need shall be demonstrated and an escort obtained. The escort shall remain visible to the Contractor at all times within areas requiring escort.

STANDARD ACCESS CONTROL BADGES SHALL BE ATTACHED TO THE OUTER GARMENT AND DISPLAYED AT ALL TIMES WHILE ON THE STATION.

CONTRACTOR PERSONNEL SHALL NOT ENTER AREAS FOR WHICH THEY HAVE NOT BEEN CLEARED. WHERE A NEED HAS BEEN DEMONSTRATED TO ENTER SUCH AREAS,

CONTRACTOR SHALL BE UNDER CONSTANT ESCORT BY PERSONNEL WHO HAVE BEEN CLEARED. FAILURE TO ADHERE TO POSTED SECURITY REQUIREMENTS MAY RESULT IN REMOVAL OF THE EMPLOYEE FROM THE STATION WITH FUTURE ACCESS DENIED.

1.14.4 Application and Issue of Vehicle Passes (PNSY)

Vehicle passes will be issued upon satisfactory proof of a valid Operator's License, Vehicle Insurance, and State Vehicle Registration. Temporary passes will be issued for short term or single trip requirements on a case by case basis. All vehicles permitted to enter or park on the Portsmouth Naval Shipyard shall comply with the Portsmouth Naval Shipyard's traffic and parking regulations and shall only park in assigned areas, which may or may not be in the vicinity of the site of the contract work. No vehicle shall be parked in such a manner that crane tracks, railroad tracks, and vehicle access routes are blocked. Vehicles left unattended which are blocking such access routes are subject to towing and loss of vehicle passes. Parking on the Portsmouth Naval Shipyard may be in excess of one-half mile from the worksite.

1.14.5 Application and Issue of Vehicle Passes for Entry into Portsmouth Naval Shipyard's Controlled Industrial Areas (CIA)

Contractor vehicular access to the CIA will be minimized and all vehicles shall comply with the following requirements:

Vehicles must visibly display a CIA vehicle entry pass and inspection pass from the Commercial Vehicle Inspection Station (CVIS), Building 386. CIA passes will only be issued to company owned or leased vehicles, rental vehicles rented in the company name, or privately owned vehicles the company has certified in writing, to be necessary in the performance of contracted work. A current license, registration, security badge, and decal number or temporary vehicle pass is required for a CIA vehicle entry pass. Contractor's company name must appear on the registration and on the vehicle. CIA passes will be issued on weekends and holidays at Building 29, from the Watch Supervisor. Contractors not possessing the level security badge required for CIA access must be accompanied by a properly badged escort to obtain the CIA vehicle pass.

Vehicles must clearly display an authorized company sign or logo, in the form of an exterior mounted magnetic signs or painted identifications on both sides of the vehicle. Paper or cardboard signs are not authorized.

Vehicles will only be allowed in the CIA for the transportation of Contractor's tools, parts, and materials to and from the worksite. An exception to this policy, Contractors may transport employees to and from the worksite if a specific security plan has been developed and approved by the Shipyard Security Officer.

Parking of privately-owned vehicles within the CIA is prohibited.

1.14.6 Application and Issue of Crane Passes (PNSY)

Comply with EM 385-1-1.

For Cranes Passes at the Portsmouth Naval Shipyard to be valid, the Certificate of Compliance must be stamped with a red, Code 700 Access Review Date and Signature Stamp displaying the current date.

1.14.7 Return of Badges and Vehicle Passes

Contractor shall ensure all vehicle access permits and personnel badges are returned to the Security Officer when the need has ended. Contractor shall account in writing for each missing pass or badge prior to final payment being made on the contract.

1.14.8 Contractor Security Responsibilities (PNSY)

Contractor employees shall not transport, drink, or have in their possession any alcoholic beverages. Possession of any controlled substances without a physician's prescription is also prohibited. Any Contractor employee appearing to be under the influence of intoxicating liquor or narcotics will be apprehended by Shipyard Police, escorted off of the Portsmouth Naval Shipyard, and turned over to the local Police Department.

Any vehicle found to contain controlled substances, including usable residue, may be seized and impounded. Within 24 hours of the work day following any vehicle seizure, the Portsmouth Naval Shipyard Police will have determined whether forfeiture of the vehicle is required. If not, the vehicle will be returned to the owner or authorized agent. If the vehicle is determined to be appropriate for forfeiture, the Portsmouth Naval Shipyard's Legal Officer will notify the Drug Enforcement Administration of such seizure and impoundment, for initiation of forfeiture proceedings pursuant to Title 2l, U.S. Code, Section 88l. Such actions may be taken regardless of whether the owner/operator of the vehicle had knowledge of the presence of drugs in the vehicle. The Government may pursue criminal or other disciplinary actions pursuant to Title l8, U.S. Code, Section l382.

Possession of firearms, ammunition and/or explosives is prohibited. In the event explosives are required for construction work, specific handling requirements and approvals shall be obtained from the Security Officer via the Contracting Officer.

Cameras, video equipment, or similar photographic equipment shall not be introduced into nor removed from the Portsmouth Naval Shipyard. In the event such equipment is required for performance of contract work, approvals shall be obtained from the Security Officer via the Contracting Officer.

Weapons (firearms, personal knives with blades 2-1/2 inch long or greater, Mace, Pepper Spray etc.) are not permitted aboard the Shipyard.

Cell phones equipped with cameras are permitted aboard the Portsmouth Naval Shipyard outside NAVSEA controlled spaces such as the CIA, but using them to take pictures is not allowed. Cameras, or cell phones equipped with cameras, are not allowed in the CIA or in any NAVSEA space such as an NWA, CNIA or Security Island.

Laptop computers shall not be introduced into nor removed from the Portsmouth Naval Shipyard. If laptop computers are required to perform work, obtain approvals from the Security Officer via the Contracting Officer.

Driver use of a hand-held cellular phone in a moving vehicle on the Portsmouth Naval Shipyard is prohibited. This prohibition does not include hands-free cellular phone devices. Hands-free devices include

console/dash-mounted or otherwise secured cellular phones with integrated features such as voice-activation, speed dial, speakerphone or other similar technology for sending and receiving calls.

Driver use of any portable, personal listening device worn inside the aural canal, around or covering the driver's ear while operating a motor vehicle, is prohibited. Listening devices include wired or wireless earphones and headphones (including blue tooth or similar technology), and do not include hearing aids or devices designed and required for hearing protection.

The use of radar or laser detection devices to indicate the presence of speed recording instruments or to transmit simulated erroneous speeds is prohibited in accordance with OPNAVINST 5100.2H.

The Contractor shall indoctrinate personnel on access limitations to ensure security control is maintained as an integral part of their work pattern and habit.

Contractor shall indoctrinate his/her personnel on escorting procedures and responsibilities. Contractor personnel acting as escorts for other Contractor personnel assume full responsibility for their actions. Escorts shall be within sight of the persons being escorted at all times.

Contractor is advised that any unescorted personnel found in security areas requiring a higher level clearance than the level represented by the badge displayed will be removed from the area with possible confiscation of security badges and vehicle passes.

1.15 MARINE ACTIVITIES (PNSY)

a. The Contractor shall coordinate all marine vessel movements with the Contracting Officer's Representative and the Shipyard's Port Operations Department. The Contractor shall submit a weekly updated schedule showing proposed docking locations and vessel movements to the Contracting Officer's Representative. The Contractor shall meet with the Contracting Officer Representative and Shipyard Port Operations Representative weekly to review the vessel schedule.

b. Any Contractor waterborne craft or vessel movements which will be adjacent to any naval vessels shall be made under the direction of the Shipyard's Pilot. The Contractor shall notify the Contracting Officer's Representative at least 14 calendar days in advance of any movements that will require the Shipyard Pilot.

c. All Contractor waterborne craft shall at all times maintain a minimum of ten (10) feet clearance to any Government Barge in the vicinity of the work. This applies to subcontractors and materials suppliers as well as to the prime Contractor. This minimum clearance shall also take into account any materials or equipment present on the Contractor craft that could reduce this effective clearance distance. This restriction is in effect at all times 24/7 including overnight hours and weekends.

d. All marine activities shall be completed to a manner that ensures the stability of caissons, piers, berths, bulkheads, fender systems, mooring hardware and other structures adjacent to the work site. The Contractor shall repair any damage caused by the Contractors operations or vessels.

e. When not in use, the Contractor vessels shall be tied up at a location approved by the contracting Officer's Representative and the Shipyard's Port Operations Department.

f. Any waterborne craft which is deemed to be unsafe by the Contracting Officer's Representative shall be prohibited from working at the Shipyard. Copies of all inspections and certificates shall be submitted to the Contracting Officer's Representative for approval prior to bringing any vessel to the Shipyard.

1.16 CONSTRUCTION VEHICLES

The Contractor shall not utilize any vehicle that will exceed an HS20 wheel load. The use of "off road" vehicles which cannot be legally operated on State roadways or highways is prohibited.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

ATTACHMENT A

LISTS OF ACCEPTABLE DOCUMENTS

All documents must be unexpired

LIST A Documents that Establish Both Identity and Employment Authorization	OR	LIST B Documents that Establish Identity	AND	LIST C Documents that Establish Employment Authorization
1. U.S. Passport or U.S. Passport Card		1. Driver's license or ID card issued by a State or outlying possession of the United States provided it contains a photograph or information such as name, date of birth, gender, height, eye color, and address		1. Social Security Account Number card other than one that specifies on the face that the issuance of the card does not authorize employment in the United States
2. Permanent Resident Card or Alien Registration Receipt Card (Form I-551)				2. Certification of Birth Abroad issued by the Department of State (Form FS-545)
3. Foreign passport that contains a temporary I-551 stamp or temporary I-551 printed notation on a machine-readable immigrant visa		2. ID card issued by federal, state or local government agencies or entities, provided it contains a photograph or information such as name, date of birth, gender, height, eye color, and address		3. Certification of Report of Birth issued by the Department of State (Form DS-1350)
4. Employment Authorization Document that contains a photograph (Form I-766)		3. School ID card with a photograph		
		4. Voter's registration card		4. Original or certified copy of birth certificate issued by a State, county, municipal authority, or territory of the United States bearing an official seal
5. In the case of a nonimmigrant alien authorized to work for a specific employer incident to status, a foreign passport with Form I-94 or Form I-94A bearing the same name as the passport and containing an endorsement of the alien's nonimmigrant status, as long as the period of endorsement has not yet expired and the proposed employment is not in conflict with any restrictions or limitations identified on the form		5. U.S. Military card or draft record		
		6. Military dependent's ID card		
		7. U.S. Coast Guard Merchant Mariner Card		5. Native American tribal document
		8. Native American tribal document		6. U.S. Citizen ID Card (Form I-197)
		9. Driver's license issued by a Canadian government authority		
		For persons under age 18 who are unable to present a document listed above:		7. Identification Card for Use of Resident Citizen in the United States (Form I-179)
6. Passport from the Federated States of Micronesia (FSM) or the Republic of the Marshall Islands (RMI) with Form I-94 or Form I-94A indicating nonimmigrant admission under the Compact of Free Association Between the United States and the FSM or RMI		10. School record or report card		8. Employment authorization document issued by the Department of Homeland Security
		11. Clinic, doctor, or hospital record		
		12. Day-care or nursery school record		

Illustrations of many of these documents appear in Part 8 of the Handbook for Employers (M-274)

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 20 00.00 20

PRICE AND PAYMENT PROCEDURES (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 SCHEDULE OF PRICES
1.3.1 Data Required
1.3.2 Schedule Instructions
1.3.3 Real Property Assets
1.4 CONTRACT MODIFICATIONS
1.5 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT
1.5.1 Content of Invoice
1.5.2 Submission of Invoices
1.5.3 Final Invoice
1.6 PAYMENTS TO THE CONTRACTOR
1.6.1 Obligation of Government Payments
1.6.2 Payment for Onsite and Offsite Materials

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 20 00.00 20

PRICE AND PAYMENT PROCEDURES (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP-1110-1-8	(2009) Construction Equipment Ownership and Operating Expense Schedule

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Schedule of Prices; G

1.3 SCHEDULE OF PRICES

All progress payment amounts will be derived from and tied to the cost loaded schedule activities per Section 01 32 17.00 25 NETWORK ANALYSIS SCHEDULES (NAS) (PWD ME).

1.3.1 Data Required

Within 15 calendar days of notice of award, prepare and deliver to the Contracting Officer a Schedule of Prices (construction contract) as directed by the Contracting Officer. Provide a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, and extended prices. Provide labor, material, equipment for each line item. Costs shall be summarized and totals provided for each construction category.

1.3.2 Schedule Instructions

Payments will not be made until the Schedule of Prices has been submitted to and accepted by the Contracting Officer. Identify the cost for site work, and include incidental work to the 5 ft. line. Identify costs for the building(s), and include work out to the 5 ft. line. Work out to the 5 ft. line shall include construction encompassed within a theoretical line 5 ft. from the face of exterior walls and shall include attendant construction, such as pad mounted HVAC cooling equipment, cooling towers, and transformers placed beyond the 5 ft. line.

1.3.3 Real Property Assets

The Government will provide the Draft DD Form 1354, Transfer and Acceptance of Military Real Property filled in with the appropriate Real Property Unique Identifiers (RPUID) and related construction Category Codes to summarize the designed real property assets that apply to this contract. The Contractor shall meet with the Contracting Officer and the Real Property Accounting Officer during the Pre-Construction Meeting and the Project Closeout Meetings to modify and include any necessary changes to the DD Form 1354. The Contractor shall provide the Interim DD Form 1354 that uses the appropriate division of the RPUIDs/Category Codes to represent the final constructed facility and include all associated cost. Coordinate the Contractor's Price and Payment structure with the structure of the RPUIDs/Category Codes.

Divide detailed asset breakdown into the RPUIDs and related construction Category Codes and populate associated costs which represent all aspects of the work. Where assets diverge into multiple RPUID/Category Codes, divide the asset and provide the proportion of the assets in each RPUID/Category Code. Assets and related RPUID/Category Codes may be modified by the Contracting Officer as necessary during course of the work. Coordinate identification and proportion of these assets with the Government Real Property Accounting Officer.

Cost data accumulated under this section are required in the preparation of DD Form 1354.

1.4 CONTRACT MODIFICATIONS

In conjunction with the Contract Clause "DFARS 252.236-7000, Modification Proposals-Price Breakdown," and where actual ownership and operating costs of construction equipment cannot be determined from Contractor accounting records, equipment use rates shall be based upon the applicable provisions of the EP-1110-1-8.

1.5 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

1.5.1 Content of Invoice

Requests for payment will be processed in accordance with the Contract Clause FAR 52.232-27, Prompt Payment Construction Contracts and FAR 52.232-5, Payments Under Fixed-Price Construction Contracts. The requests for payment shall include the documents listed below.

a. The Contractor's invoice, on NAVFAC Form 7300/30 furnished by the Government, showing in summary form, the basis for arriving at the amount of the invoice. Form 7300/30 shall include certification by Quality Control (QC) Manager as required by the contract.

b. The Estimate for Voucher/ Contract Performance Statement on NAVFAC Form 7300/31 furnished by the Government, showing in detail: the estimated cost, percentage of completion, and value of completed performance for each of the construction categories stated in this contract. Use NAVFAC LANT Form 4-330/110 (New 7/84) on NAVFAC LANT contracts when a Monthly Estimate for Voucher is required.

c. Updated Project Schedule and reports required by the contract.

d. Contractor Safety Self Evaluation Checklist.

e. Other supporting documents as requested.

f. Updated copy of submittal register.

g. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies.

h. Contractor's Monthly Estimate for Voucher (NAVFAC LANT Form 4-330/110 (New 7/84)) with Subcontractor and supplier payment certification.

i. Affidavit to accompany invoice (NAVFAC LANT NORVA Form 4-4235/4 (Rev.5/81)).

j. Materials on Site.

k. Monthly Work-hour report.

l. Solid Waste Disposal Report.

1.5.2 Submission of Invoices

If NFAS Clause 5252.232-9301 is included in the contract, the documents listed in paragraph "CONTENT OF INVOICE" shall be provided in their entirety as attachments in Wide Area Work Flow (WAWF) for each invoice submitted. The maximum size of each WAWF attachment is two megabytes, but there are no limits on the number of attachments. If a document cannot be attached in WAWF due to system or size restriction it shall be provided as instructed by the Contracting Officer.

Monthly invoices and supporting forms for work performed through the anniversary award date of the contract shall be submitted to the Contracting Officer within 5 calendar days of the date of invoice. For example, contract award date is the 7th of the month, the date of each monthly invoice shall be the 7th and the invoice shall be submitted by the 12th of the month.

1.5.3 Final Invoice

a. A final invoice shall be accompanied by the Contractor's Final Release. If the Contractor is incorporated, the Final Release shall contain the corporate seal. An officer of the corporation shall sign and the corporate secretary shall certify the Final Release.

b. For final invoices being submitted via WAWF, the original Contractor's Final Release Form must be provided directly to the respective Contracting Officer prior to submission of the final invoice. Once receipt of the original Final Release Form has been confirmed by the Contracting Officer, the Contractor shall then submit final invoice and attach a copy of the Final Release Form in WAWF.

c. Final invoices not accompanied by the Contractor's Final Release will be considered incomplete and will be returned to the Contractor.

1.6 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous

payments to the Contractor.

1.6.1 Obligation of Government Payments

The obligation of the Government to make payments required under the provisions of this contract will, at the discretion of the Contracting Officer, be subject to reductions and/or suspensions permitted under the FAR and agency regulations including the following in accordance with "FAR 32.503-6:

a. Reasonable deductions due to defects in material or workmanship;

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

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

d. Failure to provide up to date record drawings not current as stated in Contract Clause "FAC 5252.236-9310, Record Drawings."

1.6.2 Payment for Onsite and Offsite Materials

Progress payments may be made to the contractor for materials delivered on the site, for materials stored off construction sites, or materials that are in transit to the construction sites under the following conditions:

a. FAR 52.232-5(b) Payments Under Fixed Price Construction Contracts.

b. Materials delivered on the site but not installed, including completed preparatory work, and off-site materials to be considered for progress payment shall be major high cost, long lead, special order, or specialty items, not susceptible to deterioration or physical damage in storage or in transit to the construction site. Examples of materials acceptable for payment consideration include, but are not limited to, structural steel, non-magnetic steel, non-magnetic aggregate, equipment, machinery, large pipe and fittings, precast/pre-stressed concrete products, plastic lumber (e.g., fender piles/curbs), and high-voltage electrical cable. Materials not acceptable for payment include consumable materials such as nails, fasteners, conduits; gypsum board, glass, insulation, and wall coverings.

c. Materials to be considered for progress payment prior to installation shall be specifically and separately identified in the Contractor's estimates of work submitted for the Contracting Officer's approval in accordance with Schedule of Prices requirement of this contract. Requests for progress payment consideration for such items shall be supported by documents establishing their value and that the title requirements of the clause at FAR 52.232-5 have been met.

d. Materials are adequately insured and protected from theft and exposure.

e. Provide a written consent from the surety company with each payment request for offsite materials.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 PROGRESS AND COMPLETION PICTURES
1.4 MINIMUM INSURANCE REQUIREMENTS
1.5 CONTRACTOR PERSONNEL REQUIREMENTS
1.5.1 Contractor Personnel Requirements
1.5.2 Subcontractors and Personnel
1.5.3 Subcontractor Special Requirements
1.5.3.1 Qualified Testing Organization
1.5.4 Contractor Personnel Requirements
1.6 SUPERVISION
1.7 QUALITY CONTROL PERSONNEL:
1.7.1 QC and Alternative QC Manager Qualifications
1.8 PRECONSTRUCTION CONFERENCE
1.9 FACILITY TURNOVER PLANNING MEETINGS (NAVFAC Red Zone - NRZ)
1.10 CLEANUP
1.11 PARTNERING
1.11.1 Informal Partnering
1.12 AVAILABILITY OF CADD DRAWING FILES
1.13 ELECTRONIC MAIL (E-MAIL) ADDRESS

PART 2 PRODUCTS

PART 3 EXECUTIONS

-- End of Section Table of Contents --

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

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

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Insurance; G

List of contact personnel; G

Progress and completion pictures; G

NAVFAC Red Zone Checklist/POAM; G

NAVFAC PWD ME Follow-on Services List; G

1.3 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of construction operations. Provide monthly, and within one month of the completion of work, showing the sequence and progress of work. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten views from points located by the Contracting Officer. Submit a view location sketch indicating points of view. Submit with the monthly invoice two sets of digital photographs each set on a separate CD-R, cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Photographs for each month shall be in a separate monthly directory and each file shall be named to indicate its location on the view location sketch. The view location sketch shall also be provided on the CD as digital file. All file names shall include a date designator. Cross reference submittals in the appropriate daily report. Photographs shall be provided for unrestricted use by the Government.

1.4 MINIMUM INSURANCE REQUIREMENTS

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

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

b. Automobile liability: $200,000 per person, $500,000 per occurrence for bodily injury, $20,000 per occurrence for property damage

c. Workmen's compensation as required by Federal and State workers' compensation and occupational disease laws.

d. Employer's liability coverage of $100,000, except in States where workers compensation may not be written by private carriers,

e. Others as required by State Law.

1.5 CONTRACTOR PERSONNEL REQUIREMENTS

1.5.1 Contractor Personnel Requirements

In case of conflict with other specification provisions, the requirements of this paragraph take precedence.

The following personnel shall be on site whenever work is being performed:

Project Superintendent
Site Safety and Health Officer (SSHO)
Quality Control Manager (QC Manager)

The following personnel need only be on site as their specified duties require:

Project Manager
Commissioning Authority, if included in the contract.

1.5.2 Subcontractors and Personnel

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

1.5.3 Subcontractor Special Requirements

1.5.3.1 Qualified Testing Organization

All contract requirements of work required to be performed by a Qualified Testing Organization shall be accomplished directly by a first tier subcontractor. No work to be performed by a Qualified Testing Organization shall be accomplished by a second tier subcontractor.

1.5.4 Contractor Personnel Requirements

Failure to obtain entry approval or security badging will not affect the contract price or time of completion.

1.6 SUPERVISION

Provide at least one (1) qualified Project Manager and one (1) on-site Project Superintendent per project capable of reading, writing, and conversing fluently in English to supervise the work at all times work is being performed. The Project Manager must have a minimum 10 years' experience as a Project Manager or Superintendent on projects like this contract or similar in size and complexity. The Project Superintendent must have a minimum of 10 years' experience as a Superintendent on projects similar in size and complexity.

The Project Superintendent shall be on site during working hours. The Superintendent **cannot** be the Quality Control Manager nor the Site Safety and Health Officer (SSHO).

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.

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 Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to insure timely completion. Furthermore, the Contracting Officer 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 by the Contracting Officer 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 Contracting Officer for approval. The Contracting Officer reserves the right to interview the proposed Project Manager and on-site Project Superintendent at any time in order to verify the submitted qualifications.

1.7 QUALITY CONTROL PERSONNEL:

1.7.1 QC and Alternative QC Manager Qualifications

a. Complete the course entitled "Construction Quality Management (CQM) for Contractors" and shall maintain a current certificate.

b. Ten (10) years of combined experience as a Superintendent, QC Manager, Project Manager, or Project Engineer, and at least two years' experience as a QC Manager on similar size and type construction contracts.

c. Familiar with requirements of USACE EM 385-1-1, and experience in the areas of hazard identification and safety compliance.

1.8 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule of prices, shop drawings, and other submittals, scheduling programming, prosecution of the work, and clear expectations of the "Interim DD Form 1354" Submittal. Major subcontractors who will engage in the work shall also attend.

1.9 FACILITY TURNOVER PLANNING MEETINGS (NAVFAC Red Zone - NRZ)

Key personnel will meet to identify strategies to ensure the project is carried to expeditious closure and turnover to the Client. Start the turnover process at the Pre Construction Conference meeting and convene at the Facility Turnover Meetings once the project has reached approximately 75 percent completion or three to six months prior to Beneficial Occupancy Date (BOD), whichever comes first. The Contracting Officer's Representative will lead the meetings and guide discussions based on an agenda provided by the Government. The facility Turnover effort shall include the following:

a. Pre-Construction Meeting - Contracting Officer's Technical Representative (COTR) will provide the NRZ Checklist and the Contractor, Client, and NAVFAC Representatives will compare Contractor's schedule to NRZ Checklist items.

b. Facility Turnover Meetings

   1. Fill in the NRZ Checklist including Contractor, Client, and NAVFAC Checklist Items and assign a person responsible for each item and a due date. The Contractor's Representative will facilitate the assignment of responsibilities, fill out the NRZ Checklist, and discuss "Interim DD From 1354" requirements.

   2. Review the Contractor's updated schedule. The Contractor shall develop a Plan of Action and Milestones (POAM) for the completion of all Contractor, Client, and NAVFAC Checklist items. Submit the NAVFAC Red Zone Checklist/POAM to the Contracting Officer.

   3. Confirm that all NRZ Checklist items will be completed on time for the scheduled Facility Turnover.

   4. The Contractor shall prepare the NAVFAC Red Zone Project Facility System & Equipment List included in Appendix A of this Section. The List shall include all facility systems and equipment provided as part of the project which will require future maintenance, inspections or certifications. The Contractor shall submit a preliminary list of items with the COTR at the initial Facility Turnover Meeting. The Contractor shall provide the final completed Project Facility System & Equipment List with all information required facility system/equipment information to the COTR at least sixty (60) calendar days prior to the project BOD. Prepare and submit the NAVFAC PWD ME Follow-On Services List.

      See Appendix A of this Section for the Facility Turnover Planning Meeting Agenda, NRZ Checklist & POAM and the NAVFAC Red Zone Project Facility System & Equipment List.

1.10 CLEANUP

Leave premises "broom clean." Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Replace filters of operating equipment. Clean debris from roofs, gutters, catch basins, manholes, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site.

1.11 PARTNERING

To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership within the Project Team whose members are from the Government, the Contractor and their Subcontractors. Key personnel from the Supported Command, the End User (who will occupy the facility), NAVFAC PWD ME Representatives, the Navy Region/Installation, the Contractor and Subcontractors, and the Designer of Record will be invited to participate in the Partnering process. The Partnership will draw on the strength of each organization in an effort to achieve a project that is without any safety mishaps, conforms to the Contract, and stays within budget and on schedule.

The Contracting Officer will provide Information on the Partnering Process and a list of key and optional personnel who should attend the Partnering meeting.

1.11.1 Informal Partnering

The Contracting Officer will organize the Partnering Sessions with key personnel of the project team, including Contractor personnel and Government personnel.

The Initial Partnering session should be a part of the Pre-Construction Meeting. Partnering sessions will be held at a location agreed to by the Contracting Officer and the Contractor (typically a conference room provided by the PWD ME FEAD office or the Contractor).

The Initial Informal Partnering Session will be conducted and facilitated using electronic media provided by the Contracting Officer.

The Partners will determine the frequency of the follow-on sessions.

1.12 AVAILABILITY OF CADD DRAWING FILES

After award and upon request, the electronic "Computer-Aided Drafting and Design (CADD)" drawing files included in the RFP will only be made available to the Contractor for use in preparation of construction data related to the referenced contract subject to the following terms and conditions.

Data contained on these electronic files shall not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse 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 CADD drawing files are not construction documents. Differences may exist between the CADD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CADD files, nor does it make representation to the compatibility of these files with the Contractors hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished CADD files, the signed and sealed construction documents shall govern. The Contractor is responsible for determining if any conflict exists. Use of these CADD 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.

1.13 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 days after contract award, the Contractor shall provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to, contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple email address will not be allowed.

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

PART 2 PRODUCTS

Not used.

PART 3 EXECUTIONS

Not used.

-- End of Section --

01 30 00 APPENDIX A

NAVFAC Red Zone
Facility Turnover Planning Meeting

AGENDA

I. Introduction and Overview – Purpose CM

The purpose of the Facility Turnover Planning Meeting is to address elements within the project team's purview – schedule management, assure completed facility complies with contract requirements, and other contractual issues. Each member of the project delivery team (Client, NAVFAC, and the contractor) has critical responsibilities to ensure timely completion and turnover of the new facility and each member should execute the NRZ process to achieve this end. The NRZ process provides a final re-focusing of attention to details of those key elements critical for a successful construction contract completion. In implementing NRZ processes, the NAVFAC/Contractor/Client team take a collective "snapshot" of contract status, identifying remaining actions to be accomplished, and confirm required resources needed for successful contract completion and turnover to the Client.

The Facility Turnover Planning Meeting is a collaborative effort between the Client, NAVFAC, and the contractor and results in a completed "NRZ Checklist/POAM Items" list that identifies the major items (and their due dates) that must be completed by the Contractor, the Client and the NAVFAC team to ensure timely completion of the contract.

II. Attendees

NAVFAC Echelon IV (PM); NAVFAC FEAD/ROICC Team (AROICC, CM, ET/QA, Contracting Officer); Client Team (Project Manager, Program Coordinator, User/Tenant); Contractor Team (Project Manager, Project Superintendent, CQC Manager)

III. Schedule to Completion (POAM)	Contractor
IV. Schedule of Final Outfitting and Occupancy (POAM)	Client
V. Critical feature(s) of project (POAM)	CM
VI. Transfer of Maintenance Responsibility	CM
VII. Systems training & O&M Manuals (POAM)	CQC Manager
VIII. Other Items to include on NRZ checklists	All
IX. Summary of Required Actions and Responsibility	CM

Guidelines for conducting Facility Turnover Planning Meeting are as follows:

a. Meeting is held at approximately 75% construction contract completion or three to six months prior to BOD. NAVFAC representatives will include the Project Manager, Construction Manager/AROICC (CM) and Design Manager (DM), as appropriate. The contractor representatives include applicable prime contractor staff and decision-makers from major subcontractors. Design-Build contractors will have A-E representatives attending. The Client should include representatives from Public Works Officer (PWO) staff, a Client scope and financial decision maker, a user tenant representative, a facility start-up person, and others such as SPAWAR, NMCI, telephone, and furniture contractor, etc.

b. The purpose of the meeting is to plan the remaining work, identify critical project features that still need to be completed (such as "soft" construction contract requirements as shown on the NRZ Checklist/POAM Items), and to complete the filling out of the "NRZ Checklist/POAM Items".

c. The contractor, client and NAVFAC provide a POC and due date for each item on their checklist. The team fills in the checklists by selecting items applicable to the project, selects due dates on each item, and appoints a person who has responsibility to ensure the item gets completed by the due date. The CM will be responsible to monitor the milestones.

NRZ Checklist/POAM Items

The table below provides typical NRZ checklist items for contractor, Client, and NAVFAC actions. Items listed on the checklists are required to remain on the checklists if they are part of the project/contract or required by construction convention. Items not listed on the checklists, but required in the contract or by construction convention, must be added to the checklists by the contractor, Client and NAVFAC. Checklists are applicable to all contracts no matter what Category of Work.

The Point of Contact and due date shall initially be determined during the Facility Turnover Planning Meeting by the NAVFAC, client and contractor leads. During execution of the NRZ process, for each item on the entire list, the Construction Manager (CM) shall indicate date completed and initial to indicate completion of the item. If a party fails to complete an item by the due date, this should be noted on the checklist and new due date established and indicated. The completed NRZ Checklist/POAM shall be placed in the contract file.

Resp.	Checklist Items	Point of Contact	Due Date	Actual Complete Date	CM Initials	Notes
Client	Telephone service contract					
Client	Utilities service contract					
Client	Custodial service contract					
Client	Coordination of Intrusion Detection Systems and Physical Security Equipment					
Client	Coordination of IT and Communication Infrastructure and Devices					
Client	Delivery and installation of client furnished equipment					
Client	Delivery and installation of client furnished furniture					
Client	GFE status/delivery schedule (GFCI, GFGI)					
Client	Installation of communications for phones and computers					
Client	Modification to FSC or BOSC to maintain/service new facility					
Client	NMCI Installations or other networks					
Client	Process operating permits					i.e. generators
Client	Recycled/recovered materials report					

Client	Ribbon-cutting ceremony					
Client	User move-in					
Contractor	ACATS Controls Testing					
Contractor	Communications / IT Systems Testing					
Contractor	Conduct Second Seasons TAB					
Contractor	Coordination and Delivery of Facility Signage					
Contractor	Delivery of As-Built Drawings					
Contractor	Delivery of Internal Services Requirement List					60 days prior to BOD
Contractor	Delivery of O&M Manuals					
Contractor	Delivery of Spare Parts, Extra Stock, Special Tools, etc.					
Contractor	Duct Air Leakage Testing					
Contractor	Electrical Systems Testing					
Contractor	Elevator Certification(s)					
Contractor	EV Notebook submitted (Spec Sec Temp EV Controls - SWPP etc.)					

Contractor	Final Cleaning					
Contractor	Demob					
Contractor	Final Inspection and Acceptance					
Contractor	Final utility systems connections (power, water, etc.)					
Contractor	Fire Protection Systems Inspections and Performance Verification					
Contractor	HVAC System Test & Balance					
Contractor	Landscaping Complete					
Contractor	Notice of Termination (EV Permits)					
Contractor	O&M/OMSI Training of Navy Personnel					
Contractor	Other Specified Building Performance Requirements					i.e. leed
Contractor	Plumbing / Other Mechanical Testing					
Contractor	Pre-Final Inspection					
Contractor	Pre-warranty Conference					
Contractor	Project Close-out Meeting					

Contractor	Provide Interim DD1354					
Contractor	Punch List Completion					
Contractor	Replace Construction Lock Cores and Re-keying					
Contractor	Security Systems Testing					
Contractor	Site Restoration, if applicable					
Contractor	Specialized Equipment & Systems Inspections (Boilers, UPS, etc.)					
Contractor	Superchlorination of potable water systems					
NAVFAC	A-E and Construction Contractor Evaluations (ACASS/CCASS)					
NAVFAC	Client walk-thru prior to pre-final inspections, if appropriate					
NAVFAC	Closeout actions on construction permits (e.g., NPDES)					
NAVFAC	Complete Installed Property List and DD 1354					
NAVFAC	Confirm utilities availability for final connections by contractor					
NAVFAC	Mechanical Acceptance					
NAVFAC	Process final payment (w/ final release)					

NAVFAC	Process recycled/recovered materials report					
NAVFAC	Provide keying plan to contractor					
NAVFAC	Resolve contract modifications & requests for equitable adjustment					
NAVFAC	Return unobligated funds					
NAVFAC	Schedule client satisfaction post BOD follow-up					
NAVFAC	Schedule Government inspections of specialized equipment (e.g., Boiler/pressure vessels, elevators, UPS,					
NAVFAC	Sign & provide Interim DD1354 to activity Real Property Accountability Officer NLT BOD					
NAVFAC	Startup utilities					

NAVFAC PWD Maine Follow-on Services List

Fire Suppression Requirements

		Features						Fire Pumps		Other Systems			
SHOPS / FSC Action	Location (BLDG-FLR-RM)	Wet	Dry	Pre Activation	Deluge	D-Drip	Air Compressor	Diesel	Electric	Gas	Wet Chemical	Dry Chemical	Foam

HVAC

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Equipment Description	Manufacturer	Model Number	Serial Number	Tonnage/HP	# of Filters	Size of Filters	Belt Specs	Refrigerant

Boilers

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Number of Boilers	Manufacturer	Model	MBH	Fuel	Certification Expiration	National Board Number

Back Flow Preventers

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Unique Number	Manufacturer	Model Number	Serial Number	Size (1", 3" etc.)	Type of Back Flow (BLDG FEED, Heat Make up etc.	Frequency
								Annual

Generator

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Manufacturer	Model number	Serial Number	KW	HP	Fuel Type

Water Coolers

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Building Description	EA	Floor	Outlet Location	Outlet #	Outlet Type (floor/wall mount)	Manufacturer	Model #	Serial Number	Filter Model Number

Gutters & Downspouts

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Material	Gutter Size 6" etc.	LF above 30'	LF below 30'	# of Drops	Downspout Size 4" etc.	LF above 30'	LF below 30'	#of Roof Drains

Overhead Doors

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Door Number	Width	Height	Manufacturer	Type (U-M RMP)	Condition

Elevator

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Speed (FPM)	Capacity (lbs.)	Manufacturer	MFG Date	Type (FE/H)

Lightning Protection

SHOPS / FSC Action	Location (BLDG-FLR-RM)	*Attach drawing of system

Emergency Lighting

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Number of Emergency Lights

Janitorial/Waste

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Square Footage of Room	Use (Admin/ Bathroom etc.)	# of anticipated occupants

*Attach CAD file of building
* Attach Finish Schedule

Electrical Distribution Equipment

SHOPS / FSC Action	Location (BLDG-FLR-RM)	Type (CC OIL DRY etc.)	USS or PAD	Manufacturer	Serial Number	Rating

NAVFAC PWD Maine Follow-on Services List

Refuse/ Waste				
SHOPS / FSC Action	Location (BLDG-FLR-RM)	Type of Dumpster	Number Required	Placement Location

Pest Control			
SHOPS / FSC Action	Location (BLDG-FLR-RM)	Total SQFT of Building	Food Service/Child Care/ or Medical Space SQFT

Grounds			
SHOPS / FSC Action	Total SQFT of Grounds Maint Req	Mowing (Y/N)	Tree Trimming (Y/N)
Production			

Storm Water Management Soil Filters, Ponds, etc.			
SHOPS / FSC Action			

Miscellaneous Maintainable Items (e.g. Oil and Water Separators)			
SHOPS / FSC Action			

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 32 17.00 25

NETWORK ANALYSIS SCHEDULES (NAS) (PWD ME)

12/14

PART 1 GENERAL

1.1 DESCRIPTION
1.2 SUBMITTALS
1.3 SCHEDULE ACCEPTANCE PRIOR TO START OF WORK
1.4 SOFTWARE
1.5 QUALIFICATIONS
1.6 NETWORK SYSTEM FORMAT
1.6.1 Diagrams
1.6.2 Schedule Activity Properties and Level of Detail
1.6.2.1 Activity Categories
1.6.2.2 Contract Milestones and Constraints
1.6.2.3 Activity Code
1.6.2.4 Anticipated Weather Delays
1.6.2.5 Anticipated Security Delays
1.6.2.6 Cost Loading
1.6.3 Schedule Software Settings and Restrictions
1.6.4 Required Tabular Reports
1.7 SUBMISSION AND ACCEPTANCE
1.7.1 Baseline Schedule
1.7.2 Monthly Network Analysis Schedule Update
1.7.3 As-Built Schedule
1.8 CONTRACT MODIFICATION
1.9 PROJECT FLOAT
1.10 THREE-WEEK LOOK AHEAD SCHEDULE

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 32 17.00 25

NETWORK ANALYSIS SCHEDULES (NAS) (PWD ME)
12/14

PART 1 GENERAL

1.1 DESCRIPTION

The Contractor is responsible for scheduling procurement, Contractor quality control and construction, acceptance testing and training. Refer to Specification Section 01 33 00 SUBMITTAL PROCEDURES to determine if any items require Government approval prior to construction; if any are required, that submittal review time shall be included in the schedule.

The schedule is a tool to manage the project, both for Contractor and Government activities. It will also be used to report progress and evaluate time extensions. All progress payment amounts will be derived from and tied to the cost loaded schedule activities.

The Contractor shall use the Critical Path Method (CPM) and the Precedence Diagram Method (PDM) to satisfy time and cost applications. For consistency, when scheduling software terminology is used in this specification, the terms in Primavera's scheduling programs are used.

Include commissioning milestone per LEED NC Prerequisite EAp2 - Fundamental Commission and Credit EAc3 - Enhanced Commissioning, if commissioning is included in the contract.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualifications; G

Baseline Network Analysis Schedule (NAS); G

SD-07 Certificates

Monthly Network Analysis Schedule Update; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.3 SCHEDULE ACCEPTANCE PRIOR TO START OF WORK

The Contracting Officer and Contractor shall participate in a preliminary meeting(s) to discuss the proposed schedule and requirements of this section prior to the Contractor preparing the Project Baseline Schedule.

Government review comments on the Contractor's schedule(s) shall not

relieve the Contractor from compliance with requirements of the Contract Documents.

Only bonds shall be paid prior to acceptance of the Baseline Network Analysis Schedule (NAS).

The acceptance of a Baseline NAS is a condition precedent to:

1. The Contractor starting work on the demolition or construction stage(s) of the contract.

2. Processing Contractor's pay request(s) for construction activities/items of work.

3. Review of any schedule updates.

Submittal of the Baseline Network Analysis Schedule, and subsequent schedule updates, shall be understood to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor's plan on how the work shall be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

1.4 SOFTWARE

Project schedules must be prepared and maintained using Primavera P6. Importing data into P6 using data conversion techniques or third party software will be cause for rejection of the submitted schedule.

A listing of Primavera P6 settings and parameters which shall be used in preparing the Baseline Schedule is contained later in this specification section. See Attachment A. Deviation from these settings and parameters, without prior consent of the Contracting Officer, will be cause for rejection of schedule submission.

1.5 QUALIFICATIONS

The designated Scheduler for the project shall have prepared and maintained at least 3 previous schedules of similar size and complexity of this contract using SureTrak/P6 or current mandated scheduling program. A resume outlining the qualifications of the Scheduler shall be submitted for acceptance to the Contracting Officer. Payment will not be processed until an acceptable Scheduler is provided.

1.6 NETWORK SYSTEM FORMAT

The system shall include time scaled logic diagrams and specified reports.

1.6.1 Diagrams

Provide Time-scaled Logic Diagram printed in color on ANSI D size sheets. The diagram shall clearly show activities on the critical path. Include the following information for each activity:

a. Activity ID

b. Activity Description

c. Original Duration in Work Days

d. Remaining duration

e. Percent Complete

f. Late Start Date

g. Late Finish Date

h. Total Float

1.6.2 Schedule Activity Properties and Level of Detail

The NAS shall identify all Government, Construction Quality Management (CQM), Construction activities planned for the project and all other activities that could impact project completion if delayed. Separate activities shall be created for each Phase, Area, Floor Level and Location the activity is occurring. Activity categories included in the schedule are specified below.

With the exception of the Contract Award and Contract Completion Date (CCD) milestone activities, no activity shall be open-ended; each activity shall have predecessor and successor ties. Once an activity exists on the schedule it may not be deleted or renamed to change the scope of the activity and shall not be removed from the schedule logic without approval from the Contracting Officer. The ID number for a deleted activity shall not be re-used for another activity. No more than 20 percent of the activities shall be critical or near critical. Critical is defined as having zero days of Total Float. "Near Critical" is defined as having Total Float of 1 to 14 days. Contractor activities shall be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

1.6.2.1 Activity Categories

a. Procurement Activities: Examples of procurement activities include, but are not limited to; Material/equipment submittal preparation, submittal and approval of material/equipment; material/equipment fabrication and delivery, and material/equipment on-site. As minimum, separate procurement activities will be provided for critical items, long lead items, items requiring Government approval and material/equipment procurement for which payment will be requested in advance of installation. The Contractor shall show each delivery with relationship tie to the Construction Activity specifically for the delivery.

b. Government Activities: Government and other agency activities that could impact progress shall be clearly identified. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted inspections/tests, environmental permit approvals by State regulators, utility outages, Design Start, Construction Start, (including Design/Construction Start for each Fast-Track Phase), Notice(s) to proceed and delivery of Government Furnished Material/Equipment.

c. Quality Management (QM) Activities: CQM Activities shall identify the Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan. These activities shall be added to each Three-Week Look Ahead Schedule referenced in

the paragraph entitled "THREE-WEEK LOOK AHEAD SCHEDULE" and will also be included in each monthly update. The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.

d. Construction Activities: No on-site construction activity shall have a duration exceeding 20 working days. Separate construction activities shall be created for each Phase, Area, Floor Level and Location the activity is occurring. Contractor activities will be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days, unless otherwise defined in this contract.

e. Turnover and Closeout Activities: Include a separate section with all items on the NAVFAC Red Zone Checklist/Plan of Action and Milestones (POAM) that are applicable to this project. The checklist will be provided at the Preconstruction Meeting. As a minimum, this will include all testing, specialized inspection activities, Pre-Final inspection, Punch List Completion, Final Inspection and Acceptance. Add a milestone for the Facility Turnover Planning Meeting at approximately 75 percent construction contract completion or three to six months prior to BOD, whichever is sooner.

1.6.2.2 Contract Milestones and Constraints

a. Project Start Date Milestones: The Contractor shall include as the first activity on the schedule a start milestone titled "Contract Award", which shall have a Mandatory Start constraint equal to the Contract Award Date.

b. Projected Completion Milestone: The Contractor shall include an unconstrained finish milestone on the schedule titled "Projected Completion". Projected Completion is defined as the point in time the Government would consider the project complete and ready for its intended use. This milestone shall have the Contract Completion (CCD) milestone as its only successor.

c. Contract Completion Date (CCD) Milestone: The Contractor shall include as the last activity on the schedule a finish milestone titled "Contract Completion (CCD)", which shall have a Mandatory Finish constraint equal to the current Contract Completion Date. Calculation of schedule updates shall be such that if the finish of the "Projected Completion" milestone falls after the contract completion date, then negative float will be calculated on the longest path and if the finish of the "Projected Completion" milestone falls before the contract completion date, the float calculation shall reflect positive float on the longest path. The only predecessor to the Contract Completion Date Milestone shall be the Projected Completion milestone.

1.6.2.3 Activity Code

At a minimum, the Contractor shall establish activity codes identified in this specification and 3 additional activity codes identified by the Contracting Officer. Once established, activity codes and values cannot be changed without approval by the Contracting Officer.

a. Phase: All activities shall be assigned a 4-digit code value based on the contract phase it occurs in.

b. Area Code: All activities shall be assigned an area code value

identifying the Area in which the activity occurs. Activities shall not belong to more than one area. Area is defined as a distinct space, function or activity category; such as, separate structure(s), site work, project summary, construction quality management, material/equipment procurement, etc.

c. Work Item: All activities in the project schedule shall be assigned a 4-digit Work Item code value. Examples of Work Item code values include but are not limited to water lines, drain lines, building pad and foundation, slab on grade, walls and columns, suspended slab, roof structure, roofing, exterior finish systems, interior rough-in, and finishes, etc.

d. Location 1: Assign a 4-digit Location 1 code value to activities associated with multistory structures. Code values are used to identify the floor level where an activity is occurring.

e. Location 2: Assign a 4-digit Location 2 code value to all activities to identify the location within an Area, Work Item or Building Level that an activity is occurring.

f. Responsibility Code: All activities in the project schedule shall be identified with the party responsible for completing the task. Activities shall not belong to more than one responsible party.

1.6.2.4 Anticipated Weather Delays

The Contractor shall use the National Oceanic and Atmospheric Administration's (NOAA) historical monthly averages for the NOAA location closest to the project site or the following schedule of anticipated monthly non-work days due to adverse weather for projects located at Portsmouth Naval Shipyard as the basis for establishing a "Weather Calendar" showing the number of anticipated non-workdays for each month due to adverse weather, Saturdays, Sundays and all Federal Holidays as non-work days.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAYS - PNSY											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
3	4	3	3	1	1	2	1	2	2	3	2

Assign the Weather Calendar to any activity that could be impacted by adverse weather. The Contracting Officer will issue a modification in accordance with the contract clauses, giving the Contractor a time extension for the difference of days between the anticipated and actual adverse weather delay if the number of actual adverse weather delay days exceeds the number of days anticipated for the month in which the delay occurs and the adverse weather delayed activities critical to contract completion. A lost workday due to weather conditions is defined as a day in which the Contractor cannot work at least 50 percent of the day on the impacted activity.

1.6.2.5 Anticipated Security Delays

The contractor shall allow in the schedule a total of 5 lost workdays per calendar year for instances where base access is not permitted due to a

security related closure which causes a delay in the work. A lost workday is defined as a day in which the Contractor cannot work at least 50 percent of the day on the closed installation. If the installation is closed for a period longer than 5 workdays per calendar year, the Contracting Officer will issue a no cost contract modification as applicable in accordance with the contract clauses extending the contract completion date where the critical path has been impacted.

1.6.2.6 Cost Loading

a. Cost Loading Activities: Material and Equipment Costs for which payment will be requested in advance of installation shall be assigned to their respective procurement activity (i.e., the material/equipment on-site activity). Cost for material/equipment paid for after installation, labor and construction equipment shall be assigned to their respective Construction Activities. The value of inspection/testing activities will not be less than 10 percent of the total costs for Procurement and Construction Activities. Evenly disperse overhead and profit to each activity over the duration of the project.

b. Quantities and Units of Measure: Each cost loaded activity shall have a detailed quantity breakdown and unit of measure.

1.6.3 Schedule Software Settings and Restrictions

a. Activity Constraints: Date/time constraint(s), other than those required by the contract, will not be allowed unless accepted by the Contracting Officer. Identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report.

b. Default Progress Data Disallowed: Actual Start and Actual Finish dates on the CPM schedule shall match the dates on the Contractor Quality Control and Production Reports.

c. Software Settings: Schedule calculations and Out-of-Sequence progress (if applicable) shall be handled through Retained Logic, not Progress Override. All activity durations and float values will be shown in days. Activity progress will be shown using Remaining Duration. Default activity type will be set to "Task Dependent".

d. At a minimum, include the following settings and parameters in Baseline Schedule preparation:

1. General: Calendars and Activity Codes are defined or established at the "Project" level, not the "Global" level.

2. Admin Drop-Down Menu, Admin Preferences, Time Periods Tab:

a) Time periods for P6 should be set to 8.0 Hours/Day, 40.0 Hours/Week, 172.0 Hours/Month and 2000.0 Hours/Year.

b) Allow users to specify the number of work hours for each time period: Should be unchecked.

3. Project Level, Date Tab:

a) Set "Must Finish By" date to "Contract Completion Date".

4. Project Level, Default Tab:

   a) Duration Type: Set to "Fixed Duration & Units".

   b) Percent Complete Type: Set to "Physical".

   c) Activity Type: Set to "Task Dependent".

   d) Calendar: Set to "Standard 5 Day Workweek". Calendar shall reflect Saturday, Sunday and all Federal holidays as non-work days. Alternative calendars may be used with Contracting Officer approval.

5. Project Level, Calculations Tab:

   a) Price/Unit: Set to "$1/h".

   b) Activity percent complete based on activity steps: Should be Checked.

   c) Reset Remaining Duration and Units to Original: Should be Checked.

   d) Subtract Actual from At Completion: Should be Checked.

   e) Recalculate Actual units and Cost when duration % completes changes: Should be Checked.

   f) Update units when costs change on resource assignments: Should be Unchecked.

   g) Link Actual and Actual This Period Units and Cost: Should be Checked.

6. Project Level, Settings Tab:

   a) Define Critical Activities: Check "Total Float is less than or equal to" and add "0d".

7. Work Breakdown Structure Level, Earned Value Tab:

   a) Technique for Computing Performance Percent Complete: "Activity percent complete" is selected.

   b) Technique for Computing Estimate to Complete (ETC): "PF = 1" is selected.

1.6.4 Required Tabular Reports

The following reports shall be included with the schedule submittal:

a. Log Report: Listing of all changes made between the previous schedule and current updated schedule.

b. Narrative Report: Identify and justify;

   1) Progress made in each area of the project;

   2) Critical Path;

3) Date/time constraint(s), other than those required by the contract;

4) Changes in the following; added or deleted activities, original and remaining durations for activities that have not started, logic, milestones, planned sequence of operations, critical path, and cost loading;

5) Any decrease in previously reported activity Earned Amount;

6) Pending items and status thereof, including permits, changes orders, and time extensions;

7) Status of Contract Completion Date and interim milestones;

8) Current and anticipated delays (describe cause of delay and corrective actions(s)); and

9) Description of current and future schedule problem areas. Each entry in the narrative report will cite the respective Activity ID and Activity Description, the date and reason for the change, and description of the change.

c. Earned Value Report: Listing all activities having a budget amount cost loaded. Compilation of total earnings on the project from notice to proceed to current progress payment request. Group and sort activities as directed by the Contracting Officer. Show current budget, previous physical percent complete, to-date physical percent complete, previous earned value, to-date earned value and cost to complete on the report for each activity:

d. Schedule Variance Control (SVC) Diagram: With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates and 2) Earned Value to-date. Revise Cash Flow S-Curves when the contract is modified, or as directed by the Contracting Officer.

1.7 SUBMISSION AND ACCEPTANCE

1.7.1 Baseline Schedule

The Baseline Schedule shall be submitted to the Contracting Officer no later than thirty 30 calendars days from the date of the contract award.

1.7.2 Monthly Network Analysis Schedule Update

Contractor and Government representatives shall meet at monthly intervals to review and agree on the information presented in the updated project schedule. The submission of an acceptable, updated schedule to the Government is a condition precedent to the processing of the Contractor's pay request. An acceptable, updated schedule shall be submitted to the Government regardless of whether a Contractor's pay request will be submitted for the given period. If a Schedule of Prices is the basis for progress payments, it shall be consistent with the logic and activity breakdowns on the progress schedule. If progress payments are based on a cost-loaded schedule, the Contractor and Government shall agree on percentage of payment for each activity progressed during the update period.

Provide the following with each Schedule submittal:

a. Time Scaled Logic Diagram.

b. Reports listed in paragraph entitled "Required Tabular Reports."

c. Data disks containing the project schedule. Include the back-up native .xer file.

1.7.3 As-Built Schedule

As a condition precedent to the release of retention and making final payment, submit an "As-Built Schedule," as the last schedule update showing all activities at 100 percent completion. This schedule shall reflect the exact manner in which the project was actually constructed.

1.8 CONTRACT MODIFICATION

Submit a Time Impact Analysis with each cost and time proposal for a proposed change. Time Impact Analysis (TIA) shall illustrate the influence of each change or delay on the Contract Completion Date or milestones. No time extensions will be granted nor delay damages paid unless a delay occurs which consumes all available Project Float, and extends the Projected Finish beyond the Contract Completion Date.

a. Each TIA shall be in both narrative and schedule form demonstrating the delay impact.

b. Each TIA shall include a Fragmentary Network (fragment) demonstrating how the Contractor proposes to incorporate the impact into the most currently accepted schedule update. A fragment is defined as the sequence of new activities and/or activity revisions, logic relationships and resource changes that are proposed to be added to the existing schedule to demonstrate the influence of impacts to the schedule. The fragment shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. The Contractor shall run the schedule calculations and submit the impacted schedule with the proposal or claim.

c. Unless the Contracting Officer requests otherwise, only conformed contract modifications shall be added into the Project NAS.

1.9 PROJECT FLOAT

Project Float is the length of time between the Contractor's Projected Finish Milestone and the Contract Completion Date Milestone. Project Float available in the schedule, at any time shall not be for the exclusive use of either the Government or the Contractor.

1.10 THREE-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 Project Network Analysis Schedule. The work plans shall be keyed to NAS activity numbers and 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 Project NAS on an electronic spreadsheet program and printed on 8 ½ by 11 sheets as directed by the Contracting Officer. 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. Three hard copies and one electronic file of the 3-Week Look Ahead Schedule shall be delivered to the Contracting Officer no later than 8 a.m. each Monday and reviewed during the weekly CQC Coordination Meeting.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

Initial Project Schedule (IPS)
Review Worksheet

Project Name: _____ Contract No.: _____

Contractor: _____ Contractor Scheduler: _____

NAVFAC IPS Reviewer: _____

Primavera Project ID: _____ Primavera Project Name: _____

NTP: _____ Contract Completion Date (CCD): _____

Interim or Phased Completion Contract Dates (if specified): _____

Total Contract Award: $ _____

ITM	DESCRIPTION	Y	N
IPS REPORTING & SOFTWARE (2.4.1)			
Reports Submitted			
1	P6 Project import file in Primavera Project Manager (.XER) 6.2 export file format. **(KTR)**		
2	Narrative Report		
3	Network Diagram (Schedule)		
4	Earned Value Report (If schedule cost loading specified)		
5	S-Curves (If schedule cost loading specified)		
6	All required submittals are provided by the contractor		
Software			
7	P6 was used to prepare the schedule **(KTR)**		
GENERAL SCHEDULE INFORMATION (Run Primavera Schedule Report/Log) (2.4.2)			
8	Start and Finish dated did not change after scheduling the project		
9	Retained Logic is used when scheduling progressed activities		
10	Critical activities defined as Total Float less than or equal to 0		
11	No activities have started or are in progress		
12	All Constraints are Contractually defined		
13	The only activity without predecessor(s) is the activity with the earliest start date		
14	The only activity without successor(s) is the activity with the latest finish date		
15	BLANK		
16	The Latest Early Finish Date is on or before the Contract Completion Date (CCD)		
17	No more than 20% of the activities are Critical or Near Critical; Activities with Total Float less than 14 working days are Near Critical		
PROJECT REQUIREMENTS AND SETTINGS			
Schedule Dates (2.4.3)			
18	The project Must Finish By date is set to the current CCD		
19	The Must Finish By Time is set to 5pm		
Defaults (2.4.3)			
20	Duration Type is set to Fixed Duration & Units		

Initial Project Schedule (IPS) Review Worksheet

Project Name: _____ Contract No.: _____

21	Percent Complete Type is set to Physical		
22	Activity Type is set to Task Dependent		
23	The default Project Calendar reflects Saturday, Sunday and all Federal Holidays as non-work days		
Settings (2.4.3)			
24	Total Float less than or equal to 0 defines critical activity		
Calculations (2.4.3)			
25	Price/Unit is set to $1/h		
26	Activity percent complete based on activity steps is checked		
27	Reset Remaining Duration and Units to Original is selected		
28	Subtract Actual from At Completion is selected		
29	Recalculate Actual Units and Cost when duration % complete changes is checked		
30	Update units when costs change on resource assignments is unchecked		
31	Link Actual and Actual This Period Units and Cost is checked		
Earned Value (2.4.4)			
Technique For Computing Performance Percent Complete			
32	Activity percent complete is selected		
Technique For Computing Estimate To Complete (ETC)			
33	PF = 1 is selected		
Hours Per Time Period (2.4.5)			
34	Verified with the contractor that the Time Periods established for P6 on the computer the project was created and maintained are set to 8.0 Hours/Day, 40.0 Hours/Week, 172.0 Hours/Month and 2000.0 Hours/Year		
35	Time Periods established for P6 on the Government computer matches the Time Periods established on the contractor computer		
36	Allow users to specify the number of work hours for each time period is unchecked		
Project Calendars (2.4.6)			
Standard Calendars			
37	Calendar(s) are defined at the Project level		
38	A 5-day workweek calendar is defined for the project that establishes Saturdays, Sundays and all federal holidays as non-work days		
39	A 6-day workweek calendar may be defined for the project. The 6-day workweek calendar establishes Sundays and all federal holidays as non-work days		
40	A 7-day workweek calendar may be defined for the project. If defined, it establishes Saturdays, Sundays and all federal holidays as workdays		
41	Total work hours/day for all defined calendars is set to 8		
42	Standard Calendars are correctly assigned to activities		
Weather Calendars			
43	A project level Weather Calendar is defined		
44	The weather calendar is based on the Standard 5-Day Workweek Calendar		

Initial Project Schedule (IPS) Review Worksheet

Project Name: _____ Contract No.: _____

45	Anticipated non-work days due to adverse weather are assigned to normal workdays (Mon-Fri)		
46	The approved number of anticipated non-work days per month due to adverse weather is assigned		
47	The Weather Calendar is assigned to activities that could be delayed by adverse weather		
Special Calendars			
48	Special Calendar(s) defined for the project are properly set-up		
49	Special Calendar(s) are correctly assigned to activities		
ACTIVITY CODES (2.4.7)			
50	Activity Codes are established at the Project Level		
51	As a minimum, Activity Codes identified in the scheduling specification and/or established by the Contracting Officer are defined for the project		
ACTIVITY DATA, SETTINGS AND ASSIGNMENTS			
Activity Detail (2.4.8)			
52	Activity Type is set to Task Dependent, Duration Type is set to Fixed Duration & Units and % Complete Type is set to Physical for all activities		
53	Calendars are correctly assigned to activities		
Description and Duration (2.4.9)			
54	Activity Descriptions adequately define work scope		
55	Original activity durations are reasonable		
56	No on-site construction activity has a duration greater than 20 working days		
57	Actual Activity Start and Finish dates will be easy to determine/verify		
58	Work-in-Place percent complete for partially completed activates will be easy to determine/verify		
Schedule Logic			
59	No Negative Lags **(KTR)**		
60	Finish-To-Start relationships are all assigned 0 Lag **(KTR)**		
Contract Milestone Activities (2.4.10)			
61	Interim or Phased Completion Milestone Activity dates match Contract dates(if specified)		
Activities Assigned Government Responsibility For Completing (2.4.11)			
62	Responsibility for completing the activity is correctly assigned to the Government		
63	Durations comply with contract requirements		
Longest Path (2.4.12)			
64	Government activities are not arbitrarily placed on the Longest Path		
65	The Longest Path is made up of activities that you expect to drive project completion		
66	The Longest Path shows reasonable work flow and sequencing		
67	There are no time gaps between activities on the Longest Path		
COST LOADING (2.4.13)			
68	The total cost budget equals the contract value		
69	Activities that should have a cost budget are cost loaded		
70	Budget $ are equitable spread throughout the Project – Not Front End Loaded		
71	Anomalies in monthly and cumulative Budged Cost distribution are explainable		

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 33 00

SUBMITTAL PROCEDURES

05/11

PART 1 GENERAL

1.1 DEFINITIONS
1.1.1 Submittal Descriptions (SD)
1.1.2 Approving Authority
1.1.3 Work
1.2 SUBMITTALS
1.3 SUBMITTAL CLASSIFICATION
1.3.1 Government Approved (G)
1.4 PREPARATION
1.4.1 Transmittal Form
1.5 QUANTITY OF SUBMITTALS
1.5.1 Number of Copies of SD-02 Shop Drawings
1.5.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions
1.5.3 Number of Samples SD-04 Samples
1.5.4 Number of Copies SD-05 Design Data and SD-07 Certificates
1.5.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports
1.5.6 Number of Copies of SD-10 Operation and Maintenance Data
1.5.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals
1.6 VARIATIONS
1.6.1 Considering Variations
1.6.2 Proposing Variations
1.6.3 Warranting that Variations are Compatible
1.6.4 Review Schedule is Modified
1.7 SUBMITTAL REGISTER
1.7.1 Use of Submittal Register
1.7.2 Contractor Use of Submittal Register
1.7.3 Approving Authority Use of Submittal Register
1.7.4 Copies Delivered to the Government
1.8 SCHEDULING
1.9 GOVERNMENT APPROVING AUTHORITY
1.9.1 Review Notations
1.10 DISAPPROVED OR REJECTED SUBMITTALS
1.11 APPROVED/ACCEPTED SUBMITTALS
1.12 APPROVED SAMPLES

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 33 00

SUBMITTAL PROCEDURES
05/11

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 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 prior to

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction progress schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices or Earned Value Report

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.

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.

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. Unless specified in another section, 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 document purpose is to further promote the 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-09 Manufacturer's Field Reports

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

Factory test reports.

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.

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

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.

Interim "DD Form 1354" with cost breakout for all assets 30 days prior to facility turnover.

1.1.2 Approving Authority

Office or designated person authorized to approve submittal.

1.1.3 Work

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

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Government Approved (G)

Within the terms of the Contract Clause entitled, "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.4 PREPARATION

1.4.1 Transmittal Form

1.5 QUANTITY OF SUBMITTALS

1.5.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

1.5.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.5.3 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.

1.5.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.5.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.5.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit five copies of O&M Data to the Contracting Officer for review and approval.

1.5.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit two sets of administrative submittals.

1.6 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.6.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, 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.

1.6.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, 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.

1.6.3 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.

1.6.4 Review Schedule is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.7 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. 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. The Government will provide the initial submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

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

Column (d): Lists each submittal description (SD No. and type, e.g. SD-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.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

1.7.1 Use of Submittal Register

Submit submittal register. 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 submitted with the QC plan and the project schedule:

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

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

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

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

1.7.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.7.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

1.7.4 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.8 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 Contracting Officer 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."

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.9 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received.

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

c. Identify returned submittals with one of the actions defined in paragraph entitled, "Review Notations," of this section and with markings appropriate for action indicated.

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

1.9.1 Review Notations

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" "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" or "disapproved," 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.

1.10 DISAPPROVED OR REJECTED SUBMITTALS

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

1.11 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that

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.

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

1.12 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 Contracting Officer 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 Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 11 00	SD-02 Shop Drawings															
			Aft Area Enclosure Scaffolding	Part 2	G													
			SD-03 Product Data															
			Aft Area Enclosure Scaffolding	Part 2	G													
			SD-07 Certificates															
			DD#2 Fitup Test	1.8	G													
			Movable Roof Test	1.8	G													
			Load Test of Padeyes	1.8	G													
			SD-10 Operation and Maintenance															
			Data															
			Aft Area Enclosure Scaffolding	Part 2	G													
		01 14 00.00 22	SD-01 Preconstruction Submittals															
			List of Contact Personnel	1.5.1	G													
			Vehicle List	1.5.2	G													
		01 20 00.00 20	SD-01 Preconstruction Submittals															
			Schedule of Prices	1.3	G													
		01 30 00	SD-01 Preconstruction Submittals															
			Insurance	1.4	G													
			List of contact personnel	1.5.2	G													
			Progress and completion pictures	1.3	G													
			NAVFAC Red Zone	1.9	G													
			Checklist/POAM															
			NAVFAC PWD ME Follow-on	1.9	G													
			Services List															
		01 32 17.00 25	SD-01 Preconstruction Submittals															
			Qualifications	1.5	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 32 17.00 25	Baseline Network Analysis	1.3	G													
			Schedule															
			SD-07 Certificates															
			Monthly Network Analysis	1.7.2	G													
			Schedule Update															
			SD-11 Closeout Submittals															
			As-Built Schedule	1.7.3	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.7	G													
		01 35 26.00 22	SD-01 Preconstruction Submittals															
			Accident Prevention Plan (APP)	1.7	G													
			Activity Hazard Analysis (AHA)	1.8	G													
			Crane Critical Lift Plan	1.7.1	G													
			Crane Operators	1.6.1.4	G													
			Crane Operators	1.12.4	G													
			SD-06 Test Reports															
			Notifications and Reports	1.12	G													
			Accident Reports	1.12.2	G													
			Monthly Exposure Report	1.4	G													
			Crane Reports	1.12.3	G													
			SD-07 Certificates															
			Confined Space Entry Permit	1.9	G													
			Hot work permit	1.9	G													
			License certificates	1.14	G													
			Contractor Safety Self-Evaluation	1.4	G													
			Checklist															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 35 26.00 22	Accident Notification	1.12.1	G													
			Third Party Certification of	1.12.5	G													
			Barge-Mounted Mobile Cranes															
			Certificate of Compliance	1.12.4	G													
		01 45 00.00 20	SD-01 Preconstruction Submittals															
			Construction Quality Control (QC)	1.6.1	G													
			Plan															
			Indoor Air Quality (IAQ)	1.18	G													
			Management Plan															
			Basis of Design	1.10.1	G													
			QC Manager	1.5.1	G													
			Commissioning Authority	1.5.2	G													
			SD-05 Design Data															
			Design Review	1.10.2	G													
			SD-07 Certificates															
			CA Resume	1.5.2.2	G													
		01 50 00.00 22	SD-01 Preconstruction Submittals															
			Construction site plan	1.4	G													
			Traffic control plan	3.3.1	G													
			SD-06 Test Reports															
			Backflow Preventer Tests	2.2.5	G													
			SD-07 Certificates															
			Backflow Tester	1.5.1	G													
			Backflow Preventers	1.5	G													
		01 57 19.00 22	SD-01 Preconstruction Submittals															
			Preconstruction Survey	1.5.1	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 57 19.00 22	Solid Waste Management Plan	3.4	G													
			Regulatory Notifications	1.5.2	G													
			Environmental Management Plan	3.1	G													
			(EMP)															
			Dirt and Dust Control Plan	3.14.1	G													
			Contractor Hazardous Material	3.6	G													
			Inventory Log															
			Storm Water	3.2.1	G													
			Management/Erosion and															
			Sedimentation Control Plan															
			SD-06 Test Reports															
			Laboratory Analysis	3.13.4.2	G													
			Disposal Requirements	3.15.2	G													
			Erosion and Sediment Control	3.2.4	G													
			Inspection Reports															
			Solid Waste Management Report	3.4.1	G													
			SD-11 Closeout Submittals															
			Storm Water Management and	3.2.1	G													
			Erosion Control Compliance															
			Notebook															
			Waste Determination	3.5	G													
			Documentation															
			Disposal Documentation for	3.13.4.4	G													
			Hazardous and Regulated Waste															
			Contractor 40 CFR Employee	1.5.5	G													
			Training Records															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 57 19.00 22	Solid Waste Management Report	3.4.1	G													
			Contractor Hazardous Material	3.6	G													
			Inventory Log															
			Hazardous Waste/Debris	3.13.4	G													
			Management															
			Regulatory Notifications	1.5.2	G													
		01 74 19.00 22	SD-01 Preconstruction Submittals															
			Waste Management Plan	1.3	G													
			SD-11 Closeout Submittals															
			Records	1.4	G													
		01 78 00.00 22	SD-03 Product Data															
			As-Built Record of Equipment	1.3.2	G													
			and Materials															
			Warranty Management Plan	1.7.1	G													
			Warranty Tags	1.7.4	G													
			Final Cleaning	1.10	G													
			Spare Parts Data	1.4	G													
			SD-08 Manufacturer's Instructions															
			Preventative Maintenance	1.5	G													
			Condition Monitoring (Predictive	1.5	G													
			Testing)															
			Inspection	1.5	G													
			Instructions	1.7.1	G													
			SD-10 Operation and Maintenance															
			Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 78 00.00 22	Operation and Maintenance	1.9	G													
			Manuals															
			SD-11 Closeout Submittals															
			Record Drawings	1.3.1	G													
			Certification of EPA Designated	1.6	G													
			Items															
			Certification of EPA Designated	1.6	G													
			Items															
			Interim Form DD1354	1.11	G													
			Checklist for Form DD1354	1.11	G													
			NAVFAC Sustainable & Energy	1.12	G													
			Data Record Card															
			Red Zone Documents	1.3.6	G													
		01 91 13	SD-01 Preconstruction Submittals															
			Commissioning Plan	3.3	G													
			SD-11 Closeout Submittals															
			Commissioning Report	1.7.1.1	G													
		05 12 00	SD-01 Preconstruction Submittals															
			Erection Drawings	1.5.1.1	G	AE												
			SD-02 Shop Drawings															
			Fabrication drawings	1.5.2	G	AE												
			SD-03 Product Data															
			Shop primer	2.6.2	G	AE												
			Welding electrodes and rods	2.4.1	G	AE												
			Non-Shrink Grout	2.4.2	G	AE												
			SD-06 Test Reports															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05 12 00	Bolts, nuts, and washers	2.3	G	AE												
			Weld Inspection Reports	3.7.1.2	G													
			Bolt Testing Reports	3.7.2.1	G													
			SD-07 Certificates															
			Steel	2.2	G													
			Bolts, nuts, and washers	2.3	G													
			Galvanizing	2.5	G													
			Pins and rollers	2.4.3	G													
			AISC Fabrication Plant Quality	1.3	G													
			Certification															
			AISC Erector Quality Certification	1.3	G													
			Welding procedures and	1.5.3.1	G													
			qualifications															
			Welding electrodes and rods	2.4.1	G													
		05 21 19	SD-01 Preconstruction Submittals															
			Welder qualification	1.5.2	G	AE												
			Material Safety Data Sheet	1.5.2	G	AE												
			SD-02 Shop Drawings															
			Steel joist framing	1.5.1	G	AE												
			SD-06 Test Reports															
			Erection inspection	3.3.1	G													
			Welding inspections	3.3.1	G													
			SD-07 Certificates															
			Accessories	2.1	G	AE												
			Certification of Compliance	1.5.2	G	AE												
		05 30 00	SD-02 Shop Drawings															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05 30 00	Fabrication Drawings	1.3.5	G	AE												
			Flexible Closure Strips	2.1.7	G	AE												
			Cant Strips	2.3.2.1														
			Metal Closure Strips	2.3.2.2	G	AE												
			SD-03 Product Data															
			Accessories	2.2														
			Galvanizing Repair Paint	2.1.3.1	G	AE												
			Galvanizing Repair Paint	2.1.6	G	AE												
			Joint Sealant Material	2.1.5	G	AE												
			Powder-Actuated Tool Operator	1.3.2														
			Welder Qualifications	1.3.3	G	AE												
			SD-07 Certificates															
			Welding Procedures	1.3.3	G	AE												
			Fire Safety	1.3.4.1	G	AE												
			Wind Storm Resistance	1.3.4.2	G	AE												
		05 50 13	SD-02 Shop Drawings															
			structural steel door frames	2.8	G	AE												
			Access doors and panels	2.3	G	AE												
			Cover plates and frames	3.9	G	AE												
			Expansion joint covers	2.4	G	AE												
			Floor gratings and roof walkways	2.5	G	AE												
			Roof hatch	3.10	G	AE												
			SD-03 Product Data															
			Access doors and panels	2.3	G	AE												
			Cover plates and frames	3.9	G	AE												
			Control-joint covers	3.8	G	AE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05 50 13	Expansion joint covers	2.4	G	AE												
			Floor gratings and roof walkways	2.5	G	AE												
			Structural steel door frames	2.8	G	AE												
			Roof hatch	3.10	G	AE												
		05 51 00	SD-02 Shop Drawings															
			Iron and Steel Hardware	2.1	G	AE												
			Steel Shapes, Plates, Bars and	2.1	G	AE												
			Strips															
			Metal Stair System	2.6	G	AE												
			SD-03 Product Data															
			Structural Steel Plates, Shapes,	2.2	G	AE												
			and Bars															
			Structural Steel Tubing	2.3	G	AE												
			Protective Coating	2.7	G													
			Steel Stairs	2.8	G	AE												
			SD-07 Certificates															
			Welder Qualification	1.3	G													
		05 51 33	SD-02 Shop Drawings															
			Ladders	2.3	G	AE												
			SD-03 Product Data															
			Ladders	2.3	G	AE												
		05 52 00	SD-02 Shop Drawings															
			Fabrication Drawings	1.2.1	G	AE												
			Iron and Steel Hardware	2.1	G	AE												
			Steel Shapes, Plates, Bars and	2.1	G	AE												
			Strips															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05 52 00	SD-03 Product Data															
			Structural Steel Plates, Shapes,	2.3	G	AE												
			and Bars															
			Structural Steel Tubing	2.4	G	AE												
			Cold-Finished Steel Bars	2.6	G	AE												
			Hot-Rolled Carbon Steel Bars	2.5	G	AE												
			Cold-Drawn Steel Tubing	2.7	G	AE												
			Concrete Inserts	1.2.1	G	AE												
			Masonry Anchorage Devices	1.2.1	G	AE												
			Protective Coating	2.10	G	AE												
			Steel Railings and Handrails	2.11	G	AE												
			Anchorage and Fastening	1.2.1	G	AE												
			Systems															
			SD-07 Certificates															
			Welding Procedures	1.4.1	G													
			Welder Qualification	1.4.2	G													
			SD-08 Manufacturer's Instructions															
			Installation Instructions	3.1	G													
		05 59 10	SD-01 Preconstruction Submittals															
			Assembly Tests	2.3.1	G													
			Acceptance Testing	3.2	G													
			SD-02 Shop Drawings															
			Detail Drawings	1.4.2	G	AE												
			SD-03 Product Data															
			Gearmotors	2.1.1.2	G	AE												
			Wheelblock Assemblies	2.1.1	G	AE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05 59 10	Materials List	1.4.2	G	AE												
			Limit Switches	2.1.1.2	G	AE												
			Control Panel	2.1.1.2	G	AE												
		07 42 63	SD-01 Preconstruction Submittals															
			Qualification of Manufacturer	1.5.3	G													
			Qualification of Installer	1.5.4	G													
			Qualifications for Welding Work	1.5.4.1	G													
			SD-02 Shop Drawings															
			Fabrication and Installation	1.5.1	G	AE												
			drawings															
			Wall Panel Assemblies	1.5.1	G	AE												
			Flashing and Accessories	1.5.1	G	AE												
			Anchorage Systems	1.5.1	G	AE												
			SD-03 Product Data															
			Manufacturer's catalog data	1.5.1	G	AE												
			Factory Color Finish	1.5.1	G													
			Sub-girts and Formed Shapes	1.5.1	G	AE												
			Closure Materials	1.5.1	G	AE												
			Insulation	1.5.1	G	AE												
			Pressure Sensitive Tape	1.5.1	G	AE												
			Sealants and Caulking	2.4.4.1	G	AE												
			Rated Wall Assembly	1.5.1	G	AE												
			Enamel Repair Paint	1.5.1	G	AE												
			Accessories	1.5.1	G	AE												
			SD-04 Samples															
			Wall Panel Assemblies	1.5.1	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		07 42 63	Fasteners	1.5.1	G													
			Metal Closure Strips	1.5.1	G													
			Insulation	1.5.1	G													
			manufacturer's color charts and	1.5.1	G													
			chips															
			SD-05 Design Data															
			wind design analysis	1.5.1	G AE													
			SD-06 Test Reports															
			Leakage Tests	3.7.2	G AE													
			wind load tests	1.3.2	G AE													
			seismic tests	1.3.2	G AE													
			Factory Color Finish	1.5.1	G AE													
			SD-07 Certificates															
			Fasteners	1.5.1	G													
			Enamel Repair Paint	1.5.1	G													
			Qualification of Manufacturer	1.5.3	G													
			Qualification of Installer	1.5.4	G													
			wall system assembly wind load	1.5.1	G													
			and fire rating classification listings															
			SD-08 Manufacturer’s Instructions															
			Installation of Wall panels	1.5.1	G													
			SD-11 Closeout Submittals															
			Instructions	1.5.1	G													
			Material Safety Data Sheets	1.5.1	G													
			20 year 'No-Dollar-Limit' warranty	1.5.1	G													
		07 60 00	SD-02 Shop Drawings															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		07 60 00	Flashing	2.1	G	AE												
			SD-11 Closeout Submittals															
			Quality Control Plan	3.4	G													
		08 11 13	SD-02 Shop Drawings															
			Doors	2.1	G	AE												
			Frames	2.4	G	AE												
			Field-Applied Epoxy Finish	2.7.4	G	AE												
			SD-03 Product Data															
			Doors	2.1	G	AE												
			Frames	2.4	G	AE												
			Weatherstripping	2.5	G	AE												
		08 33 23	SD-02 Shop Drawings															
			Overhead Coiling Doors	2.3	G	AE												
			Counterbalancing Mechanism	2.5	G	AE												
			Electric Door Operators	1.4	G	AE												
			Electric Door Operators	2.6	G	AE												
			Bottom Bars	2.3.3	G	AE												
			Guides	1.3	G	AE												
			Brackets	2.5.1	G	AE												
			Overhead Drum	2.3.8	G	AE												
			Hood	1.4	G	AE												
			Installation Drawings	1.3	G													
			Surface Finishing	2.7	G	AE												
			SD-03 Product Data															
			Overhead Coiling Doors	2.3	G	AE												
			Hardware	2.4	G	AE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		08 33 23	Counterbalancing Mechanism	2.5	G	AE												
			Electric Door Operators	1.4	G	AE												
			Electric Door Operators	2.6	G	AE												
			SD-05 Design Data															
			Overhead Coiling Doors	2.3	G													
			Hardware	2.4	G													
			Counterbalancing Mechanism	2.5	G													
			Electric Door Operators	1.4	G	AE												
			Electric Door Operators	2.6	G	AE												
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.4	G													
			Manuals															
			Materials	1.4	G													
			Devices	1.4	G													
			Procedures	1.4	G													
			Manufacture's Brochures	1.4	G													
			Parts Lists	1.4	G													
			Cleaning	3.3.2	G													
		08 34 16.10	SD-02 Shop Drawings															
			Hangar doors	2.1	G	AE												
			SD-05 Design Data															
			Hangar doors	2.1	G	AE												
			SD-10 Operation and Maintenance															
			Data															
			Hangar doors	2.1	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		08 34 16.20	SD-01 Preconstruction Submittals															
			Manufacturer's Qualifications	1.4.1	G													
			Installer's Qualifications	1.4.2	G													
			SD-02 Shop Drawings															
			Door Design	1.3.1	G	AE												
			SD-03 Product Data															
			Electric Operator	2.3	G	AE												
			Motors	2.3.5	G	AE												
			Doors	2.2	G	AE												
			Controls	2.3.6	G	AE												
			Door Fabric	2.1.7	G	AE												
			Surge Protection Device (SPD)	2.3.6.1	G	AE												
			SD-05 Design Data															
			Calculations	1.3.2.1	G	AE												
			Load Diagrams	1.3.4	G	AE												
			SD-06 Test Reports															
			Safety Arrester Operation Test	2.3.3	G													
			Door Fabric	2.1.7	G													
			Door Fabric	2.1.7	G													
			SD-07 Certificates															
			Manufacturer's Qualifications	1.4.1	G													
			Installers Qualifications	1.4.2	G													
			Welding Procedures and	1.5	G													
			Qualifications															
			SD-09 Manufacturer’s Field															
			Reports															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		08 34 16.20	Acceptance Testing Procedure	3.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Door Operation	2.7.1	G													
			Emergency and Routine	1.4.3.1	G													
			Preventative Maintenance Plan															
			SD-11 Closeout Submittals															
			Acceptance Testing Procedure	3.3	G													
			Warranty	1.4.3	G													
		08 71 00	SD-02 Shop Drawings															
			Hardware schedule	1.3	G	AE												
			SD-03 Product Data															
			Hardware items	2.3	G	AE												
			SD-08 Manufacturer's Instructions															
			Installation	3.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Hardware Schedule	1.3	G													
		09 97 13.26	SD-07 Certificates															
			Epoxy-polyamide	2.1.1.1	G	AE												
		13 34 21	SD-01 Preconstruction Submittals															
			Qualification Data	1.7	G													
			Welder Qualifications	1.5.1	G													
			SD-02 Shop Drawings															
			Shop Fabrication Drawings	1.7	G	AE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		13 34 21	Field Erection and Assembly	1.7	G	AE												
			Drawings															
			SD-03 Product Data															
			Wheel Assembly	1.7	G	AE												
			Fabric Roof Covering	1.7	G	AE												
			SD-06 Test Reports															
			Material Test Reports	1.7	G	AE												
			Assembly Tests	3.5	G													
			Acceptance Testing	3.5	G													
			SD-07 Certificates															
			Calculations	1.7	G	AE												
			Lifting and Rigging Plan	1.7	G													
			SD-10 Operation and Maintenance															
			Data															
			Roof Operating Instructions	1.7	G													
			Maintenance Data of Entire	3.6	G													
			System															
			User and Operation Manual	3.6	G													
		23 05 15	SD-01 Preconstruction Submittals															
			Material, Equipment, and Fixture	1.2	G	AE												
			Lists															
			SD-02 Shop Drawings															
			Record Drawings	1.2	G	AE												
			Coordination Drawings	1.2	G	AE												
			Installation Drawings	3.1	G	AE												
			SD-03 Product Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		23 05 15	Pipe and Fittings	2.1	G	AE												
			Piping Specialties	2.2	G	AE												
			Valves	2.3	G	AE												
			Miscellaneous Materials	2.4	G	AE												
			Supporting Elements	2.5	G	AE												
			SD-05 Design Data															
			Pipe and Fittings	2.1	G	AE												
			Piping Specialties	2.2	G	AE												
			Valves	2.3	G	AE												
			SD-06 Test Reports															
			Hydrostatic Tests	3.1	G	AE												
			Air Tests	3.1	G	AE												
			System Operation Tests	3.1	G	AE												
		23 31 13.00 40	SD-01 Preconstruction Submittals															
			Material, Equipment, and Fixture	Part 2	G	AE												
			Lists															
			SD-02 Shop Drawings															
			offset fitting configurations	2.3.3	G	AE												
			Record Drawings	1.3	G													
			SD-03 Product Data															
			Galvanized Steel Ductwork	2.2.1	G	AE												
			Materials															
			Dampers	2.3.4	G	AE												
			Round Sheet Metal Duct Fittings	2.3.1	G	AE												
			Manual Volume Dampers	2.3.7	G	AE												
			SD-07 Certificates															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		23 31 13.00 40	Galvanized Steel Ductwork	2.2.1	G													
			Materials															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.6	G													
			Manuals															
		26 20 00	SD-02 Shop Drawings															
			Panelboards	2.12	G	AE												
			Transformers	2.13	G	AE												
			SD-03 Product Data															
			Receptacles	2.10	G	AE												
			Circuit breakers	2.12.3	G	AE												
			Switches	2.8	G	AE												
			Transformers	2.13	G	AE												
			Motor controllers	2.15	G	AE												
			Cable Reels	2.11	G	AE												
			SD-06 Test Reports															
			600-volt wiring test	3.5.2	G													
			Grounding system test	3.5.5	G													
			Transformer tests	3.5.3	G													
			Ground-fault receptacle test	3.5.4	G													
			SD-09 Manufacturer's Field															
			Reports															
			Transformer factory tests	2.24.1	G													
			SD-10 Operation and Maintenance															
			Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		26 20 00	Electrical Systems	1.5.1	G													
		26 29 23	SD-02 Shop Drawings															
			Schematic diagrams	1.5.1	G	AE												
			Interconnecting diagrams	1.5.2	G	AE												
			Installation drawings	1.5.3	G	AE												
			SD-03 Product Data															
			Variable frequency drives	2.1	G	AE												
			Wires and cables	2.3	G	AE												
			Equipment schedule	1.5.4	G	AE												
			SD-06 Test Reports															
			VFD Test	3.2.1	G													
			Performance Verification Tests	3.2.2	G													
			Endurance Test	3.2.3	G													
			SD-08 Manufacturer’s Instructions															
			Installation instructions	1.5.5	G													
			SD-09 Manufacturer’s Field															
			Reports															
			VFD Factory Test Plan	2.5.1	G													
			Factory test results	1.5.6	G													
			SD-10 Operation and Maintenance															
			Data															
			Variable frequency drives	2.1	G													
		26 51 00	SD-03 Product Data															
			Fluorescent lighting fixtures	2.1	G	AE												
			Fluorescent electronic ballasts	1.6.1	G	AE												
			Fluorescent lamps	2.1.2	G	AE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		26 51 00	Lighting contactor	2.4	G	AE												
			Exit signs	2.5	G	AE												
			Emergency lighting equipment	2.6	G	AE												
			SD-04 Samples															
			Lighting fixtures	1.6.2	G													
			SD-06 Test Reports															
			Operating test	3.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Operational Service	1.8	G													
		40 95 00	SD-02 Shop Drawings															
			Installation	3.1.1	G	AE												
			Wiring	3.1.1	G	AE												
			Control System Drawings	3.5	G	AE												
			SD-03 Product Data															
			Control and Sensor Wiring	3.3.1.2	G	AE												
			Factory Test Procedure	2.7.2	G	AE												
			Control System Components	2.3	G	AE												
			SD-06 Test Reports															
			Factory Test Report	2.7.3	G	AE												
			Testing, Adjusting and	3.6.1	G	AE												
			Commissioning															
			Performance Verification	3.6.2	G	AE												
			Test(PVT)															
			SD-10 Operation and Maintenance															
			Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
DD2

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		40 95 00	Training Manual	3.8	G													
			Instrumentation and Control	1.3	G													
			System															

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 35 26.00 22

GOVERNMENTAL SAFETY REQUIREMENTS (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.3 SUBMITTALS
1.4 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST
1.5 REGULATORY REQUIREMENTS
1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS
1.6.1 Personnel Qualifications
1.6.1.1 Site Safety and Health Officer (SSHO)
1.6.1.2 Contractor Quality Control (QC) Manager
1.6.1.3 Competent Person for Confined Space Entry
1.6.1.4 Crane Operators
1.6.2 Personnel Duties
1.6.2.1 Site Safety and Health Officer (SSHO)
1.6.3 Meetings
1.6.3.1 Preconstruction Conference
1.6.3.2 Safety Meetings
1.7 ACCIDENT PREVENTION PLAN (APP)
1.7.1 EM 385-1-1 Contents
1.8 ACTIVITY HAZARD ANALYSIS (AHA)
1.9 DISPLAY OF SAFETY INFORMATION
1.10 SITE SAFETY REFERENCE MATERIALS
1.11 EMERGENCY MEDICAL TREATMENT
1.12 NOTIFICATIONS AND REPORTS
1.12.1 Accident Notification
1.12.2 Accident Reports
1.12.3 Crane Reports
1.12.4 Certificate of Compliance
1.12.5 Third Party Certification of Barge-Mounted Mobile Cranes
1.13 HOT WORK
1.14 RADIATION SAFETY REQUIREMENTS
1.15 FACILITY OCCUPANCY CLOSURE
1.16 SEVERE STORM PLAN
1.17 CONFINED SPACE ENTRY REQUIREMENTS.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

PART 3 EXECUTIONS

3.1 CONSTRUCTION AND/OR OTHER WORK
3.1.1 Hazardous Material Use
3.1.2 Hazardous Material Exclusions
3.1.3 Unforeseen Hazardous Material

3.2 PRE-OUTAGE COORDINATION MEETING
3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)
3.3.1 Tag Placement
3.3.2 Tag Removal
3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM
3.4.1 Training
3.4.2 Fall Protection Equipment and Systems
3.4.2.1 Personal Fall Arrest Equipment
3.4.3 Fall Protection for Roofing Work
3.4.4 Existing Anchorage
3.4.5 Horizontal Lifelines
3.4.6 Guardrails and Safety Nets
3.4.7 Rescue and Evacuation Procedures
3.5 SHIPYARD REQUIREMENTS
3.6 SCAFFOLDING
3.6.1 Stilts
3.7 EQUIPMENT
3.7.1 Material Handling Equipment
3.7.2 Weight Handling Equipment
3.7.3 Equipment and Mechanized Equipment
3.7.4 USE OF EXPLOSIVES
3.8 ELECTRICAL
3.8.1 Conduct of Electrical Work
3.8.2 Portable Extension Cords
3.9 WORK IN CONFINED SPACES

-- End of Section Table of Contents --

SECTION 01 35 26.00 22

GOVERNMENTAL SAFETY REQUIREMENTS (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.32	(2004) Fall Protection
ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

ASME B30.22	(2010) Articulating Boom Cranes
ASME B30.3	(2009) Tower Cranes
ASME B30.5	(2011) Mobile and Locomotive Cranes
ASME B30.8	(2010) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2010; Errata 2012) Standard for Portable Fire Extinguishers
NFPA 241	(2009) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 51B	(2009; TIA 09-1) Fire Prevention during Welding, Cutting, and Other Hot Work
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NFPA 70E	(2015) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

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

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

10 CFR 20	Standards for Protection against Radiation
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1919	Gear Certification
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.16	Rules of Construction
29 CFR 1926.500	Fall Protection
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146.

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

NAVFAC P-307	(2012) Management of Weight Handling Equipment
ATTACHMENT "A"	"CONTRACTOR CRANE, MULTI-PURPOSE MACHINE, FORKLIFT, CONSTRUCTION EQUIPMENT, AND RIGGING GEAR REQUIREMENTS"
ATTACHMENT "B"	"PORTSMOUTH NAVAL SHIPYARD UTILITY LOCATING PROCEDURES"

The attachments are included following the end of this specification section. If attachments are missing from this copy of specification notify the Contracting Officer.

1.2 DEFINITIONS

a. Competent Person for Fall Protection: A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.

b. High Visibility Accident: Any mishap which may generate publicity or

high visibility.

c. 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 though provided by a physician or registered personnel.

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

e. 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.

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

g. Weight Handling Equipment (WHE) Accident: A WHE accident occurs when any one or more of the eight 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; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occur. 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 days both as provided by the Contracting Officer. Comply with additional requirements and procedures for accidents in accordance with NAVFAC P-307, Section 12.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control

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

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

Activity Hazard Analysis (AHA); G

Crane Critical Lift Plan; G

Proof of qualification for Crane Operators; G

SD-06 Test Reports

Notifications and Reports; G

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

Accident Reports; G

Monthly Exposure Report; G

Crane Reports; G

SD-07 Certificates

Confined Space Entry Permit; G

Hot work permit; G

License certificates; G

Contractor Safety Self-Evaluation Checklist; G

Accident Notification; G

Third Party Certification of Barge-Mounted Mobile Cranes; G

Certificate of Compliance (Crane); G

Submit one copy of each permit/certificate attached to each Daily Production or Quality Control Report

1.4 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction conference. Complete the checklist monthly and submit with each request for payment voucher. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90, may result in a retention of up to 10 percent of the voucher. Additionally, provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the

voucher. The Contracting Officer will submit a copy of the Contractor Safety Self-Evaluation and Monthly Exposure Report to the local safety and occupational health office.

1.5 REGULATORY REQUIREMENTS

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

1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

The SSHO must meet with requirements of EM 385-1-1 Section 1 and ensure that the requirements of 29 CFR 1926.16 are met for this project. 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 or an equally-qualified designated representative/alternate shall be at the work site at all times to implement and administer the Contractor's safety program and government-accepted Accident Prevention Plan. The SSHO's training, experience, and qualifications shall be as required by EM 385-1-1 paragraph 01.A.17, entitled SITE SAFETY AND HEALTH OFFICER (SSHO), and all associated sub-paragraphs.

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

1.6.1.2 Contractor Quality Control (QC) Manager

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

1.6.1.3 Competent Person for Confined Space Entry

Provide a "Competent Person" to supervise the entry into each confined space. That individual must meet the requirements and definition of Competent Person as contained in EM 385-1-1.

1.6.1.4 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 capacitates of 2,000 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. In addition, the Contractor shall comply with Contractor Operated Crane Requirements included in the latest revision of document NAVFAC P-307 Section 1.7.2 "Contractor Operated Cranes," and Appendix P, Figure P-1 and with 29 CFR 1926, Subpart CC.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)

The SSHO shall:

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 production or 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 APP's and AHA's.

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.

h. Maintain a list of hazardous chemicals on site and their Safety Data Sheet (SDS).

Failure to perform the above duties will result in dismissal of the Project 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.

1.6.3 Meetings

1.6.3.1 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 Manager, 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 Contracting Officer'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.

1.6.3.2 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 Contractors' daily production or quality control report.

1.7 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". 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 or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

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

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, Project Superintendent, SSHO and Quality Control Manager. Should any 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 Contracting Officer 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 Contracting Officer's office and at the job site.

Continuously review 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.

1.7.1 EM 385-1-1 Contents

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

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

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

c. Confined Space Entry Plan: Develop a confined 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 CPL 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.)

d. Crane Critical Lift Plan: Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. Submit 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.H. and the following:

(1) For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.550(g).

(2) For barge mounted mobile cranes, barge stability calculations identifying barge list and trim based on anticipated loading; and load charts based on calculated list and trim. The amount of list

and trim shall be within the crane manufacturer's requirements.

e. 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 in height. 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).

The FP&P Plan shall include a Rescue and Evacuation Plan in accordance with USACE EM 385-1-1, Section 21.M. The plan shall 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 in the Fall Protection and Prevention (FP&P) Plan, and as part of the Accident Prevention Plan (APP).

1.8 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 5 calendar days prior to the phase preparatory meeting. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the Portsmouth Naval Shipyard'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 Contracting Officer.

1.9 DISPLAY OF SAFETY INFORMATION

Within one calendar 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 Contracting Officer, 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.

1.10 SITE SAFETY REFERENCE MATERIALS

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

1.11 EMERGENCY MEDICAL TREATMENT

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

1.12 NOTIFICATIONS AND REPORTS

1.12.1 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than four hours after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Ensure positive contact is made with GDA as voice mail and e-mail is not acceptable as official notification. 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.

1.12.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, property damage accidents resulting in at least $20,000 in damages, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: Complete the applicable documentation in NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS).

c. 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 Contracting Officer 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 Contracting Officer. The

Contracting Officer will provide a blank copy of the accident report form.

1.12.3 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix I and as specified herein (Refer to ATTACHMENT "A"- "CONTRACTOR CRANE, MULTI-PURPOSE MACHINE, FORKLIFT, CONSTRUCTION EQUIPMENT, AND RIGGING GEAR REQUIREMENTS") with Daily Reports of Inspections.

1.12.4 Certificate of Compliance

Provide a Certificate of Compliance for each crane entering the Portsmouth Naval Shipyard under this contract (see Contracting Officer for a blank certificate). State within the certificate that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance comply with 29 CFR 1926 and USACE EM 385-1-1 Section 16 and Appendix I. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. Also certify that all of its crane operators working on the Portsmouth Naval Shipyard have been trained in the proper use of all safety devices (e.g., anti-two block devices). Post certifications on the crane.

1.12.5 Third Party Certification of Barge-Mounted Mobile Cranes

Certify barge-mounted mobile cranes in accordance with 29 CFR 1919 by an OSHA accredited person.

1.13 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 Portsmouth Naval Shipyard Activity Fire Department. 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. Provide at least one (1) 2A: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 Portsmouth Naval Shipyard. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 60 minutes after completion of the task or as specified on the hot work permit. Separate hot work permits will be issued for any Hot Asphalt roofing kettle.

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 Portsmouth Naval Shipyard Activity Fire Department phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE PORTSMOUTH NAVAL SHIPYARD ACTIVITY FIRE DEPARTMENT AND THE CONTRACTING OFFICER IMMEDIATELY.

Obtain services from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems, welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, vaults, etc.) that have the potential for flammable or explosive atmospheres.

1.14 RADIATION SAFETY REQUIREMENTS

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

Complete list of requirements are available on the PWD Maine's Web site or available for the COTS representative.

https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_navfacmidlant_pp/pwbl/maine/construction:general%20contractor%20information:tab3

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 un-shielding 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 Portsmouth Naval Shipyard 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.

1.15 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 Contracting Officer.

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.

d. Comply with requirements as per EM-385 1-1 Section 06.I INCLEMENT WEATHER. Contracting Officer will notify Contractor of COR (Condition of Readiness level 1-5) for severe storms.

1.17 CONFINED SPACE ENTRY REQUIREMENTS.

Contractors entering and working in confined spaces while performing general industry work are required to follow the requirements of OSHA 29 CFR 1926 and comply with the requirements in Section 34 of EM 385-1-1 and OSHA 29 CFR 1910.146. Contractors entering and working in confined spaces while performing shipyard industry work are required to follow the requirements of OSHA 29 CFR 1915 Subpart B.

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.

PART 3 EXECUTIONS

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with USACE EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and Portsmouth Naval Shipyard's fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be carried/available on each person.

Mandatory PPE includes:

a. Hard Hat

b. Appropriate Safety Shoes

c. Reflective Vests

3.1.1 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Officer or their designated representative prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract,

radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on Portsmouth Naval Shipyard.

3.1.3 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, dust that could potentially be hazardous, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e., 29 CFR Part 1910.1000). If additional material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Apply for utility outages at least 10 to 15 calendar 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 Contracting Officer to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist and Contracting Officer written approval is obtained.

3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Ensure that each employee is familiar with and complies with these procedures and USACE EM 385-1-1, Section 12, Control of Hazardous Energy and 29 CFR 1910.147.

Contracting Officer will, at the Contractor's request, apply lockout/tag-out 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.

No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tag-out tag attached to it, nor shall such tag be removed except as provided in this section.

No person shall work on any equipment that requires a lockout/tag-out tag

unless he, his immediate supervisor, project leader, or a subordinate has in his possession the stubs of the required lockout/tag-out tags.

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/tag-out 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.

Shipyard and NAVFAC Personnel use a red lock and a red tag to indicate personnel are working on the systems. Use of a red lock and a red tag is highly encouraged to maintain continuity throughout the installation. The use of another colored locks and tags (blue for Shipyard workers and Yellow for NAVFAC personnel) indicate that the system is out of service for some reason.

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/tag-out 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/tag-out 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/tag-out 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/tag-out tag stub to the Contracting Officer. That group's or individual's lockout/tag-out tags on equipment may then be removed on authorization by the Contracting Officer.

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 carabineers 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 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being

constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

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

(2) For work greater than 6 feet from an edge, erect and install warning lines in accordance with 29 CFR 1926.500 and USACE EM 385-1-1.

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

3.4.4 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 fall arrest anchorage systems.

3.4.5 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).

3.4.6 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.

3.4.7 Rescue and Evacuation Procedures

When personal fall arrest systems are used, 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 SHIPYARD REQUIREMENTS

All personnel who enter the Controlled Industrial Area (CIA) of Portsmouth Naval Shipyard shall wear mandatory personal protective equipment (PPE) at all times and comply with PPE postings of shops both inside and outside the CIA.

3.6 SCAFFOLDING

Provide employees with a safe means of access to the work area on the scaffold. A scaffolding competent person shall be present observing erecting, moving, altering, or dismantling any 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 are 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 in height. 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.

3.6.1 Stilts

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

3.7 EQUIPMENT

3.7.1 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. Additionally, when material handling equipment is used as a crane it must meet NAVFAC P-307 requirements in paragraphs entitled "Contractor Operated Cranes," an "Investigation and Reporting of Crane and Rigging Gear Accidents."

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

3.7.2 Weight Handling Equipment

a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.

b. Notify the Contracting Officer 15 days in advance of any cranes entering the Portsmouth Naval Shipyard so that necessary quality assurance spot checks can be coordinated. Contractor's operator shall

remain with the crane during the spot check. (Refer to ATTACHMENT "A" - "CONTRACTOR CRANE, MULTI-PURPOSE MACHINE, FORKLIFT, CONSTRUCTION EQUIPMENT, AND RIGGING GEAR REQUIREMENTS.")

c. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.

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

f. 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.

g. 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.

h. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

i. All employees must keep clear of loads about to be lifted and of suspended loads.

j. Use cribbing when performing lifts on outriggers.

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

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

m. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

n. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by Contracting Officer personnel.

o. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

p. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. Prior to conducting lifting operations set a maximum wind speed at which a crane can be safely operated based on the equipment being used, the load being lifted, experience of operators and riggers, and hazards on the work site. This maximum wind speed determination shall be included as part

of the activity hazard analysis plan for that operation.

3.7.3 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.

3.7.4 USE OF EXPLOSIVES

Use of Explosives is not allowed on Portsmouth Naval Shipyard.

3.8 ELECTRICAL

3.8.1 Conduct of Electrical Work

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

3.8.2 Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately remove from service all damaged extension cords. Portable extension cords shall meet the requirements of EM 385-1-1, NFPA 70E, and OSHA electrical standards.

3.9 WORK IN CONFINED SPACES

Comply with the requirements in Section 34 of USACE EM 385-1-1, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, OSHA Directive CPL 2.100 and OSHA 29 CFR 1926. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 34 of USACE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Sewer wet wells require continuous atmospheric monitoring with audible alarms for oxygen, a flammable gas (methane preferably), hydrogen sulfide and carbon monoxide.

-- End of Section --

SECTION 01 35 26 – ATTACHMENT A

CONTRACTOR CRANE, MULTI-PURPOSE MACHINE, FORKLIFT, CONSTRUCTION EQUIPMENT, AND RIGGING GEAR REQUIREMENTS

1 CONTRACTOR CRANE, MULTI-PURPOSE MACHINE, FORKLIFT, CONSTRUCTION EQUIPMENT, AND RIGGING GEAR REQUIREMENTS

1.1 The following is a list of requirements that contractors shall comply with for all contracts that may result in the use of a category 1 or 4 crane, multi-purpose machines, forklifts, construction equipment, and rigging gear when used on Navy property to lift suspended loads. Non-compliance with the requirements of this instruction may result in denial of access, stopping of operations, or removal from Navy property.

1.2 References:

1.2.1 NAVFAC P-307, Management of Weight Handling Equipment

1.2.2 American Society of Mechanical Engineers (ASME) B30.3 (tower cranes), B30.5 (mobile cranes), B30.8 (floating cranes), B30.9 (slings), B30.20 (below the hook lifting devices), B30.22 (articulating booms), B30.26 (rigging hardware); ANSI/ITSDF B56.6 (rough terrain forklifts); Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings

1.2.3 CFR, Title 29, Chapter XVII, Part 1917, Marine Terminals.

1.2.4 CFR, Title 29, Chapter XVII, Part 1926, Safety and Health Regulations for Construction

1.2.5 CFR, Title 29, Chapter XVII, Part 1915, Occupational Safety and Health Standards for Shipyard Employment

1.2.6 OPNAVINST 5100.23, Navy Safety and Occupational Health Program Manual

1.2.7 EM 385-1-1, Safety and Health Requirements Manual, U.S. Army Corps of Engineers

1.2.8 NAVFAC Guide Specification NFGS-01525D, Safety Requirements

1.3 These requirements are solely intended to provide for the protection of Government property and personnel and are not intended to, and do not, in any manner whatsoever, relieve the contractor of its responsibility, including, without limitation, its responsibility for the protection of its equipment and personnel.

1.4 Notification Requirement: Contractor shall notify the Contracting Officer 7 calendar days in advance of the intent of bringing a non-Navy owned crane onto Navy property or of any multi-purpose machines, material handling equipment, or construction equipment that may be used in a crane-like application to lift suspended loads. The contractor shall also specify when crane entry onto Navy property is scheduled during back shift, weekend, or holiday hours of operation. All entries shall be through a prearranged entry point. The following documentation shall be provided along with notification: a copy of the Certification of Compliance (reference 1.2.1) and objective evidence of operator qualifications for cranes with rated capacities of 2,000 lbs. or greater. Failure to schedule or provide necessary documentation may result in the crane being denied access to the facility.

1.5 The contractor shall comply with applicable reference 1.2.2 standards (e.g., B30.3 for construction tower cranes, B30.5 for mobile cranes, B30.8 for floating cranes, B30.9 for slings, B30.20 for below the hook lifting devices, and B30.22 for articulating boom cranes), B30.26 for rigging hardware, and ANSI/ITSDF B56.6 for rough terrain forklifts). For barge mounted mobile cranes, require a third party certification from an OSHA accredited organization (or from a state accredited organization for those states with OSHA approved state plans), a load indicating device, a wind-indicating device, and a marine type list and trim indicator readable in one-half degree increments. Third party certification is not required for barge-mounted mobile cranes at naval activities in foreign countries.

1.6 Certification of Compliance (reference 1.2.1): The contractor shall complete a certificate of compliance that the crane (or other machine if used to lift suspended loads) and rigging gear meet applicable OSHA and ANSI/ASME regulations (with the contractor citing which OSHA regulations are applicable, e.g., cranes/multi-purpose machines used in cargo transfer shall comply with reference 1.2.3; cranes/multi-purpose machines used in construction, demolition, or maintenance shall comply with reference 1.2.4; cranes/multi-purpose machines used in ship repair shall comply with reference 1.2.5; slings shall comply with ASME B30.9; rigging hardware shall comply with ASME B30.26). For cranes (or other machine if used to lift suspended loads) and rigging equipment at naval activities in foreign countries, the contractor shall certify that the crane and rigging gear conform to the appropriate host country safety standards. The contractor shall also certify that all of its crane (or other machine) operators working on the naval activity have been trained not to bypass safety devices (e.g., anti-two block devices) during lifting operations, and that its operators, riggers, and company officials are aware of the actions required in the event of an accident as specified in the contract. Require that the certifications be posted on the crane. When a crane on Navy property is not authorized for use, the Certification of Compliance shall state, "Operation of this Crane is NOT Authorized."

1.7 The contractor shall certify (reference 1.2.1) that the crane or machine operator is qualified and trained for the operation of the crane to be used. For mobile and commercial truck mounted cranes with OEM rated capacities of greater than 2,000 pounds, the crane operator shall be designated as qualified by a source that qualifies crane operators (i.e., a union, a government agency, or an organization that tests and qualifies crane operators). Proof of current qualification shall be provided.

1.8 For multi-purpose machines, material handling equipment and construction equipment used to lift loads suspended by rigging equipment, the contractor shall have proof or authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. The contractor shall demonstrate that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.9 All hooks used on cranes, hoists, other machines, and rigging gear shall have self-closing latches or the throat opening shall be "moused" (secured with wire, rope, heavy tape, etc.) or otherwise secured to prevent the attached item from coming free of the hook under a slack condition. The following exceptions apply and shall be approved by the contractor's technical organization: items where the hook throat is fully obstructed and not available for manual securing and lifts where securing the hook throat increases the danger to personnel such as forge shop, dip tank, or underwater work.

1.10 Loading Limitations:

CAUTION: Piers and waterfront areas such as along dry docks and quay walls may have load restrictions.

1.10.1 The contractor shall notify the Contracting Officer prior to moving a crane on a pier, dry dock, or other waterfront area. Provide the Contracting Officer with the crane make, model, and configuration in which it is to be used.

1.10.2 The contractor shall comply with crane access routes and load limitations issued with the contract.

1.10.3 Allowable Surface Loads. Loads transferred to soils and pavements shall be minimized to a desired maximum of 3000 pounds per square foot, by placement of cribbing or steel pads under rubber-tired crane outriggers and trailer stanchions/sand shoes, or by placement of mats under treads of crawler cranes. Visually inspect areas adjacent to cribbing or plates and report any unusual bituminous pavement surface conditions, irregularities, or cracking to the Contracting Officer.

1.10.3.1 Outriggers of rubber-tired cranes shall be landed on two layers of timbers of appropriate thickness, oriented at right angles to each other, or landed on properly designed steel pads. Treads of crawler cranes shall run on appropriate mats. Use and design of cribbing, plates and mats shall be in a manner consistent with general construction industry standards.

1.10.3.2 Position loads that will remain on trailers detached from tractors to attain a distribution of 65 percent to rear axles and 35 percent to front support stanchions/sand shoes. For example, assuming an 83000 pound maximum gross weight and a soil bearing pressure of 3000 pounds per square foot, the required support under each sand shoe would be 2.5 feet x 2.5 feet. Accordingly, two tiers of timber cribbing at right angles, each 2.5 feet x 2.5 feet x 4 inches, or a properly designed 2.5 feet x 2.5 feet steel pad would be utilized under each trailer stanchion/ sand shoe.

1.11 Prior to making any critical lift, the contractor shall provide a critical lift plan for each of the following lifts: lifts over 75 percent of the capacity of the crane, hoist, or other machine (50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one crane, hoist, or other machine; lifts of personnel (lifts of personnel suspended by rigging equipment from multi-purpose machines, material handling equipment, or construction equipment shall not be permitted); lifts made in the vicinity of overhead power lines; erection of cranes; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. The plan shall include the following as applicable:

1.11.1 The size and weight of the load to be lifted, including crane (or other machine) and rigging equipment that add to the weight. The OEM's maximum load capacities for the entire range of the lift shall also be provided.

1.11.2 The lift geometry, including the crane (or other machine) position, boom length and angle, height of lift, and radius for the entire range of the lift. Applies to both single and tandem crane/machine lifts.

1.11.3 A rigging plan, showing the lift points, rigging equipment, and rigging procedures.

1.11.4 The environmental conditions under which lift operations are to be stopped.

1.11.5 For lifts of personnel, the plan shall demonstrate compliance with the requirements of reference

1.11.6 For barge mounted mobile cranes, barge stability calculations identifying crane placement/footprint; barge list and trim based on anticipated loading; and load charts based on calculated list and trim specific to the barge the crane is mounted on. The amount of list and trim shall be within the crane manufacturer's requirements.

1.11.7 For lifts in the vicinity of overhead power lines (i.e., if any part of the crane or other machine, including the fully extended boom of a telescoping boom crane or machine, or the load could approach the distances noted in figure 10-3 of reference 1.2.1 during a proposed operation), the plan shall demonstrate compliance to 29 CFR 1926.550(a)(15).

1.12 The following additional documentation is required for contractor provided tower cranes (those cranes defined by ASME B30.3).

1.12.1 Foundation design and requirements

1.12.2 Installation instructions 1.12.4

1.12.3 Assembly and disassembly instructions including climbing/jumping instructions if applicable

1.12.4 Operating manual, limitations, and precautions

1.12.5 Periodic inspection and maintenance requirements

1.13 <u>Crane and Rigging Gear Accident Reporting and Record Keeping</u>: Contractor's operating cranes on Navy property shall report all WHE accidents that occur incidental to an operation, project, or facility as

prescribed by paragraphs (1.10.1) through (1.10.3) requirements below. Contractors shall report directly to their respective Contracting Officer. There are two general categories of accidents as defined below. Crane accidents are those that occur during operation of a crane. Rigging gear accidents are those that occur when gear is used by itself in weight handling operation i.e., without a crane.

1.13.1 Crane Accident: For the purpose of this definition, it is assumed there is an "operating envelope" around any crane, and inside the envelope are the following elements:

- The crane
- The operator
- The rigger(s) and crane walker
- Other personnel involved in the operation (supervisor, mechanic, tag line handler, engineer, etc.)
- The rigging gear between the hook and the load
- The load
- The crane's supporting structure (ground, rail, etc.)
- The lift procedure

1.13.1.1 Definition: A crane 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 the following:

- Personnel injury or death. Minor injuries that are inherent in any industrial operation, including strains and repetitive motion related injuries, shall be reported by the normal personnel injury reporting process in lieu of these requirements.
- Material or equipment damage
- Dropped load
- Derailment
- Two-blocking
- Overload (This includes load tests when the test load tolerance is exceeded.)
- Collision, including unplanned contact between the load, crane, and/or other objects.

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.). *[Bullets]* 3, 4, 5, 6, and 7 are considered crane accidents even though no material damage or injury occurs.

Exception: If a crane is used as an anchor point for a portable hoist/rigging gear, rigging gear accident as defined in paragraph 1.10.2 below is not considered a crane accident if the crane is not being operated (no functions are in motion) at the time of the rigging gear accident, unless the accident results in an overload or damage to the crane, in which case it shall be reported as a crane accident.

1.13.2 Rigging Gear Accidents: For the purpose of this definition, it is assumed there is an “operating envelope” around any weight handling operation, and inside the envelope are the following:

- Rigging gear and miscellaneous equipment
- The user of the gear or equipment
- Other personnel involved in the operation (supervisor, mechanic, tag line handler, engineer, etc.)
- The load
- The gear or equipment’s supporting structure
- The load’s rigging path

- The rigging procedure

1.13.2.1 Definition. A rigging gear accident occurs when any one or more of the five elements in the operating envelope fails to perform correctly during weight handling operations resulting in the following:

- Personnel injury or death. Minor injuries that are inherent in any industrial operation, including strains and repetitive motion related injuries, shall be reported by the normal personnel injury reporting process of the activity in lieu of these requirements.
- Material or equipment damage that requires the damaged item to be repaired because it can no longer perform its intended function. This does not include superficial damage such as scratched paint, damaged lagging, or normal wear on rigging gear.
- Dropped load.
- Two-blocking of cranes and powered hoists.
- Overload. (This includes load tests when the test load tolerance is exceeded.)

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 load, damaged load, etc.). *[Bullets]* 3, 4, and 5 are considered accidents even though no material damage or injury occurs.

1.13.3 The contractor shall notify the Contracting Officer as soon as practical, but not later than four hours, after any WHE accident. The contractor shall secure the accident site and protect evidence until released by the Contracting Officer. The contractor shall conduct an accident investigation to establish the root cause(s) of the accident. Crane operations shall not proceed until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The contractor shall provide the Contracting Officer within 30 days of any accident a Crane and Rigging Gear Accident Report using the form provided in reference1.2.1 consisting of a summary of circumstances, an explanation of causes(s), photographs if available, and corrective actions taken. These notifications and reporting requirements are in addition to those promulgated by reference 1.2.6 and related claimant instructions.

1.14 Each contractor shall perform the following actions prior to conducting crane operations on Navy property:

1.14.1 <u>Inspection Requirements</u>: It shall be the sole responsibility of the contractor to assure the Contracting Officer and/or designated Navy personnel that the crane and associated rigging gear are in good working order and safe for use.

1.14.1.1 <u>Crane Inspection</u>: Perform pre-operational inspection of the crane in the presence of a representative of the Contracting Office of the crane prior to starting work on Navy property. Inspection shall meet all applicable reference 1.2.2, reference 1.2.7 (for NAVFAC construction contracts), and OSHA requirements.

1.14.1.2 <u>Wire Rope Inspection</u>: Perform a Wire Rope Inspection in the presence of a representative of the contracting office to applicable reference 1.2.2, reference 1.2.7 (for NAVFAC construction contracts), and OSHA requirements.

1.14.1.3 <u>Rigging Gear Inspection</u>: Perform a Rigging Gear Inspection in the presence of a representative of the contracting office to applicable reference 1.2.2, reference 1.2.7 (for NAVFAC construction contracts), and OSHA requirements.

APPENDIX P – CONTRACTOR CRANE (OR ALTERNATE MACHINE USED TO LIFT SUSPENDED LOAD) AND RIGGING GEAR REQUIREMENTS

CERTIFICATE OF COMPLIANCE	
This certificate shall be signed by an official of the company that provides cranes (or multi-purpose machines, material handling equipment, or construction equipment used to lift loads suspended by rigging gear) or rigging gear for any application under this contract. Post a completed certificate on each crane or alternate machine (or in the contractor's on-site office for rigging operations) brought onto Navy property.	
CONTRACTING OFFICER'S POINT OF CONTACT (**Government Representative)**	PHONE
PRIME CONTRACTOR/PHONE	CONTRACT NUMBER
CRANE OR ALTERNATE MACHINE SUPPLIER/PHONE (if different from prime contractor)	CRANE OR ALTERNATE MACHINE NUMBER (i.e., ID number)
CRANE OR ALTERNATE MACHINE MANUFACTURER/TYPE/CAPACITY	
CRANE OR ALTERNATE MACHINE OPERATOR'S NAME(S)	
I certify that 1. The above noted crane or alternate machine and all rigging gear conform to applicable OSHA regulations (host country regulations for naval activities in foreign countries) and applicable ASME B30 standards. The following OSHA regulations and ASME standards apply:_____ 2. The operators noted above have been trained and are qualified for the operation of the above noted crane(s) or alternate machine(s). 3. The operators noted above have been trained not to bypass safety devices during lifting operations. 4. The operators, riggers and company officials are aware of the actions required in the event of an accident as specified in the contract.	
COMPANY OFFICIAL SIGNATURE	DATE
COMPANY OFFICIAL NAME/TITLE	
POST ON CRANE (OR ALTERNATE MACHINE) (IN CAB OR VEHICLE) (or in the contractor's on-site office for rigging operations)	

FIGURE P-1

SECTION 01 35 26 – ATTACHMENT A

CONTRACTOR CRANE ENTRY CHECKLIST

1	Crane Company:	**Date of Entry:**		
	Crane Manufacturer/Crane Model/Crane Number:	**Time of Entry:**		
2	Date of Annual Inspection Expiration			
3	Date of Quadrennial Inspection Expiration			
4	Name & phone number of Contracting Official (or designated local representative)	**Contracting Official** **Phone Number**		
5	Does the package include a routine or critical lift plan?		**Yes** ☐	**No** ☐
6	Location of lift site?			
7	Duration crane will be continuously on the job site (hrs, days, weeks…)			
8	Does plan include certification from contractor that the crane complies with ASME B30 standard [B30.5 (mobile cranes), B30.8 (floating cranes), B30.22 (articulating boom cranes), or B30.3 (construction tower cranes)] as applicable?		**Yes** ☐	**No** ☐
9	Does plan include a certificate of compliance?		**Yes** ☐	**No** ☐
10	Which OSHA regulations does the certificate of compliance indicate? (For cranes used in cargo transfer, 29 CFR 1917 applies; for cranes used in construction, demolition, or maintenance, 29 CFR 1926 applies; for cranes used in shipbuilding, ship repair, or ship breaking, 29 CFR 1915 applies).			
11	Does plan include valid medical certificate and proof of operator qualification from a source that qualifies crane operators (union, governmental agency, or an organization that tests and qualifies crane operators)? Verify qualification for each back-up operator (if provided) on the certificate of compliance.	**Yes** ☐	**No** ☐	**N/A** ☐
12	Does the plan designate a qualified Rigger-in-Charge		**Yes** ☐	**No** ☐
13	What is the weight of the heaviest load to be lifted?		**lbs.**	
14	What is the weight of the rigging gear?		**lbs.**	
15	What are the crane components (and their weights) that add to the weight of the load (hook, jib, etc.)?	**Main Block**	**lbs.**	
		Aux. Block	**lbs.**	
		Jib (Stowed)	**lbs.**	
		Jib (Erected)	**lbs.**	
		Other	**lbs.**	
16	What is the maximum total crane lift (sum of 13, 14 & 15 above)?	**TOTAL**	**lbs.**	
17	What is the capacity of the crane as configured		**lbs.**	
18	What percentage of crane capacity does this lift represent?		**%**	

FIGURE P-2

19	What is the main boom length? If a jib will be utilized, indicate the length and offset.		**MAIN**	**JIB**	**OFFSET**	
20	What are the minimum and maximum load radii?	**Min**		**Max**		
21	Does the plan include the manufacturer's load chart for entire range of lift(s)?				**Yes** ☐	**No** ☐
22	Does plan include ground loading and outrigger reaction data to determine cribbing requirements, or a Waterfront Operational Permit?			**Yes** ☐	**No** ☐	**N/A** ☐
23	For crawler crane, does the plan indicate area restrictions for operation?			**Yes** ☐	**No** ☐	**N/A** ☐
24	For floating crane, does plan include maximum allowable list?			**Yes** ☐	**No** ☐	**N/A** ☐
25	For mobile crane mounted on barge, is crane equipped with load indicating device? Wind indicating device? Marine type list and trim indicator (readable in one-half degree increments)?			**Yes** ☐	**No** ☐	**N/A** ☐
26	For mobile crane mounted on barge, does plan include revised load chart?			**Yes** ☐	**No** ☐	**N/A** ☐
27	What are the environmental conditions under which crane operations are to be stopped?					
28	Will the crane perform critical lifts? **(If no, skip items 29 –49.)**				**Yes** ☐	**No** ☐
29	What circumstances require this lift to be classified as a critical lift? (Blind lift, 75% of chart, non-routine rigging, etc.)					
30	What are the exact dimensions of the load? (L x W x H)					
31	Does the plan indicate the crane position? (Overhead view)				**Yes** ☐	**No** ☐
32	What is the maximum lift height of the lift?					
33	What is the minimum boom angle?					
34	What is the maximum boom angle?					
35	What is the name of the operator?					
36	Indicate name(s) of backup operator (if required).					
37	Does the plan show lift points?				**Yes** ☐	**No** ☐
38	Does the plan describe the rigging procedures?				**Yes** ☐	**No** ☐
39	Does the plan indicate rigging hardware requirements?				**Yes** ☐	**No** ☐

FIGURE P-2

40	For personnel lifts, does the plan demonstrate compliance with 29 CFR 1926.550?	**Yes** ☐	**No** ☐	**N/A** ☐
41	Does EM 385-1-1 govern this lift?	**Yes** ☐	**No** ☐	**N/A** ☐
42	What are the coordination and communication requirements for the lift (e.g., radio and hand signals)?			
43	For tandem or tailing crane lifts, does the plan indicate the make and model of the crane, the line, boom, and swing speeds, and the requirement for an equalizer beam?	**Yes** ☐	**No** ☐	**N/A** ☐
44	For floating cranes, refer to questions 20-22?			
45	What is the name of the lift supervisor?			
56	Does the plan indicate the qualifications of the lift supervisor?		**Yes** ☐	**No** ☐
47	What are the names of the riggers?			
48	Does the plan indicate the qualifications of the riggers?		**Yes** ☐	**No** ☐
49	Did all involved personnel (Operator, Riggers, Lift Supervisor, etc.) sign the critical lift plan?		**Yes** ☐	**No** ☐

Name	Organization	**Signature**	**Date**	**Phone**
Contracting Official:				
wed By				

FIGURE P-2

CRANE AND RIGGING GEAR ACCIDENT REPORT

Accident Category: ☐ Crane Accident ☐ Rigging Gear Accident

From: UIC:	To: Navy Crane Center Bldg 491 NNSY Portsmouth, VA 23709 Fax (757) 967-3808
Activity:	Report No:
Crane No: / Category:	Accident Date: / Time: hrs
Category of Service: ☐ SPS ☐ GPS	Crane Type: / Crane Manufacturer:
Was Crane/Rigging Gear Being Used in SPS? Yes No	Was Crane/Rigging Gear Being Used in a Complex Lift/Critical non-crane rigging operation? Yes No
Location:	Weather:
Crane Capacity: / Hook Capacity:	Weight of Load on Hook:
Fatality or Permanent Disability? ☐ Yes ☐ No	Material/Property Cost Estimate:
Reported to NAVSAFECEN? ☐ Yes ☐ No	

Accident Type:
☐ Personal Injury ☐ Overload ☐ Derail ☐ Damaged Rigging Gear
☐ Load Collision ☐ Two Blocked ☐ Dropped Load ☐ Damaged Crane
☐ Crane Collision ☐ Damaged Load ☐ Other Specify _____

Cause of Accident:
☐ Improper Operation ☐ Equipment Failure ☐ Inadequate Visibility
☐ Improper Rigging ☐ Switch Alignment ☐ Inadequate Communication
☐ Track Condition ☐ Procedural Failure ☐ Other Specify _____

Chargeable to:
☐ Crane Walker ☐ Rigger ☐ Operator
☐ Maintenance ☐ Management/Supervision ☐ Other Specify _____

Crane Function:
☐ Travel ☐ Hoist ☐ Rotate ☐ Luffing ☐ Telescoping ☐ Other ☐ N/A

Is this accident indicative of a recurring problem? ☐ Yes ☐ No

If yes, list Accident Report Nos.: _____

ATTACH COMPLETE AND CONCISE SITUATION DESCRIPTION AND CORRECTIVE/PREVENTIVE ACTIONS TAKEN AS ENCLOSURE (1). Include probable cause and contributing factors. Assess damages and define responsibility. For equipment malfunction or failure, include specific description of the component and the resulting effect or problem caused by the malfunction or failure. List immediate and long term corrective/preventive actions assigned and respective codes.

Preparer:	Phone and email	Code	Date

Concurrences:

	Code	Date
Certifying Official (Crane Accidents Only):		

FIGURE 12-1 (1 of 2)

CRANE AND RIGGING GEAR ACCIDENT REPORT INSTRUCTIONS

This form is designed for fax transmission without a cover page or by e-mail and, with enclosures and signatures, shall be the official document. Electronic submission will be accepted without signatures but the names of the preparer, concurring personnel, and certifying official (for crane accidents only) shall be filled in. The e-mail address is m_nfsh_ncc_accident@navy.mil. The fax number is (757) 967-3808.

1. Accident Category: Indicate either crane accident or rigging gear accident.
2. From: The naval activity that is responsible for reporting the accident and UIC number.
3. Activity: The naval activity where the accident took place.
4. Report No.: The activity assigned accident number (e.g., 95-001).
5. Crane No.: The activity assigned crane number (e.g., PC-5), if applicable.
6. Category: Identify category of crane (i.e., 1, 2, 3, or 4), if applicable.
7. Accident Date: The date the accident occurred.
8. Time: The time (24 hour clock) the accident occurred (e.g., 1300).
9. Category of Service: Check the applicable service (SPS as defined by NAVSEA 0989-030-7000).
10. Crane Type: The type of crane involved in the accident (e.g., mobile, bridge), if applicable.
11. Crane Manufacturer: The manufacturer of the crane (e.g., Dravo, Grove, P&H), if applicable.
12. SPS: Was the crane or rigging gear being used in an SPS lift?
13. Complex lift: Was the crane or rigging gear being used in a complex lift?
14. Location: The detailed location where the accident took place (e.g., building 213, dry dock 5).
15. Weather: The weather conditions at time of accident (e.g., wind, rain, cold).
16. Crane Capacity: The certified capacity of the crane (e.g., 120,000 pounds), if applicable.
17. Hook Capacity: The capacity of the hook involved in the accident at the max radius of the operation, if applicable.
18. Weight of Load on Hook: If applicable, the weight of the load on the hook.
19. Fatality or Permanent Disability?: Check yes or no.
20. Material/Property Cost Estimate: Estimate total cost of damage resulting from the accident.
21. Reported to NAVSAFECEN?: Self-explanatory.
22. Accident Type: Check all that apply.
23. Cause of Accident: Check all that apply.
24. Chargeable to: Check all that apply.
25. Crane Function: Check all functions in operation at time of accident. Check N/A if a rigging gear accident.
26. Is this a recurring problem?: Check yes or no. Identify any other similar accidents.
27. Situation Description/Corrective Actions: Self-explanatory.
28. Preparer: Self-explanatory.
29. Concurrences: Self-explanatory.
30. Certifying Official (Crane Accidents Only): Self-explanatory.

FIGURE 12-1 (2 of 2)

CRANE AND RIGGING GEAR NEAR MISS REPORT

Near Miss Category: ☐ Crane Near Miss ☐ Rigging Gear Near Miss

From: UIC:	To: Navy Crane Center Bldg 491 NNSY Portsmouth, VA 23709 Fax (757) 967-3808 nfsh_ncc_accident@navy.mil

Activity:			Report No:
Crane/Equipment No:	Category:	Near Miss Date:	Time: hrs
Category of Service: ☐ SPS ☐ GPS		Crane /Equipment Type:	Crane/Equipment Manufacturer:
Location:		Weather:	
Crane/Equipment Capacity:	Hook Capacity:	Weight of Load on Hook:	

Is this near miss indicative of a recurring problem? ☐ Yes ☐ No

If yes, list report numbers: _____

In the space below, include a brief description of the event and corrective actions taken to prevent recurrence:

Preparer:	Phone and email	Code	Date

FIGURE 12-2 (1 of 2)

CRANE AND RIGGING GEAR NEAR MISS INSTRUCTIONS

This form is designed for fax transmission without a cover page or by e-mail and, with enclosures and signatures, shall be the official document. Electronic submission will be accepted without signatures but the names of the preparer, concurring personnel, and certifying official (for crane accidents only) shall be filled in. The e-mail address is nfsh_ncc_accident@navy.mil. The fax number is (757) 967-3808.

1. Near Miss Category: Indicate either crane or rigging gear near miss.
2. From: The naval activity that is responsible for reporting the near miss and UIC number.
3. Activity: The naval activity where the near miss took place.
4. Report No.: The activity assigned near miss number (e.g., 95-001).
5. Crane No.: The activity assigned crane number (e.g., PC-5), if applicable.
6. Category: Identify category of crane (i.e., 1, 2, 3, or 4), if applicable.
7. Near Miss Date: The date the near miss occurred.
8. Time: The time (24 hour clock) the near miss occurred (e.g., 1300).
9. Category of Service: Check the applicable service (SPS as defined by NAVSEA 0989-030-7000).
10. Crane Type: The type of crane involved in the near miss (e.g., mobile, bridge), if applicable.
11. Crane Manufacturer: The manufacturer of the crane (e.g., Dravo, Grove, P&H), if applicable.
12. Location: The detailed location where the near miss took place (e.g., building 213, dry dock 5).
13. Weather: The weather conditions at time of the near miss (e.g., wind, rain, cold).
14. Crane Capacity: The certified capacity of the crane (e.g., 120,000 pounds), if applicable.
15. Hook Capacity: The capacity of the hook involved in the near miss at the maximum radius of the operation, if applicable.
16. Weight of Load on Hook: If applicable, the weight of the load on the hook.
17. Is this a recurring problem?: Check yes or no. Identify any other similar near misses or accidents.
18. Situation Description/Corrective Actions: Self-explanatory.
19. Preparer: Self-explanatory.

FIGURE 12-2 (2 of 2)

SECTION 01 35 26 – ATTACHMENT B

PORTSMOUTH NAVAL SHIPYARD UTILITY LOCATING PROCEDURES

LOCATION OF UNDERGROUND FACILITIES

B1.1 General

Excavation or ground penetrating work is defined as any operation in which earth, rock or other material below ground is moved or otherwise displaced, by means of power and hand tools, power equipment which includes grading, trenching, digging, boring, auguring, tunneling, scraping and cable or pipe driving except tilling of soil, gardening or displacement of earth, rock or other material for agricultural purposes. Removal of bituminous concrete pavement or concrete is not considered excavation

Ground penetrating work may include but is not limited to installing fence posts, probes, borings, piles, sign posts, stakes or anchor rods of any kind that penetrates the soil more than 3”.

The “Excavator” is defined as the person directly responsible for performing the excavation or ground penetrating work.

B1.2 Underground Utilities

The Contractor/Excavator shall fully comply with the State of Maine “DIG SAFE “law (Title 23, MRSA 3360-A).

Existing underground utilities shown on the plans are based on PNS Yard Plates and are shown in their approximate locations only.

The Excavator shall pre-mark the excavation area in “White Paint Only”. (Field notes may be done in Pink paint).

The Excavator shall notify “DIG SAFE” (1-888-344-7233) at least within 14calendar days, but no more than 30 calendar days prior to the commencement of the excavation or ground penetrating activity.

The Excavator shall prepare a PWD ME Dig Safe Utility Locate Request Format least within 14 calendar days prior to the commencement of the excavation or ground penetrating activity and submit the Form to the Contracting Officer. (The PDW ME Dig Safe Form is attached at the end of this Section.)

The Government will locate and mark the underground utilities within 14 calendar days of receiving the Dig Safe Notification.

Excavation or ground penetrating activities cannot commence until the utilities have been marked in the field and the PWD ME Dig Safe Utility Locate Form has been returned indicating the PWD ME Dig Safe review process has been completed and excavation has been approved by the Contracting Officer.

If the excavation or ground penetrating activities do not commence within27 days of Dig Safe notification or the excavation work is expanded outside the location originally specified in the notification, the Excavator shall re-notify Dig Safe, the Contracting Officer and the PWD ME Dig Safe Coordinator.

PORTSMOUTH NAVAL SHIPYARD UTILITY LOCATING PROCEDURES

The Contractor shall maintain the utility markings though out the contract period. If additional markings are required, the Excavator shall re-notify Dig Safe, the Contracting Officer and the PWD ME Dig Safe Coordinator. Re-markings will be completed at the Contractor’s expense.

The Contractor shall contact the PWD ME Dig Safe Coordinator at 207-438-1082 if there are any questions regarding the underground utilities or the Dig Safe notification

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

11/14

PART 1 GENERAL

1.1 REFERENCES
1.2 ORDERING INFORMATION

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS
11/14

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g. ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ALUMINUM ASSOCIATION (AA)
National Headquarters
1525 Wilson Boulevard, Suite 600
Arlington, VA 22209
Ph: 703-358-2960
E-Mail: info@aluminum.org
Internet: http://www.aluminum.org

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173-4268
Ph: 847-303-5664
Fax: 847-303-5774
E-mail: customerservice@aamanet.org
Internet: http://www.aamanet.org

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
One East Wacker Drive, Suite 700
Chicago, IL 60601-1802

Ph: 312-670-2400
Fax: 312-670-5403
Bookstore: 800-644-2400
E-mail: aisc@ware-pak.com
Internet: http://www.aisc.org

AMERICAN IRON AND STEEL INSTITUTE (AISI)
25 Massachusetts Avenue, NW Suite 800
Washington, DC 20001
Ph: 202-452-7100
Internet: http://www.steel.org

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

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018
Ph: 847-699-2929
Internet: http://www.asse.org

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy Avenue
Denver, CO 80235-3098
Ph: 303-794-7711
E-mail: distribution@awwa.org
Internet: http://www.awwa.org

AMERICAN WELDING SOCIETY (AWS)
13301 NW 47 Ave
Miami, FL 33054

Ph: 888-WELDING, 305-824-1177, 305-826-6192
Fax: 305-826-6195
E-mail: customer.service@awspubs.com
Internet: http://www.aws.org

ASME INTERNATIONAL (ASME)
Two Park Avenue, M/S 10E
New York, NY 10016-5990
Ph: 800-843-2763
Fax: 973-882-1717
E-mail: customercare@asme.org
Internet: http://www.asme.org

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 877-909-2786
Internet: http://www.astm.org

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

CALIFORNIA ENERGY COMMISSION (CEC)
Media and Public Communications Office
1516 Ninth Street, MS-29
Sacramento, CA 95814-5512
Ph: 916-654-5106
E-mail: appliances@energy.ca.gov
Internet: http://www.energy.ca.gov/

FLUID SEALING ASSOCIATION (FSA)
994 Old Eagle School Rd. #1019
Wayne, PA 19087-1866
Ph: 610-971-4850
Internet: www.fluidsealing.com

FM GLOBAL (FM)
270 Central Avenue
P.O. Box 7500
Johnston, RI 02919-4923
Ph: 877-364-6726
Fax: 401-275-3029
E-mail: servicedesk.myrisk@fmglobal.com
Internet: http://www.fmglobal.com

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)
University of South California
Research Annex 219
3716 South Hope Street
Los Angeles, CA 90089-7700
Ph: 213-740-2032 or 866-545-6340
Fax: 213-740-8399
E-mail: fccchr@usc.edu
Internet: http://www.usc.edu/dept/fccchr

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

ILLUMINATING ENGINEERING SOCIETY (IES)
120 Wall Street, 17th Floor
New York, NY 10005-4001
Ph: 212-248-5000

Fax: 212-248-5018
E-mail: IES@IES.org
Internet: http://www.IES.org

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 and 501 Hoes Lane
Piscataway, NJ 08854-4141
Ph: 732-981-0060 or 800-701-4333
Fax: 732-562-9667
E-mail: onlinesupport@ieee.org
Internet: http://www.ieee.org

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)
3050 Old Centre Ave. Suite 102
Portage, MI 49024
Ph: 269-488-6382
Internet: http://www.netaworld.org

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)
3, rue de Varembe
P.O. Box 131
CH-1211 Geneva 20, Switzerland
Ph: 41-22-919-02-11
Fax: 41-22-919-03-00
Internet: http://www.iec.ch

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)
127 Park Street, NE
Vienna, VA 22180-4602
Ph: 703-281-6613
E-mail: info@mss-hq.com
Internet: http://mss-hq.org/Store/index.cfm

MASTER PAINTERS INSTITUTE (MPI)
2800 Ingleton Avenue
Burnaby, BC CANADA V5C 6G7
Ph: 1-888-674-8937
Fax: 1-888-211-8708
E-mail: info@paintinfo.com or techservices@mpi.net
Internet: http://www.mpi.net/

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

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

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 900
Arlington, VA 22209
Ph: 703-841-3200
Internet: http://www.nema.org/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000
Fax: 617-770-0700
Internet: http://www.nfpa.org

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)
100 Bureau Drive
Stop 1070
Gaithersburg, MD 20899-1070
Ph: 301-975-NIST (6478)
E-mail: inquiries@nist.gov
Internet: http://www.nist.gov

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

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

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)
400 Commonwealth Drive
Warrendale, PA 15096
Ph: 724-776-4970
Fax: 877-606-7323
E-mail: customerservice@sae.org
Internet: http://www.sae.org

STEEL DECK INSTITUTE (SDI)
P.O. Box 426
Glenshaw, PA 15116
Ph: 412.487.3325
Fax: 412.487.3326
E-mail: bob@sdi.org
Internet: http://www.sdi.org

STEEL DOOR INSTITUTE (SDI/DOOR)
30200 Detroit Road
Westlake, OH 44145
Ph: 440-899-0010
Fax: 440-892-1404
E-mail: info@steeldoor.org

Internet: http://www.steeldoor.org

STEEL JOIST INSTITUTE (SJI)
234 W. Cheves Street
Florence, SC 29501
Ph: 843-407-4091
Internet: http://www.steeljoist.org

U.S. ARMY CORPS OF ENGINEERS (USACE)
CRD-C DOCUMENTS available on Internet:
http://www.wbdg.org/ccb/browse_cat.php?c=68
Order Other Documents from:
USACE Publications Depot
Attn: CEHEC-IM-PD
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: http://www.publications.usace.army.mil/
or
http://www.hnc.usace.army.mil/Missions/Engineering/TECHINFO.aspx

U.S. DEPARTMENT OF DEFENSE (DOD)
Order DOD Documents from:
Room 3A750-The Pentagon
1400 Defense Pentagon
Washington, DC 20301-1400
Ph: 703-571-3343
FAX: 215-697-1462
E-mail: customerservice@ntis.gov
Internet: http://www.ntis.gov
Obtain Military Specifications, Standards and Related Publications from:
Acquisition Streamlining and Standardization Information System (ASSIST)
Department of Defense Single Stock Point (DODSSP)
Document Automation and Production Service (DAPS)
Building 4/D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Ph: 215-697-6396 - for account/password issues
Internet: http://assist.daps.dla.mil/online/start/; account registration required
Obtain Unified Facilities Criteria (UFC) from:
Whole Building Design Guide (WBDG)
National Institute of Building Sciences (NIBS)
1090 Vermont Avenue NW, Suite 700
Washington, CD 20005
Ph: 202-289-7800
Fax: 202-289-1092
Internet: http://www.wbdg.org/references/docs_refs.php

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-272-0167
Internet: http://www2.epa.gov/libraries

--- Some EPA documents are available only from:
National Technical Information Service (NTIS)
5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6050 or 1-688-584-8332
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)
Order for sale documents from:
Superintendent of Documents
U.S. Government Printing Office (GPO)
710 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: http://www.gpoaccess.gov
Order free documents from:
Federal Aviation Administration
Department of Transportation
800 Independence Avenue, SW
Washington, DC 20591
Ph: 1-866-835-5322
Internet: http://www.faa.gov

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)
FHWA, Office of Safety
1200 New Jersey Ave., SE
Washington, DC 20590
Ph: 202-366-4000
Internet: http://www.fhwa.dot.gov
Order from:
Superintendent of Documents
U. S. Government Printing Office (GPO)
710 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: http://www.gpoaccess.gov

U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
1275 First St. NE
Washington, DC 20417
Ph: 202-501-1231
Internet: http://www.gsaelibrary.gsa.gov/ElibMain/home.do
Obtain documents from:
Acquisition Streamlining and Standardization Information System (ASSIST)
Internet: https://assist.dla.mil/online/start/; account registration required

U. S. GREEN BUILDING COUNCIL (USGBC)
2101 L St NW, Suite 500
Washington, D.C. 20037
Ph: 800-795-1747

Internet: http://www.usgbc.org

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

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)
1322 Patterson Ave. SE, Suite 1000
Washington Navy Yard, DC 20374-5065
Ph: 202-685-9387
Internet: http://www.navfac.navy.mil

UNDERWRITERS LABORATORIES (UL)
2600 N.W. Lake Road
Camas, WA 98607-8542
Ph: 877-854-3577
E-mail: CEC.us@us.ul.com
Internet: http://www.ul.com/
UL Directories available through IHS at http://www.ihs.com

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 45 00.00 20

QUALITY CONTROL (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 INFORMATION FOR THE CONTRACTING OFFICER
1.4 QC PROGRAM REQUIREMENTS
1.4.1 Commissioning
1.4.2 Acceptance of the Construction Quality Control (QC) Plan
1.4.3 Preliminary Construction Work Authorized Prior to Acceptance
1.4.4 Notification of Changes
1.5 QC ORGANIZATION
1.5.1 QC Manager
1.5.1.1 Duties
1.5.1.2 Qualifications
1.5.2 Commissioning Authority
1.5.2.1 Duties
1.5.2.2 Qualifications
1.5.3 Construction Quality Management Training
1.5.4 Alternate QC Manager Duties and Qualifications
1.5.5 Submittal Reviewers Duties and Qualifications
1.6 QUALITY CONTROL (QC) PLAN
1.6.1 Construction Quality Control (QC) Plan
1.6.1.1 Requirements
1.7 QC PLAN MEETINGS
1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING
1.8.1 Purpose
1.8.2 Coordination of Activities
1.8.3 Attendees
1.9 QC MEETINGS
1.10 DESIGN REVIEW AND DOCUMENTATION
1.10.1 Basis of Design
1.10.2 Design Review
1.10.3 Contract Document Review
1.11 THREE PHASES OF CONTROL
1.11.1 Preparatory Phase
1.11.2 Initial Phase
1.11.3 Follow-Up Phase
1.11.4 Additional Preparatory and Initial Phases
1.11.5 Notification of Three Phases of Control for Off-Site Work
1.12 SUBMITTAL REVIEW AND APPROVAL
1.13 TESTING
1.13.1 Accreditation Requirements
1.13.2 Laboratory Accreditation Authorities
1.13.3 Capability Check
1.13.4 Test Results
1.13.5 Test Reports and Monthly Summary Report of Tests

1.14 QC CERTIFICATIONS
1.14.1 CQC Report Certification
1.14.2 Invoice Certification
1.14.3 Completion Certification
1.15 COMPLETION INSPECTIONS
1.15.1 Punch-Out Inspection
1.15.2 Pre-Final Inspection
1.15.3 Final Acceptance Inspection
1.16 DOCUMENTATION
1.16.1 Construction Documentation
1.16.2 Quality Control Validation
1.16.3 Testing Plan and Log
1.16.4 Rework Items List
1.16.5 As-Built Drawings
1.17 NOTIFICATION ON NON-COMPLIANCE
1.18 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN
1.18.1 Requirements During Construction
1.18.1.1 Control Measures
1.18.1.2 Moisture Contamination
1.18.2 Requirements after Construction

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 PREPARATION

-- End of Section Table of Contents --

SECTION 01 45 00.00 20

QUALITY CONTROL (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 52.2	(2012; Errata 2013) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size

ASTM INTERNATIONAL (ASTM)

ASTM D6245	(2012) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation
ASTM D6345	(2010) Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

ANSI/SMACNA 008	(2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

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

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED GBDC	(2009) LEED Reference Guide for Green Building Design and Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES

SD-01 Preconstruction Submittals

Construction Quality Control (QC) Plan; G

Submit a Construction QC Plan prior to start of construction.

Indoor Air Quality (IAQ) Management Plan; G

Basis of Design; G

QC Manager Qualifications; G

Commissioning Authority Qualifications; G

SD-05 Design Data

Design Review; G

SD-07 Certificates

CA Resume; G

1.3 INFORMATION FOR THE CONTRACTING OFFICER

Prior to commencing work on construction, the Contractor can obtain a single copy set of the current report forms from the Contracting Officer. The report forms will consist of the Contractor Production Report, Contractor Production Report (Continuation Sheet), Contractor Quality Control (CQC) Report, (CQC) Report (Continuation Sheet), Preparatory Phase Checklist, Initial Phase Checklist, Rework Items List, and Testing Plan and Log.

Deliver the following to the Contracting Officer during Construction:

a. CQC Report: Mail or hand-carry the original (wet signatures) and one copy by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work.

b. Contractor Production Report: Submit the report electronically by 10:00 AM the next working day after each day that work is performed and for every seven consecutive calendar days of no-work.

c. Preparatory Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Preparatory Phase held.

d. Initial Phase Checklist: Submit the report electronically in the same manner as the CQC Report for each Initial Phase held.

f. Field Test Reports: Mail or hand-carry the original within two working days after the test is performed, attached to the original CQC Report and one copy attached to each QC Report copy.

g. Monthly Summary Report of Tests: Submit the report as an electronic attachment to the CQC Report at the end of each month.

h. Testing Plan and Log: Submit the report as an electronic attachment to the CQC Report, at the end of each month. A copy of the final Testing Plan and Log shall be provided to the OMSI preparer for inclusion into the eOMSI documentation.

i. Rework Items List: Submit lists containing new entries daily, in the same manner as the CQC Report.

j. CQC Meeting Minutes: Within two working days after the meeting is held, submit the report as an electronic attachment to the CQC Report.

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

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. This QC program is a key element in meeting the objectives of NAVFAC Commissioning. The QC program consists of a QC Organization, QC Plan, QC Plan Meeting(s), a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, completion inspections, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program must cover on-site and off-site work and be keyed to the work sequence. No construction work or testing may be performed unless the QC Manager is on the work site. The QC Manager must report to an officer of the firm and not be subordinate to the Project Superintendent or the Project Manager. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the QC Manager is the primary individual responsible for quality control, all individuals will be held responsible for the quality of work on the job.

1.4.1 Commissioning

Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS (PWD ME) for project commissioning requirements.

Commissioning (Cx) is a systematic process of ensuring that all building systems meet the requirements and perform interactively according to the Contract. The QC Program is a key to this process by coordinating, verifying and documenting measures to achieve the following objectives:

a. Verify and document that the applicable equipment and systems are installed in accordance with the design intent as expressed through the Contract and according to the manufacturer's recommendations and industry accepted minimum standards.

b. Verify and document that equipment and systems receive complete operational checkout by the installing Contractors.

c. Verify and document proper performance of equipment and systems.

d. Verify that Electronic Operation and Maintenance Support Information (eOMSI) documentation is complete.

e. Verify the Training Plan and training materials are accurate and provide correct instruction and documentation on the critical elements of the products, materials, and systems in the constructed facility. Verify that all identified Government operating personnel are trained.

1.4.2 Acceptance of the Construction Quality Control (QC) Plan

Acceptance of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary, including removal of personnel, to

ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel are subject to acceptance by the Contracting Officer. The Contracting Officer may require the removal of any individual for non-compliance with quality requirements specified in the Contract.

1.4.3 Preliminary Construction Work Authorized Prior to Acceptance

The only construction work that is authorized to proceed prior to the acceptance of the QC Plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.4 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed changes in the QC Plan or changes to the QC organization personnel, a minimum of 10 work days prior to a proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The QC Manager shall not perform the duties of Project Superintendent nor the duties of SSHO,nor the duties of Project Manager. The QC Manager is required to attend the partnering meetings, QC Plan Meetings, Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this Contract. The QC Manager is responsible for managing and coordinating the testing laboratory personnel and any other inspection and testing personnel required by this Contract. The QC Manager is the manager of all QC activities and shall not be the Special Inspector.

1.5.1.2 Qualifications

An individual with a minimum of 10 years combined experience in the following positions: Project Superintendent, QC Manager, Project Manager, Project Engineer or Construction Manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual must have at least two years experience as a QC Manager. The individual must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification, safety compliance, and sustainability.

1.5.2 Commissioning Authority

1.5.2.1 Duties

Provide a Commissioning Authority (CA) as key person for the Cx and documentation thereof, who is subordinate to the QC Manager. The CA directs and coordinates Cx activities and submits Cx reports to the Contracting Officer to meet the submittal and reporting requirements of the LEED EA Prerequisite Requirement for Fundamental Commissioning. The

CA coordinates the actions of the Testing Laboratory personnel, eOMSI Preparer, and other inspection and testing personnel required by this Contract for building Cx.

1.5.2.2 Qualifications

The CA must be certified as a commissioning professional by the Association of Energy Engineers (AEE), the Building Commissioning Association (BCA), the National Environmental Balancing Bureau (NEBB), or the University of Wisconsin - Madison (UWM). CA resume is required, providing education, experience and management capabilities on at least two similar size and type contracts. The CA may not have been involved with the project design, construction management, or supervision , and must be with a third-party firm that is not on the design team.

1.5.3 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager must have completed the course entitled "Construction Quality Management (CQM) for Contractors." If the QC Manager does not have a current certification, they must obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

1.5.4 Alternate QC Manager Duties and Qualifications

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

1.5.5 Submittal Reviewers Duties and Qualifications

Each submittal must be reviewed by an individual with 10 years of construction experience.

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Construction Quality Control (QC) Plan

1.6.1.1 Requirements

Provide, for acceptance by the Contracting Officer, a Construction QC Plan submitted in a three-ring binder that includes a table of contents, with major sections identified with tabs, with pages numbered sequentially, and that documents the proposed methods and responsibilities for accomplishing commissioning activities during the construction of the project:

a. QC ORGANIZATION: A chart showing the QC organizational structure.

b. NAMES AND QUALIFICATIONS: Names and qualifications, in resume format, for each person in the QC organization. Include the CQM for Contractors course certifications for the QC Manager and Alternate QC Manager as required by the paragraphs entitled "Construction Quality Management Training" and "Alternate QC Manager Duties and Qualifications".

c. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL: Duties, responsibilities, and authorities of each person in the QC organization.

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

e. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as described in this Contract. Include in this letter the responsibility of the QC Manager and Alternate QC Manager to implement and manage the three phases of control, and their authority to stop work which is not in compliance with the Contract.

f. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving, and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in Section 01 33 00 SUBMITTAL PROCEDURES.

g. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs entitled "Accreditation Requirements", as applicable.

h. TESTING PLAN AND LOG: A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test. Use Government forms to log and track tests.

i. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track, and complete rework items. Use Government forms to record and track rework items.

j. DOCUMENTATION PROCEDURES: Use Government form.

k. LIST OF DEFINABLE FEATURES: A Definable Feature of Work (DFOW) is a task that is separate and distinct from other tasks and has control requirements and work crews unique to that task. A DFOW is identified by different trades or disciplines and is an item or activity on the construction schedule. Include in the list of DFOWs, but not be limited to, all critical path activities on the NAS. Include all activities for which this specification requires specialty inspection personnel. Provide separate DFOWs in the Network Analysis Schedule for each design development stage and submittal package.

l. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL: Identify procedures used to ensure the three phases of control to manage the quality on this project. For each DFOW, a Preparatory and Initial phase checklist will be filled out during the Preparatory and Initial phase meetings. Conduct the Preparatory and Initial Phases and meetings with a view towards obtaining quality construction by planning ahead and identifying potential problems for each DFOW.

m. PERSONNEL MATRIX: A personnel matrix showing for each section of the

specification who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document the testing.

n. PROCEDURES FOR COMPLETION INSPECTION: Procedures for identifying and documenting the completion inspection process. Include in these procedures the responsible party for punch out inspection, pre-final inspection, and final acceptance inspection.

o. TRAINING PROCEDURES AND TRAINING LOG: Procedures for coordinating and documenting the training of personnel required by the Contract.

p. ORGANIZATION AND PERSONNEL CERTIFICATIONS LOG: Procedures for coordinating, tracking and documenting all certifications on subcontractors, testing laboratories, suppliers, personnel, etc. QC Manager will ensure that certifications are current, appropriate for the work being performed, and will not lapse during any period of the contract that the work is being performed.

1.7 QC PLAN MEETINGS

Prior to submission of the QC Plan, the QC Manager will meet with the Contracting Officer to discuss the QC Plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding of the QC Plan requirements prior to plan development and submission and to agree on the Contractor's list of DFOWs.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to the start of construction, the QC Manager will meet with the Contracting Officer to present the QC program required by this Contract. When a new QC Manager is appointed, the coordination and mutual understanding meeting shall be repeated.

1.8.1 Purpose

The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, design intent, Cx, environmental requirements and procedures, coordination of activities to be performed, and the coordination of the Contractor's management, production, and QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each DFOW, as well as how each DFOW will be affected by each management plan or requirement as listed below:

a. Waste Management Plan.

b. IAQ Management Plan.

c. Procedures for noise and acoustics management.

d. Environmental Protection Plan.

e. Environmental regulatory requirements.

f. Cx Plan.

1.8.2 Coordination of Activities

Coordinate activities included in various sections to assure efficient and orderly installation of each component. Coordinate operations included under different sections that are dependent on each other for proper installation and operation. Schedule construction operations with consideration for indoor air quality as specified in the IAQ Management Plan. Coordinate prefunctional tests and startup testing with Cx.

1.8.3 Attendees

As a minimum, the Contractor's personnel required to attend include an officer of the firm, the Project Manager, Project Superintendent, QC Manager, Alternate QC Manager, A/E, Commissioning Authority (CA), Environmental Manager, and subcontractor representatives or approved by the approved by the Contracting Officer. Each subcontractor who will be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by the Contractor, the A/E and the Contracting Officer. Provide a copy of the signed minutes to all attendees and shall be included in the QC Plan.

1.9 QC MEETINGS

After the start of construction, conduct weekly QC meetings by the QC Manager at the work site with the Project Superintendent, the CA, and the foremen who are performing the work of the DFOWs. The QC Manager is to prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. The Contracting Officer may attend these meetings. As a minimum, accomplish the following at each meeting:

a. Review the minutes of the previous meeting.

b. Review the schedule and the status of work and rework.

c. Review the status of submittals.

d. Review the work to be accomplished in the next two weeks and documentation required.

e. Resolve QC and production problems (RFI, etc.).

f. Address items that may require revising the QC Plan.

g. Review Accident Prevention Plan (APP).

h. Review environmental requirements and procedures.

i. Review Waste Management Plan.

j. Review IAQ Management Plan.

k. Review Environmental Management Plan.

l. Review the status of training completion.

m. Review Cx Plan and progress.

1.10 DESIGN REVIEW AND DOCUMENTATION

1.10.1 Basis of Design

Review the basis of design received from the Contracting Officer.

1.10.2 Design Review

Review design documents to verify that each commissioned system meets the design intent relative to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. Fully document review in written report.

1.10.3 Contract Document Review

Review the Contract documents to verify that Cx is adequately specified, and that each commissioned system is likely to meet the design intent relative to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts.

1.11 THREE PHASES OF CONTROL

Adequately cover both on-site and off-site work with the Three Phases of Control and include the following for each DFOW.

1.11.1 Preparatory Phase

Notify the Contracting Officer at least two work days in advance of each preparatory phase meeting. The meeting will be conducted by the QC Manager and attended by the Project Superintendent, the CA, and the foreman responsible for the DFOW or as approved by the Contracting Officer. When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman shall attend the preparatory phase meeting. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report and in the Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

a. Review each paragraph of the applicable specification sections.

b. Review the Contract drawings.

c. Verify that field measurements are as indicated on construction and/or shop drawings before confirming product orders, in order to minimize waste due to excessive materials.

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

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

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

g. Coordinate the schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to

stored materials.

h. Arrange for the return of shipping/packaging materials, such as wood pallets, where economically feasible.

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

j. Discuss specific controls used and construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW.

k. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

l. Review the Cx Plan and ensure all preliminary work items have been completed and documented.

1.11.2 Initial Phase

Notify the Contracting Officer at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the Project Superintendent, and the foreman responsible for that DFOW. Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily CQC Report and in the Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

a. Establish the quality of workmanship required.

b. Resolve conflicts.

c. Ensure that testing is performed by the approved laboratory.

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

e. Review the Cx Plan and ensure all preparatory work items have been completed and documented.

1.11.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report:

a. Ensure the work is in compliance with Contract requirements.

b. Maintain the quality of workmanship required.

c. Ensure that testing is performed by the approved laboratory.

d. Ensure that rework items are being corrected.

e. Assure manufacturers representatives have performed necessary inspections if required and perform safety inspections.

f. Review the Cx Plan and ensure all work items, testing, and documentation has been completed.

1.11.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

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

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

1.12 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in Section 01 33 00 SUBMITTAL PROCEDURES.

1.13 TESTING

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

1.13.1 Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

1.13.2 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at http://ts.nist.gov/ts/htdocs/210/214/214.htm , the American Association of State Highway and Transportation Officials (AASHTO) program at http://www.transportation.org/aashto/home.nsf/frontpage , International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, U. S. Army Corps of Engineers Materials Testing Center (MTC)at http://www.wes.army.mil/SL/MTC/, the American Association for Laboratory Accreditation (A2LA) program at http://www.a2la.org/, the Washington Association of Building Officials (WABO) at http://www.wabo.org/ (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) at http://www.wacel.org/labaccred.html (Approval authority by WACEL is limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

1.13.3 Capability Check

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

1.13.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results must be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month, per the paragraph entitled "INFORMATION FOR THE CONTRACTING OFFICER".

1.13.5 Test Reports and Monthly Summary Report of Tests

Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. Provide a copy of the signed test reports and certifications to the OMSI preparer for inclusion into the OMSI documentation.

1.14 QC CERTIFICATIONS

1.14.1 CQC Report Certification

Contain the following statement within the CQC Report: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.14.2 Invoice Certification

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

1.14.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract." Provide a copy of this final QC Certification for completion to the OMSI preparer for inclusion into the OMSI documentation.

1.15 COMPLETION INSPECTIONS

1.15.1 Punch-Out Inspection

Near the completion of all work or any increment thereof, established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager and the CA must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract. Include in the punch list any remaining items on the "Rework Items List", which were not corrected prior to the Punch-Out Inspection. Include within the punch list the estimated date by which the deficiencies will be corrected. Provide a copy of the punch list to the Contracting Officer. The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government "Pre-Final Inspection".

1.15.2 Pre-Final Inspection

The Government and QCM will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" will be documented by the QC Manager as a result of this inspection. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled. Any items noted on the "Pre-Final" inspection must be corrected in a timely manner and be accomplished before the contract completion date for the work, or any particular increment thereof, if the project is divided into increments by separate completion dates.

1.15.3 Final Acceptance Inspection

Notify the Contracting Officer at least 14 calendar days prior to the date a final acceptance inspection can be held. State within the notice that all items previously identified on the pre-final punch list will be corrected and acceptable, along with any other unfinished Contract work, by the date of the final acceptance inspection. The Contractor must be represented by the QC Manager, the Project Superintendent, the CA, and others deemed necessary. Attendees for the Government will include the Contracting Officer, other FEAD personnel, and personnel representing the Client. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract Clause entitled "Inspection of Construction."

1.16 DOCUMENTATION

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

1.16.1 Construction Documentation

Reports are required for each day that work is performed and must be attached to the Contractor Quality Control Report prepared for the same day. Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER" will be used. Reports are required for each day work is performed. Account for each calendar

day throughout the life of the Contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The Project Superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work must be identified by terminology consistent with the construction schedule. In the "remarks" sections of the reports, enter pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, meetings held. For each entry in the report(s), identify the Schedule Activity No. that is associated with the entered remark.

1.16.2 Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders shall be divided and tabbed as shown below. These binders must be readily available to the Contracting Officer during all business hours.

a. All completed Preparatory and Initial Phase Checklists, arranged by specification section.

b. All milestone inspections, arranged by Activity Number.

c. An up-to-date copy of the Testing Plan and Log with supporting field test reports, arranged by specification section.

d. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.

e. An up-to-date copy of the Rework Items List.

f. Maintain up-to-date copies of all punch lists issued by the QC staff to the Contractor and Sub-Contractors and all punch lists issued by the Government.

g. Commissioning documentation including Cx checklists, schedules, tests, and reports.

1.16.3 Testing Plan and Log

As tests are performed, the CA and the QC Manager will record on the "Testing Plan and Log" the date the test was performed and the date the test results were forwarded to the Contracting Officer. Attach a copy of the updated "Testing Plan and Log" to the last daily CQC Report of each month, per the paragraph "INFORMATION FOR THE CONTRACTING OFFICER". Provide a copy of the final "Testing Plan and Log" to the OMSI preparer for inclusion into the OMSI documentation.

1.16.4 Rework Items List

The QC Manager must maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily CQC Report of each month. The

Contractor is responsible for including those items identified by the Contracting Officer.

1.16.5 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by Section 01 78 00.00 22 CLOSEOUT SUBMITTALS (PWD ME) are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager must initial each revision. Upon completion of work, the QC Manager will furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.17 NOTIFICATION ON NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected non-compliance with the Contract. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer 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 will be made the subject of claim for extension of time for excess costs or damages by the Contractor.

1.18 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

Submit an IAQ Management Plan within 15 days after Contract award and not less than 10 days before the preconstruction meeting. Revise and resubmit the Plan as required by the Contracting Officer. Make copies of the final plan available to all workers on site. Include provisions in the Plan to meet the requirements specified below and to ensure safe, healthy air for construction workers and building occupants.

1.18.1 Requirements During Construction

Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of volatile organic compounds (VOCs) in indoor air in accordance with ASTM D6345. Use filters with a Minimum Efficiency Reporting Value (MERV) of 8 in permanently installed air handlers during construction.

1.18.1.1 Control Measures

Meet or exceed the requirements of ANSI/SMACNA 008, Chapter 3, to help minimize contamination of the building from construction activities. The five requirements of this manual which must be adhered to are described below:

a. HVAC protection: Isolate return side of HVAC system from surrounding environment to prevent construction dust and debris from entering the duct work and spaces.

b. Source control: Use low emitting paints and other finishes, sealants, adhesives, and other materials as specified. When available, cleaning products shall have a low VOC content and be non-toxic to minimize building contamination. Utilize cleaning techniques that minimize

dust generation. Cycle equipment off when not needed. Prohibit idling motor vehicles where emissions could be drawn into building. Designate receiving/storage areas for incoming material that minimize IAQ impacts.

c. Pathway interruption: When pollutants are generated use strategies such as 100 percent outside air ventilation or erection of physical barriers between work and non-work areas to prevent contamination.

d. Housekeeping: Clean frequently to remove construction dust and debris. Promptly clean up spills. Remove accumulated water and keep work areas dry to discourage the growth of mold and bacteria. Take extra measures when hazardous materials are involved.

e. Scheduling: Control the sequence of construction to minimize the absorption of VOCs by other building materials.

1.18.1.2 Moisture Contamination

a. Remove accumulated water and keep work dry.

b. Use dehumidification to remove moist, humid air from a work area.

c. Do not use combustion heaters or generators inside the building.

d. Protect porous materials from exposure to moisture.

e. Remove and replace items which remain damp for more than a few hours.

1.18.2 Requirements after Construction

After construction ends and prior to occupancy, conduct a building flush-out or test the indoor air contaminant levels. Flush-out must be a minimum two-weeks with MERV-13 filtration media as determined by ASHRAE 52.2at 100 percent outside air, or in accordance with LEED GBDC. Air contamination testing must be consistent with EPA's current Compendium of Methods for the Determination of Air Pollutants in Indoor Air, and with the LEED GBDC. After building flush-out or testing and prior to occupancy, replace filtration media. Filtration media must have a MERV of 13 as determined by ASHRAE 52.2.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PREPARATION

Designate receiving/storage areas for incoming material to be delivered according to installation schedule and to be placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. Store and handle materials in a manner as to prevent loss

from weather and other damage. Keep materials, products, and accessories covered and off the ground, and store in a dry, secure area. Prevent contact with material that may cause corrosion, discoloration, or staining. Protect all materials and installations from damage by the activities of other trades.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 50 00.00 22

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS (PWD ME)

12/14

PART 1 GENERAL

1.1 SUMMARY
1.2 REFERENCES
1.3 SUBMITTALS
1.4 CONSTRUCTION SITE PLAN
1.5 BACKFLOW PREVENTERS CERTIFICATE
1.5.1 Backflow Tester Certificate
1.5.2 Backflow Prevention Training Certificate

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE
2.1.1 Bulletin Board
2.1.2 Project and Safety Signs
2.2 TEMPORARY TRAFFIC CONTROL
2.2.1 Haul Roads
2.2.2 Barricades
2.2.3 Fencing
2.2.4 Temporary Wiring
2.2.5 Backflow Preventers

PART 3 EXECUTION

3.1 EMPLOYEE PARKING
3.2 AVAILABILITY AND USE OF UTILITY SERVICES
3.2.1 Temporary Utilities
3.2.2 Payment for Utility Services
3.2.2 Sanitation
3.2.3 Telephone
3.2.4 Obstruction Lighting of Cranes
3.2.5 Fire Protection
3.3 TRAFFIC PROVISIONS
3.3.1 Maintenance of Traffic
3.3.2 Protection of Traffic
3.3.3 Rush Hour Restrictions
3.4 CONTRACTOR'S TEMPORARY FACILITIES
3.4.1 Safety
3.4.2 Administrative Field Offices
3.4.3 Storage Area
3.4.4 Appearance of Trailers
3.4.4 Maintenance of Storage Area
3.4.5 Security Provisions
3.4.6 Laydown Space
3.4.7 Weather Protection of Temporary Facilities and Stored Materials
3.4.7.1 Building and Site Storm Protection

3.4.7.2 Condition of Readiness
3.5 PLANT COMMUNICATION
3.6 TEMPORARY PROJECT SAFETY FENCING
3.7 CLEANUP
3.8 RESTORATION OF STORAGE AREA

-- End of Section Table of Contents --

SECTION 01 50 00.00 22

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS (PWD ME)
12/14

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component of, each section of the specifications.

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.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511	(1997e1) Standard for Reduced-Pressure Principle Backflow Prevention Assembly

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

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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2009) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2007; Rev K) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2000) Manual of Uniform Traffic Control Devices

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control

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

SD-01 Preconstruction Submittals

Construction site plan; G

Traffic control plan; G

SD-06 Test Reports

Backflow Preventer Tests; G

SD-07 Certificates

Backflow Tester Certification; G

Backflow Preventers Certificate of Full Approval; G

1.4 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas where vehicle track pads will be installed to prevent the tracking of mud onto the pavement outside the project site limits. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, dewatering system storage tanks and infiltration pits and worker parking areas. Note that worker parking areas may be located at remote locations from the building or project site. Acceptable Parking areas shall be coordinated with the Contracting Officer.

1.5 BACKFLOW PREVENTERS CERTIFICATE

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

1.5.1 Backflow Tester Certificate

Prior to testing, submit to the Contracting Officer certification issued by the State or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester must not be affiliated with any company participating in any other phase of this Contract.

1.5.2 Backflow Prevention Training Certificate

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

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

2.1.1 Bulletin Board

Immediately upon beginning of work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer.

2.1.2 Project and Safety Signs

Construct sign with a face sheet of 4- by 8-foot exterior grade plywood, 1/2-inch thick, mounted on a substantial frame of treated lumber. Provide one coat of lead-free alkyd primer paint and two coats of an exterior type white enamel to frame and sign. Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.

2.2 TEMPORARY TRAFFIC CONTROL

2.2.1 Haul Roads

At Contractors expense construct access and haul roads necessary for proper prosecution of the work under this contract. Construct with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are be avoided. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.2.3 Fencing

Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.

2.2.4 Temporary Wiring

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Include frequent

inspection of all equipment and apparatus.

2.2.5 Backflow Preventers

Backflow Preventers shall be reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged mounted gate valve, stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed must be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and be accompanied by a Certificate of Full Approval from FCCCHR List. After installation conduct Backflow Preventer Tests and provide test reports verifying that the installation meets the FCCCHR Manual Standards.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles in an area designated by the Contracting Officer. These areas will be within reasonable walking distance of the project site. Contractor employee parking must not interfere with existing and established parking requirements of the Portsmouth Naval Shipyard. Privately-owned vehicles are prohibited from the CIA.

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

3.2.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.2.2 Payment for Utility Services

a. Reasonable amounts of the following utilities will be made available to the Contractor without charge.

   Electricity
   Water

b. The Contractor shall pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines; providing meters; and providing transformers; and make disconnections. The Contractor shall provide the backflow devices as specified above and NAVFAC PWD ME shop personnel (at the Portsmouth Naval Shipyard only) will install the backflow preventer. The Contractor shall not operate any Shipyard water system valves. The Contractor shall notify the Contracting Officer a minimum of 15 calendar days prior to the desired date of the installation of the backflow device.

3.2.2 Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes into a municipal, district, or Portsmouth Naval Shipyard

sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow Portsmouth Naval Shipyard regulations and procedures when discharging into the Portsmouth Naval Shipyard sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

3.2.3 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.4 Obstruction Lighting of Cranes

Provide a minimum of two (2) aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

3.2.5 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

3.3 TRAFFIC PROVISIONS

3.3.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide to the Contracting Officer a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the State of Maine Department of Transportation have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that may obstruct vehicle or pedestrian traffic.

c. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage and overhead protection.

3.3.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of

lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

3.3.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

3.4 CONTRACTOR'S TEMPORARY FACILITIES

3.4.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.4.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

3.4.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

3.4.4 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.

b. Paint using suitable paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.4.4 Maintenance of Storage Area

Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

3.4.5 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

3.4.6 Laydown Space

Parking and laydown space on the site is limited to the area shown on the plans. The Contractor shall manage the on-site work including equipment, storage trailers, material, material deliveries to allow the work to be completed within the specified contract duration. This may require the Contractor to locate suitable storage off-site and multiple equipment mobilizations to allow the work to be completed. Equipment or materials not used to complete the work shall be removed from the site. If additional offsite storage; additional mobilization or demobilizations, all these costs shall be included in the base bid.

Failure by the Contractor to plan the work based on the space limitations shall not be the basis for any claim nor an equitable price or contract time adjustment.

3.4.7 Weather Protection of Temporary Facilities and Stored Materials

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

3.4.7.1 Building and Site Storm Protection

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

3.4.7.2 Condition of Readiness

Unless directed otherwise, comply with:

a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards. Contact Contracting Officer for Condition of Readiness (COR) updates and completion of required actions.

b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.

c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.

d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

3.5 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor must install a satisfactory means of communication, such as telephone or other suitable devices and made available for use by Government personnel.

3.6 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

3.7 CLEANUP

Remove construction debris, waste materials, packaging material and the like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store within the fenced area described above or at the supplemental storage area any materials resulting from demolition activities which are salvageable. Neatly stacked stored materials not in trailers, whether new or salvaged.

3.8 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haulroads, and any other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore to the original or better condition, areas used by the Contractor for the storage of equipment or material, or other use. Gravel used to traverse grassed areas must be removed and the area restored to its original condition, including top soil and seeding as necessary.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 57 19.00 22

TEMPORARY ENVIRONMENTAL CONTROLS - PORTSMOUTH NAVAL SHIPYARD (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Sediment
1.2.2 Solid Waste
1.2.3 Hazardous Debris
1.2.4 Chemical Wastes
1.2.5 Garbage
1.2.6 Hazardous Waste
1.2.7 Hazardous Materials
1.2.8 Waste Hazardous Material (WHM)
1.2.9 Oil or Oily Waste
1.2.10 Regulated Waste
1.2.11 Ozone Depleting Substance (ODS)
1.2.12 Universal Waste
1.3 SUBMITTALS
1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS
1.4.1 Environmental Compliance Assessment Training and Tracking System (ECATTS)
1.5 QUALITY ASSURANCE
1.5.1 Preconstruction Survey
1.5.2 Regulatory Notifications
1.5.3 Environmental Brief
1.5.4 Environmental Manager
1.5.5 Contractor 40 CFR Employee Training Records
1.6 SOLID WASTE DISPOSAL PLAN

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)
3.1.1 Environmental Management Plan Review
3.1.2 Licenses, State and Federal permits
3.2 PROTECTION OF NATURAL RESOURCES
3.2.1 Erosion and Sediment Control Measures
3.2.2 Dust Control
3.2.3 Burnoff
3.2.4 Erosion and Sediment Control Inspection Reports
3.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES
3.4 SOLID WASTE MANAGEMENT PLAN
3.4.1 Solid Waste Management Report
3.4.2 Control and Management of Solid Wastes
3.4.2.1 Dumpsters

3.5 WASTE DETERMINATION DOCUMENTATION
3.6 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG
3.7 POLLUTION PREVENTION/HAZARDOUS WASTE MINIMIZATION
3.8 WHM/HW MATERIALS PROHIBITION
3.9 HAZARDOUS MATERIAL MANAGEMENT
3.10 PETROLEUM PRODUCTS AND REFUELING
3.10.1 Oily and Hazardous Substances
3.10.2 Inadvertent Discovery of Petroleum Contaminated Soil or Hazardous Wastes
3.11 FUEL TANKS
3.12 RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES
3.13 CONTROL AND MANAGEMENT OF HAZARDOUS WASTES
3.13.1 General
3.13.2 Containers
3.13.3 Facility Hazardous Waste Generator Status
3.13.4 Hazardous Waste/Debris Management
3.13.4.1 Regulated Waste Storage/Satellite Accumulation/90 Day Storage Areas
3.13.4.2 Sampling and Analysis of HW
3.13.4.3 Asbestos Certification
3.13.4.4 Hazardous Waste Disposal
3.13.5 Class I ODS Prohibition
3.13.5.1 Universal Waste/e-Waste Management
3.14 DUST CONTROL
3.14.1 Dirt and Dust Control Plan
3.15 ABRASIVE AND/OR WET BLASTING
3.15.1 Blasting Operations
3.15.2 Disposal Requirements
3.16 SPRAY PAINTING
3.16.1 Spray Painting Operations
3.17 NOISE
3.18 MERCURY MATERIALS
3.19 CONCRETE WASH WATER
3.19.1 Concrete Wash Water
3.19.2 Pollution Prevention
3.19.3 On-Shipyard Disposal
3.19.4 On-Shipyard Containment Structures
3.19.5 Off-Shipyard Disposal
3.20 DISPOSAL OF CHLORINATED WATER AND DECHLORINATION REQUIREMENTS

-- End of Section Table of Contents --

SECTION 01 57 19.00 22

TEMPORARY ENVIRONMENTAL CONTROLS - PORTSMOUTH NAVAL SHIPYARD (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Note: This is not an all inclusive list of publications and other references may be applicable.

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 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 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 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
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

STATE OF MAINE REGULATIONS

The following STATE OF MAINE REGULATIONS are available on the Internet at: http://www.maine.gov/dep/permits.htm

STATE OF MAINE Statutes are available on the internet at http://www.mainelegislature.org/legis/statues/38/title38ch3sec0.html

MAINE DEP AIR BUREAU CHAPTER 101 Visible Emissions Regulations; http://www.maine.gov/dep/air/rules/index.html

MAINE DEP AIR BUREAU CHAPTER 151 Architectural and Industrial Maintenance(AIM) COATINGS; http://www.maine.gov/dep/air/rules/index.html

MAINE DEP 38 MSRA 420-C	Erosion and Sedimentation Control Law and Rules
MAINE DEP 38 MSRA 420-D	Stormwater Management
MAINE 38 MRSA 439-B	Contractors Certified in Erosion Control (Effective January 1, 2013)
MAINE DEP MSRA 481-490	Site Location of Development

MAINE 38 MSRA 850	Identification of Hazardous Waste
MAINE 38 MSRA 851	Standards for Generators of Hazardous Waste
MAINE 38 MSRA 852	Land Disposal Restrictions
MAINE DEPLW0738	Stormwater Management for Maine
MAINE DEPLW0588	Maine Erosion and Sediment Control Best Management Practices
MAINE 88 MRSA 480A-480Z	Natural Resources Protection Act

MAINE DEP AIR BUREAU CHAPTER 159 Control of Volatile Organic Compounds from Adhesives and Sealants; http://www.maine.gov/dep/air/rules/index.html

1.2 DEFINITIONS

1.2.1 Sediment

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

1.2.2 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 non-hazardous 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.

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. NOTE: Aerosol (paint) cans are Hazardous Wastes and must not be disposed of as solid waste or be considered in any definition of "empty", "paint", or "metal" cans.

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 recyclables.

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.

i. Special Waste: "Special waste" means any solid waste generated by sources other than household and typical commercial establishments that exists in such an unusual quantity or in such a chemical or physical state, or any combination thereof, that may disrupt or impair effective waste management or threaten the public health, human safety or the environment and requires special handling, transportation and disposal procedures. Special waste includes, but is not limited to:

   (1) Ash;

   (2) Industrial and industrial process waste;

   (3) Sludge and dewatered septage;

   (4) Debris from nonhazardous chemical spills and cleanup of those spills;

   (5) Contaminated soils and dredge materials;

   (6) Asbestos and asbestos-containing waste;

   (7) Sand blast grit and non-liquid paint waste;

   (8) High and low pH waste;

   (9) Spent filter media residue; and

   (10) Shredder residue.

1.2.3 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.

1.2.4 Chemical Wastes

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

1.2.5 Garbage

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

1.2.6 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 Parts 260-273, as applicable.

The Resource Conservation and Recovery Act (RCRA) governs the management of hazardous wastes. There is no continuously updated, comprehensive list of hazardous waste, as hazardous waste identification is a process that involves many steps. By Regulation, to be considered a hazardous waste, a material first must be classified as a solid waste (40 CFR §261.2). If a waste is a solid waste, it must then be determined if it is hazardous waste (§262.11). Wastes are defined as hazardous by EPA if they are specifically named on one of four lists of hazardous wastes located in Subpart D of 40 CFR 261, or if they exhibit one of four characteristics located in Subpart C of Part 261 (characteristic wastes), which are: ignitability, corrosivity, reactivity and toxicity. Generators are responsible for characterizing their waste and must determine whether a waste exhibits a characteristic by either testing or applying knowledge of the hazardous waste characteristic of the waste (§262.11). Hazardous waste controls also apply to Universal Wastes.

1.2.7 Hazardous Materials

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

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, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D.

Designation of a material by this definition, when separately regulated or controlled by other 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.

1.2.8 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.

1.2.9 Oil or Oily Waste

Oil: Oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animals, fish or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum fuel oil, sludge, synthetic oils, mineral oils, oil refuse or oil mixed with wastes other than dredged oil.

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.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that:

a. It is not prohibited in other State regulations or local ordinances;

b. The amount generated is "de minimus" (a small amount);

c. It is the result of minor leaks or spills resulting from normal process operations; and

d. All free-flowing oil has been removed to the practical extent possible.

Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, 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.

1.2.10 Regulated Waste

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

1.2.11 Ozone Depleting Substance (ODS)

Chlorofluorocarbons (CFCs), halons or chlorinated hydrocarbons (such as carbon tetrachloride and methyl chloroform), and hydrochlorofluorocarbon (HCFCs) which have been linked to depletion of the earth's ozone layer are all substances collectively known as ozone depleting substances or ODSs. Class I or Class II ODS substances are defined and listed in the Clean Air

Act Section 602 and 40 CFR 82.

1.2.12 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.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey; G

Solid Waste Management Plan; G

Regulatory Notifications; G

Environmental Management Plan (EMP); G

Dirt and Dust Control Plan; G

Contractor Hazardous Material Inventory Log; G

Storm Water Management/Erosion and Sedimentation Control Plan; G

SD-06 Test Reports

Laboratory Analysis; G

Disposal Requirements; G

Erosion and Sediment Control Inspection Reports; G

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 Management and Erosion Control Compliance Notebook; G

Waste Determination Documentation; G

Disposal Documentation for Hazardous and Regulated Waste; G

Contractor 40 CFR Employee Training Records; G

Solid Waste Management Report; G

Contractor Hazardous Material Inventory Log; G

Hazardous Waste/Debris Management; G

Regulatory Notifications; G

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined herein. 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.

1.4.1 Environmental Compliance Assessment Training and Tracking System (ECATTS)

The QC Manager is responsible for environmental compliance on projects unless an Environmental Manager is named. The QC Manager (and alternative QC Manager) or Environmental Manager shall complete ECATTS training prior to starting respective portions of on-site work under this contract. If personnel changes occur for any of these positions after starting work, replacement personnel shall complete ECATTS training within 14 days of assignment to the project.

Submit an ECATTS certificate of completion for personnel who have completed the required "Environmental Compliance Assessment Training and Tracking System (ECATTS)" training. This training is web-based and can be accessed from any computer with Internet access using the following instructions.

Register for NAVFAC Environmental Compliance Training and Tracking System, by logging on to http://navfac.ecatts.com/. Obtain the password for registration from the Contracting Officer.

This training has been structured to allow Contractor personnel to receive credit under this contract and also to carry forward credit to future contracts. Contractors shall ensure that the QC Manager (and alternate QC Manager) or Environmental Manager review their training plans for new modules or updated training requirements prior to beginning work. Some training modules are tailored for specific State regulatory requirements; therefore, Contractors working in multiple states will be requires to re-take modules tailored to the state where the contract work is being performed.

ECATTS is available for use by all Contractor and subcontractor personnel associated with this project. These other personnel are encouraged (but not required) to take the training and may do so at their discretion.

1.5 QUALITY ASSURANCE

1.5.1 Preconstruction Survey

Perform a Preconstruction Survey of the project site with the Contracting Officer, and when requested, take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record with a copy provided to the Contracting Officer. The Contractor must obtain a camera pass from PNSY security (via Contracting Officer) prior to use of a camera at PNSY. Digital cameras only shall be used. All computer discs shall be turned over to PNSY security (via Contracting Officer) for review and clearance prior to use by the Contractor.

1.5.2 Regulatory Notifications

The Contractor is responsible for preparing all regulatory notification requirements in accordance with Federal, State and local regulations. Regulatory notifications shall be submitted by the Government unless otherwise directed by the Contracting Officer. The Contractor shall submit copies of all regulatory notifications to the Contracting Officer prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, remediation of controlled substances asbestos, hazardous waste, lead paint.

1.5.3 Environmental Brief

Attend an environmental brief prior to commencing any work on the Shipyard. The brief will be conducted by the Contracting Officer's Representative. The Contractor shall 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; types and quantities of oil that will be brought onto the activity; and pollution control measures for spill prevention and control, and any bulk oil storage container information including quantity and type of product stored. Discuss the results of the Preconstruction Survey at this time.

Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, required permits, specific permit requirements, and other measures to be taken. Identify additional environmental concerns specific to the site (i.e. historic, archeological and natural resources, Installation Restoration, erosion and sediment control, spill prevention and control, soil management and disposal requirements, etc.).

1.5.4 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 Shipyard requirements. The Environmental Manager cannot perform the duties of the Project Superintendent or the SSHO. 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; implement, inspect and maintain erosion and sediment controls as required by State law; and maintain the Environmental Records binder and required documentation, ensure compliance with all SPCC requirements, not limited to the proper storage of tanks and containers and their secondary containment, inspections, spill procedures, etc. including environmental permits compliance and close-out.

1.5.5 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 shall 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 Contracting Officer at the conclusion of the project, unless otherwise directed.

1.6 SOLID WASTE DISPOSAL PLAN

Provide a Solid Waste Disposal Plan in accordance with Paragraph entitled "Solid Waste Management Plan" in Part 3 of this Section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Prior to initiating any work on site, the Contractor shall meet with the Contracting Officer and the Shipyard's Activity Environmental Staff (Code 106.3) to discuss the proposed Environmental Management Plan and develop a mutual understanding relative to the details of environmental protection required to be addressed in EMP, including measures for protecting natural resources and other measures to be taken. The Environmental Management Plan shall 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 (office phone number, cell phone number, and e-mail address).

(2) General site information including a site plan showing haul routes, stockpile and material laydown and storage areas, dust control, construction trailers locations, sanitary facilities and all other construction facilities required for the work.

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

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 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.

(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 will be provided by the Contracting Officer. 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) At a minimum, procedures to prevent releases to the environment will be made available, as well as what notifications to make in

the event of a release to the environment.

(2) A Spill Prevention, Control, and Countermeasures (SPCC) Plan is required if work is anticipated to extend beyond 6 months, AND will use bulk oil storage containers 55 gallons or greater, in accordance with 40 CFR 112. All SPCC plans must be approved by Code 106.3. Plans need not be certified by a Professional Engineer but must clearly demonstrate proper management of all tanks and containers on site.

(3) Spill plans should at a minimum include the following:

a) Type of tank or container, quantity stored, type of product stored, location

b) Secondary containment required for tanks/containers 55 gallons or greater; double-wall tanks preferred

c) Tank inspection forms (industry standard, but prefer if they used the Shipyard inspection forms) Records shall be kept for 3 years or for the duration of the project. Tanks shall be inspected monthly.

i) Bulk storage containers (55 gallons or greater require monthly inspection)

ii) Inspection sheet for release of retained storm water from secondary containment.

d) Where spill kits are located

e) If transferring fuel: how often, what type of fuel, and where? The Contractor must coordinate with Contracting Officer Representative and Code 106.3 prior to transferring any fuel.

f) Who to notify in case of a spill (Central Dispatch, NRC, MEDEP as needed)

g) How to clean up a spill safely and how to properly dispose of spill cleanup waste (call for pickup at B357)

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 Management Plan Review

Within 30 calendar days after the Contract award date, the Contractor shall 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 by the Contracting Officer and Activity Environmental Office.

3.1.2 Licenses, State and Federal permits

The approved State and Federal permits for this project may include the following:

1. Costal Zone Management Act
2. MEDEP Site Location of Development Permit Modification (SLDA)
3. Natural Resource Protection Act Permit (NRPA)
4. Army Corp of Engineers (ACOE)

Copies of the approved permit(s) are available from the Contracting Officer. The Contractor shall maintain copies of all permits at the project site. The Contractor shall comply with all the terms and conditions of the approved permits.

Where required by the State regulatory authority, the inspections and certifications will be provided through the services of a Professional Engineer (PE), registered in the State of Maine. Where a PE is not required, the individual must be otherwise qualified by other current State licensure, specific training and prior experience (minimum 5 years). As a part of the quality control plan, which is required to be submitted for approval by the quality control section, provide a sub item containing the name, appropriate professional registration or licence number, address, and telephone number of the professionals or other qualified persons who will be performing the inspections and certifications for each permit.

3.2 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work and as specified in the permits issued for the 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.

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 Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor 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 Contracting Officer's approval before replacement. Tree wound paint shall not be used for tree cuts or stumps.

3.2.1 Erosion and Sediment Control Measures

a. The State of Maine Erosion and Sediment Control Law requires persons undertaking activity involving filling, displacing or exposing soil or other earthen materials to take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource.

At the Portsmouth Naval Shipyard, the Piscataqua River, Upper Meade Pond and Lower Meade Pond are protected natural resources under State Law. Erosion control measures shall be in place before the activity begins, maintained and shall remain in place and functional until the site is permanently stabilized.

Temporary and permanent erosion control measures shall meet, at a minimum, the construction standards presented in the Maine Erosion and Sediment Control Best Management Practices Manual, latest edition. Other techniques may be employed if the Contractor demonstrates to the Contracting Officer that the practice will achieve the required result of no release of sediment per State law.

b. Site work including any filling, excavation, landscaping, and/or other earthwork in excess of one cubic yard of disturbance, shall comply with State of Maine requirements for certification in erosion and sediment control practices within a shoreland zone. A certified individual shall be responsible for management of erosion and sediment control practices at the site each day earth moving activities occur. A certified individual is required to visit the site every day to ensure proper erosion and sediment control practices are followed. As an alternative, the Contractor may choose to contract with a certified individual to supervise the Contractor's work in shoreland areas.

Under the State of Maine's Shoreland Zoning Statutes, the Portsmouth Naval Shipyard is located entirely within the state's Shoreland zone.

c. Storm Water Management/Erosion and Sedimentation Control Plan

(1) The Contractor shall submit a Storm Water Management/Erosion and Sedimentation Control Plan to the Contracting Officer, for review and approval. The Plan shall demonstrate effective selection, implementation and maintenance of Best Management Practices (BMPs) demonstrating compliance with the Shipyard's Maine Pollutant Discharge Elimination System's Multi-Sector General Permit for Stormwater Discharge Associated With Industrial Activity (MSGP) and the State of Maine Erosion and Sediment Control Law for projects in Maine.

The Contractor shall describe and ensure compliance with terms of state general permit for storm water discharge and terms and conditions specified in the approved permits issued for the work.

Provide plan details of chosen temporary erosion and sediment controls to be employed specific to the work site. Provide site plan showing locations for controls. Ensure proposed controls comply with MEDEP approved plans and State regulations.

Submit Storm Water Management and Erosion Control Compliance Notebook at project completion or as directed by the Contracting Officer.

The Plan shall:

(a) Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.

(b) Describe and ensure implementation of practices which will be used

to reduce the pollutants in storm water discharge at the manufacturing, storage and lay down, and construction sites.

(c) Describe and ensure full compliance with State of Maine General Permit - Construction Activity (No. DEPLW0801 latest edition) and permits issued by the MEDEP and ACOE specific to the project.

(d) Describe and ensure compliance with MEDEP over winter stabilization and construction requirements.

(e) Identify inspections and maintenance schedules for Best Management Practices demonstrating compliance with Maine standards. Maintenance procedures shall address regular cleaning of drainage structures and repair of temporary erosion control structures, as well as a final cleaning of all drainage structures and removal and reclamation of temporary erosion and sediment control BMP's upon completion of the project.

(f) Select applicable management practices from Maine Erosion and Sediment Control BMPs. Present construction details for all proposed erosion and sediment controls.

(g) Include documentation that the individual responsible for management of erosion and sediment control practices at the site is certified in accordance with the State of Maine DEP regulations.

(h) Control of Manufactured Concrete Product Waste Plan

3.2.2 Dust Control

Dust control shall meet the requirements of MEDEP Erosion and Sediment Control BMPs. 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.

When temporary dust control measures are employed, repetitive treatment shall be applied as needed to accomplish control.

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed an opacity of 20 percent, except for no more than five (5) minutes in any 1-hour period.

3.2.3 Burnoff

Burnoff of the ground cover is not permitted.

3.2.4 Erosion and Sediment Control Inspection Reports

Inspection reports shall be kept on file at the project site and submitted electronically to the Contracting Officer upon request. The State of Maine requires inspections of disturbed and impervious areas, erosion and sediment control measures, areas used for storage that are exposed to precipitation, and locations where vehicles enter or exit the site.

Inspections shall be performed at least once per week as well as BEFORE and AFTER a storm event. A storm event is any precipitation event with the potential to create runoff but at a minimum should be every storm greater than 0.5 inches of precipitation. Inspection reports shall document compliance with State requirements.

3.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

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

If required for the project, a certified Maine Archeologist shall be on site to monitor excavation work. The qualifications of the Archeologist shall be submitted and approved by the Contracting Officer. A site monitoring report prepared by the Archeologist shall be submitted to the Contracting Officer within 21 calendar days of completing site excavation work.

3.4 SOLID WASTE MANAGEMENT PLAN

Provide a written Solid Waste Disposal Plan (SWDP) to the Contracting Officer, of intended licensed disposal sites for Government approval and for submission to State regulatory agencies. At a minimum, the SWDP shall contain, but not be limited to, the following wastes: stumps and grubbings, excess soil, construction debris, demolition debris, household solid waste, special waste, and industrial solid waste. The submission shall contain the name of the disposal facility, address, facility phone number, and the waste type and quantity to be disposed of at the facility.

If waste from the site is taken to a transfer station, identify the facility or facilities at which the waste is ultimately disposed. Government approval for the facility must be obtained prior to transporting wastes off Government property.

Provide to the Contracting Officer 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 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 Contracting Officer. For each waste, the report shall state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

The Contractor shall 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/her own use, the Contractor shall submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received will not be reported to the Contracting Officer 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 Contracting Officer and the Shipyard 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 and Shipyard requirements.

3.4.2.1 Dumpsters

Equip dumpsters with a secure cover and paint the standard Shipyard 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 Shipyard 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 and/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/graphtoc.pdf), which provides information required by EPCRA Sections 312 and 313 along with corresponding Material

Safety Data Sheets (MSDS) to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Documentation for any spills/releases, environmental reports or off-site transfers shall be submitted to the Contracting Officer.

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 Shipyard Environmental Office 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 Contracting Officer. 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.

Incidental materials used to support the contract including, but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. may be hazardous wastes and shall be disposed by the Government as described in the Hazardous Waste Management Section. The list is illustrative rather than inclusive. Universal wastes must be managed with controls similar to those for hazardous waste.

The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or to the Piscataqua River or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer.

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 Contracting Officer prior to bringing the material on the Shipyard. 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 Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. 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 Contracting Officer

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. 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 Contracting Officer. The Contractor shall not disturb this material until authorized by the Contracting Officer.

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. 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 **ALL** spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law. 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 Shipyard Fire Department and the Shipyard's Command Duty Officer, and the Contracting Officer. If the Contractor's response is inadequate, the Navy may respond. If this should occur, the Contractor will be required to reimburse the Government for spill response assistance

and analysis.

The Contractor is responsible for verbal and written notifications as required by the Federal 40 CFR 355, State, and local regulations and Navy Instructions. Spill response shall be in accordance with 40 CFR 300 and applicable State and local regulations. 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 20 days.

Maintain spill cleanup equipment and materials at the work site. Clean up all hazardous and non-hazardous (WHM) 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

At the time of the pre construction conference the Contractor will be briefed and provided written information regarding hazardous waste management. The Government will provide technical and oversight assistance in all aspects of hazardous waste management.

3.13.1 General

All hazardous wastes generated within the confines of the Shipyard shall be disposed of by the Government. Accordingly, all hazardous wastes generated by the Contractor to accomplish requirements of this contract shall be considered Government-generated, and shall be disposed of by the Government. Contractor shall not bring hazardous wastes onto Government property. Hazardous wastes shall be handled in compliance with 40 CFR 260-268, 273, 279 and State of Maine MEDEP Regulations Chapter 850 to 855. For hazardous waste spills, the Contractor shall call the Shipyard Fire Department, extension 2333, immediately, then verbally notify the Contracting Officer.

3.13.2 Containers

Contractor shall use only Government-furnished, Government-labeled containers for the packaging of hazardous soils and wastes. Containers will be delivered to the Contractor's work area following receipt and approval of the Management Plan required above.

a. Contractor shall segregate hazardous and non-hazardous soils/wastes. Hazardous soils/wastes shall be placed into containers provided by the Government. Full containers shall be turned over to the Government at Building 357 (Code 106.3). While hazardous soils/wastes are in the control of the Contractor, such hazardous soils/wastes shall be handled in accordance with Shipyard requirements.

b. Notify the Contracting Officer or the designated representative daily to ensure containers of hazardous and universal wastes are secured by the Government prior to the end of the shift or as arranged and approved by Code 106. All hazardous wastes shall be placed in a Government approved hazardous waste satellite accumulation area or turned over directly to Building 357. Prior to Government acceptance of the containers, the Contractor shall provide the certification required by the "Submittals" paragraph of this Section, and such additional information regarding contents of the containers as may be required by the Government representative for proper classification of the wastes.

3.13.3 Facility Hazardous Waste Generator Status

Portsmouth Naval Shipyard is designated as a Large Quantity Generator. All work conducted within the boundaries of the Shipyard must meet the regulatory requirements of this generator designation. The Contractor shall 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.

3.13.4 Hazardous Waste/Debris Management

Identify all construction activities which will generate hazardous waste/debris and universal wastes. 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 wastes and universal wastes will also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Daily worksite accumulation of hazardous wastes and universal wastes shall be 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 Shipyard personnel from the Shipyard Environmental Office. No hazardous waste will be brought onto Government property. Provide to the Contracting Officer 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 Contracting Officer immediately.

3.13.4.1 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 Contracting Officer providing the following information:

Contract Number	_____	Contractor	_____
Haz/Waste or Regulated Waste POC	_____	Phone Number	_____
Type of Waste	_____	Source of Waste	_____
Emergency POC	_____	Phone Number	_____

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 - UNAUTHORIZED PERSONNEL KEEP OUT"

3.13.4.2 Sampling and Analysis of HW

a. Waste Sampling

Sample waste in accordance with Navy Environmental Compliance Sampling and Field Testing Procedures Manual, NAVSEA T0300-AZ-PRO-010, 01 April 2013. Each sampled drum or container will be clearly marked with the Contractor's identification number and cross referenced to the chemical analysis performed; sampling shall be in accordance with NAVSHIPY PTSMH INST 5090.8 B.

b. Laboratory Analysis

Follow the analytical procedure and methods in accordance with the EP-SLU-846. The Contractor will provide all analytical results and reports performed to the Contracting Officer, and Code 106.3 Environmental Sampling Project Manager.

All laboratory analysis for hazardous waste identification must be performed by a laboratory complaint with OPNAVINST 5090.1 Chapter 7-3.3. Proof of compliance must be made available upon request. All analyses provided by laboratories that are not compliant with the stated requirements will be rejected.

c. Analysis Type

Identify waste material/hazardous waste by analyzing for properties that are reasonably suspected of the waste. Soil and other materials may require specific analysis for acceptance to a disposal facility - please check with personnel at the HWSF before choosing parameters.

3.13.4.3 Asbestos Certification

Items, components, or materials disturbed by or included in work under this contract may involve asbestos. Other materials in the general area around where work will be performed may contain asbestos. All thermal insulation, in all work areas, should be considered to be asbestos unless positively identified by conspicuous tags or previous laboratory analysis certifying them as asbestos free.

Inadvertent discovery of non-disclosed asbestos that will result in an abatement action requires a change in scope before proceeding. Upon discovery of asbestos containing material not identified in the contract documents, the Contractor shall immediately stop all work that would generate further damage to the material, evacuate the asbestos exposed area, and notify the Contracting Officer for resolution of the situation prior to resuming normal work activities in the affected area. The Contractor will not remove or perform work on any asbestos containing materials without the prior approval of the Contracting Officer. The Contractor will not engage in any activity, which would remove or damage such materials or cause the generation of fibers from such materials.

Asbestos containing waste shall be managed and disposed of in accordance with applicable environmental law. Asbestos containing waste shall be manifested and the manifest provided to the Contracting Officer. Disposal of asbestos-containing waste must be coordinated with the Navy.

3.13.4.4 Hazardous Waste Disposal

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) 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 Contracting Officer. 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 Contracting Officer.

<u>Contractor Disposal Turn-In Requirements</u>

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'.

f. Provide disposal documentation for hazardous and regulated waste.

3.13.5 Class I ODS Prohibition

Class I ODS as defined 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 Contracting Officer.

3.13.5.1 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.

3.14 DUST CONTROL

Dust control shall meet the requirements of MEDEP Erosion and Sediment Control BMPs. 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. When temporary dust control measures are employed, repetitive treatment shall be applied as needed to accomplish control. Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed an opacity of 20 percent, except for no more than five (5) minutes in any 1-hour period.

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 measure the reduce dirt, dust, and debris form roadways.

3.15 ABRASIVE AND/OR WET BLASTING

3.15.1 Blasting Operations

(a) Abrasive Blasting

The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive, agent, paint chips, and other debris.

Abrasive blasting shall take place in containments with emissions vented through bag house filters and emissions shall be limited to 10% opacity on a six minute block average. The bag houses must be used to control PM emission and operated properly at all times abrasive blasting is being performed.

(b) Wet Blasting

The use of wet blasting requires the capture and proper disposal of all wastes, including the blasting water, associated with the process.

3.15.2 Disposal Requirements

Submit analytical results of the wastes and/or debris generated from 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. Concrete wash water and oily waste generated from blasting operations will be disposed of in accordance with the policy outlined in these specifications.

3.16 SPRAY PAINTING

3.16.1 Spray Painting Operations

Spray painting operations shall take place in containment. Emissions from spray painting shall vent through air filters and are limited to 10% opacity on a six minute block average. The air filters are used to control particulate emissions.

3.17 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA or sound deadening enclosures to limit noise within the project site. Blasting or the use of explosives will not be permitted. Confine any operations that may generate excessive noise to the period between 7 a.m. and 5 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified or approved by the Contracting Officer. The maximum permissible sound pressure levels, as measured at the limits of the Navy Property

boundary, shall not exceed the maximum noise levels as specified in the Town of Kittery's Ordinance and all applicable OHSA Regulations.

3.18 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 Shipyard Environmental Office and the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer. Cleanup of a mercury spill shall not be recycled and shall be managed as a hazardous waste for disposal.

3.19 CONCRETE WASH WATER

Concrete wash water shall be defined as water or storm water that has come into contact with cement, uncured concrete, concrete dust or other material of a similar nature generated during construction activities including, but not limited to, washing down ready-mix trucks, mixers and wheelbarrows, tools, concrete areas; masonry cutting operations; cleaning up of split mortar or block fill; hosing away excess materials.

3.19.1 Concrete Wash Water

Concrete wash water shall be defined as water, pressure washing water, or storm water that has come into contact with cement, uncured concrete, concrete dust or other material of a similar nature generated during construction activities including, but not limited to, washing down ready-mix trucks, mixers and wheelbarrows, pre casting equipment, forms, manufactured cast concrete sections, tools, concrete areas; masonry cutting operations; cleaning up of split mortar or block fill; hosing away excess materials.

Water or storm water that has come into contact with pre casting equipment, forms, tools, etc which have been subjected to oil based form release agents will be considered an oily waste if a visual inspection indicates any signs of oil residual. Oily wastes shall be collected and disposed of in accordance with Shipyard policy.

3.19.2 Pollution Prevention

Store dry and wet concrete supplies under cover away from drainage areas. Concrete wash water shall not be released to the storm drain system, sewer system, roadways or other uncontained impervious surfaces, or to natural waterways including the Piscataqua River and its tributaries. Contractor shall take all precautions necessary to prevent rainwater or stormwater runoff to come in contact with concrete wash water. Divert clean stormwater and roof runoff from contact with concrete wash water. Contractor shall take all measures necessary to minimize the volume of concrete wash water generated. Contractor shall protect all waterways, catch basins and storm drain structures from potential discharges of concrete wash water. Contractor shall collect and control concrete wash water separately from waste water determined to be oily waste.

3.19.3 On-Shipyard Disposal

Small volumes of concrete wash water generated can be disposed on-site under certain conditions when approved by the Contracting Officer. When approved, small volumes of concrete wash water can be directed onto an area of open soil such as a trench or shallow pit to allow it to be absorbed and neutralized by the soil. The area shall be constantly monitored during filling operations to prevent overflow.

3.19.4 On-Shipyard Containment Structures

Concrete wash water shall be gathered and contained on site for removal and disposal at a facility designed and approved for disposal of concrete wash water. Under no circumstances shall clean water be added to concrete wash water for dilution purposes or any other reason. Containment structures shall be watertight and provide adequate freeboard to contain the wash water, solids, and rainfall to prevent overflow. Cover wash out structures prior to predicted rainfall events to prevent rainfall from entering the containment structure. Ensure that concrete washout containers are watertight and are designed to promote evaporation. Washout shall occur in designated areas only that have been approved by the Contracting Officer Representative.

Inspect all concrete washout facilities daily to determine filled capacity. Remove all materials from containment structures when 75% fill capacity has been reached. Remove liquids or cover structures before predicted rainstorms to prevent overflows and infiltration of rainwater. Inspect structures for holes and tears daily and repair to maintain watertight conditions.

Hardened solids can be removed from containment structures and recycled, reused, or disposed of per regulatory requirements. Liquids remaining in the containment structure shall be vacuumed and disposed of at a facility designated for disposal of concrete wash water.

3.19.5 Off-Shipyard Disposal

Contractor shall provide careful oversight to prevent improper dumping of concrete wash water. Contractor shall ensure companies use proper disposal facilities designated for concrete wash water disposal. The Contractor shall be responsible for any clean up resulting from improper control of concrete wash water.

3.20 DISPOSAL OF CHLORINATED WATER AND DECHLORINATION REQUIREMENTS

Chlorinated water created during disinfection procedures shall not be directly discharged to storm drains or sanitary sewers without prior dechlorination. Chlorinated water shall be neutralized by the controlled addition of a reducing chemical such as sodium thiosulfate, sodium bisulfate, sodium sulfite, sulfur dioxide or ascorbic acid (commonly known as Vitamin C). Dechlorination shall be sufficiently effective to reduce total residual chlorine concentration to existing water system chlorine levels (typically 1.2 to 1.5 mg/l).

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 74 19.00 22

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT (PWD ME)

12/14

PART 1 GENERAL

1.1 GOVERNMENT POLICY
1.2 SUBMITTALS
1.3 WASTE MANAGEMENT PLAN
1.4 RECORDS
1.5 DISPOSAL
1.5.1 Reuse
1.5.2 Recycle
1.5.3 Waste
1.6 Additional Reporting and Recording Requirements

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 74 19.00 22

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT (PWD ME)
12/14

PART 1 GENERAL

1.1 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 the Contractor shall: (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.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan; G

SD-11 Closeout Submittals

Records; G

1.3 WASTE MANAGEMENT PLAN

A waste management plan shall be submitted within 15 calendar days after contract award and prior to initiating any site preparation work. The plan 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 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. Actions that will be taken to divert at least 50% of the non-hazardous

solid wastes (including waste from construction and demolition operations) from the waste stream. Report actual diversion rates during construction and demolition.

g. 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.

h. 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.

i. 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. Provide percentage of non-hazardous construction and demolition waste materials that have been diverted from the waste stream.

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

k. Description of the means by which any waste materials identified in item (i) above will be protected from contamination.

k. 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.

l. 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).

1.4 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 Contracting Officer during construction, and a copy of the records shall be delivered to the Contracting Officer upon completion of the construction.

1.5 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.5.1 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. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

1.5.2 Recycle

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

1.5.3 Waste

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

1.6 Additional Reporting and Recording Requirements

Provide monthly cost and revenue data to the NAVFAC Midlant Integrated Solid Waste Management office. The report shall be submitted by e-mail to:
IntegratedSolidWasteManagement@navy.mil
no later than the 3rd of each month. Data shall be reported on an excel document provided by the Contracting Officer. Comply with the requirements specified in Appendix 01 74 19-1, "Construction and Demolition Solid Waste Report".

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of section --

CONSTRUCTION AND DEMOLITION SOLID WASTE REPORT

SITE: **Month:**

Contractor's Company Name: **Contract #**

Contractor's POC and Telephone or Email Address:

Project Description:

SECTION 1	Tons	Cost	Revenue	Remarks
Recycled (tons)				
Concrete(incl: brick & block)				
Wood				
Metal				
Asphalt				
Green waste(clearing debris)				
Dirt				
Sand				
Gravel/Rock				
Mixed				
Misc				
Subtotal - Recycled	**0.00**	**$ -**	**$ -**	
SECTION 2				
Landfilled (tons)				
Concrete(incl: brick & block)				
Wood				
Metal				
Asphalt				
Green Waste(clearing debris)				
General C&D				
Dirt				
Sand				
Gravel/Rock				
Mixed				
Misc				
Subtotal - Landfilled	**0.00**	**$ -**	**$ -**	
Solid Waste (tons)				
Total Solid Waste	**0.00**	**$ -**	**$ -**	

REPORTING DEADLINE IS NO LATER THAN THE 3RD OF EACH MONTH

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 78 00.00 22

CLOSEOUT SUBMITTALS (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 PROJECT RECORD DOCUMENTS
1.3.1 Record Drawings
1.3.1.1 Government Furnished Materials
1.3.1.2 Working Record and Final Record Drawings
1.3.1.3 Drawing Preparation
1.3.1.4 Computer Aided Design and Drafting (CADD) Drawings
1.3.2 As-Built Record of Equipment and Materials
1.3.3 Final Approved Shop Drawings
1.3.4 Construction Contract Specifications
1.3.5 Real Property Equipment
1.3.6 Red Zone Documents
1.4 SPARE PARTS DATA
1.5 PREVENTATIVE MAINTENANCE
1.6 CERTIFICATION OF EPA DESIGNATED ITEMS
1.7 WARRANTY MANAGEMENT
1.7.1 Warranty Management Plan
1.7.2 Performance Bond
1.7.3 Pre-Warranty Conference
1.7.4 Warranty Tags
1.8 COMMISSIONING
1.8.1 Building Commissioning
1.9 OPERATION AND MAINTENANCE MANUALS
1.9.1 Configuration
1.9.2 Training and Instruction
1.10 CLEANUP
1.11 REAL PROPERTY RECORD
1.12 NAVFAC SUSTAINABLE & ENERGY DATA RECORD CARD

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 78 00.00 22

CLOSEOUT SUBMITTALS (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

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

GREEN SEAL (GS)

GS-37	(2000; R 2005) Industrial and Institutional Cleaners

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-300-08	(2009, with Change 2) Criteria for Transfer and Acceptance of DoD Real Property

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

As-Built Record of Equipment and Materials; G

Two (2) paper copies and one pdf copy of the record listing the as-built materials and equipment incorporated into the construction of the project.

Warranty Management Plan; G

One paper and one pdf set of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

Warranty Tags; G

Two (2) paper record copies and one pdf copy of the warranty tags showing the layout and design.

Final Cleaning; G

Two (2) copies of the listing of completed final clean-up items.

Spare Parts Data; G

Two (2) paper copies and one pdf copy of the list that indicates manufacturer's name, part number, nomenclature, and stock level recommended for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

SD-08 Manufacturer's Instructions

Preventative Maintenance; G and Condition Monitoring (Predictive Testing); G and Inspection; G schedules with instructions that state when systems should be retested.

Define within the schedule 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. On each test feature; e.g., gpm, rpm, psi, provide a signoff blank for the Contractor and Contracting Officer. Within a remarks column of the testing validation procedure include references to operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventative maintenance, condition monitoring (predictive testing) and inspection, adjustment, lubrication and cleaning necessary to prevent failure.

Posted Instructions; G

SD-10 Operation and Maintenance Data

Submit Operation and Maintenance Manuals; G in accordance with paragraph entitled, "Operation and Maintenance," of this section. Submit 2 paper copies, and one pdf copy on CD.

SD-11 Closeout Submittals

Record Drawings; G

Drawings showing final as-built conditions of the project. The final CADD record drawings must consist of one set of electronic CADD drawing files in the specified electronic format saved on a CD, one set of mylar drawings, 2 sets of blue-line prints of the mylars, and one set of the approved working Record drawings.

Certification of EPA Designated Items; G
Interim Form DD1354; G
Checklist for Form DD1354; G
NAVFAC Sustainable & Energy Data Record Card; G
Certification of EPA Designated Items; G
Red Zone Documents per Section 01 30 00; G

1.3 PROJECT RECORD DOCUMENTS

1.3.1 Record Drawings

This paragraph covers Record Drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built record drawings," and "final record drawings" refer to contract drawings (hard copy and CADD) which are revised to be used for final record drawings reflecting current project as-built conditions.

1.3.1.1 Government Furnished Materials

One set of electronic CADD files in the specified software and format of the contract drawings will be provided by the Government at the preconstruction conference for projects requiring Final Record Drawings in CADD format.

1.3.1.2 Working Record and Final Record Drawings

Revise 2 sets of hard copy paper contract drawings by red-line process described herein to reflect the current as-built conditions during the prosecution of the project. The Contractor shall keep the working as-built drawings current and shall keep at least one set available on the jobsite for review 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. 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) provide (1) set of working as-built drawings (CADD) in the specified software and format hard copy and electronic to the Contracting Officer. The working as-built drawings, hard copy and (CADD), will be jointly reviewed for accuracy, completeness and format by the Contracting Officer and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working as-built drawings, hard copy and (CADD) as specified herein, the Contracting Officer 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 Contracting Officer and the Contractor regarding the accuracy and completeness of updated drawings. Items to be shown on the working as-built drawings, hard copy and (CADD) are, but are not limited to, the following information:

a. The actual location (horizontal and vertical position based on Shipyard datums), 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, as a back-up to the horizontal and vertical position, feature shall also be shown by offset dimensions to two permanently fixed surface features the end of each run including each change in direction. 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 of pipe, fittings, valves, etc.

b. The actual location (horizontal and vertical position based on Shipyard datums), kind and size of any sub-surface feature uncovered not accurately represented on the contract drawings.

c. The location and dimensions of any changes within the building structure.

d. Changes in grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities.

e. 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.

f. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

g. Changes or modifications which result from the final inspection.

h. Where contract drawings or specifications present options, identify the option selected for construction on the working as-built prints.

i. 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.

j. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

k. 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) Both sets of the hard copy paper contract working as-built drawings must be neat, legible and accurate. Any drawings damaged, lost or corrupted by the Contractor must be satisfactorily replaced by the Contractor at no expense to the Government.

(2) For text deletions/revisions; strikeout existing drawing text with a single line as to not obscure or make the original text unreadable. Place the new text adjacent, clearly annotating the intent of the change.

(3) For line work; strikeout entities with parallel lines drawn at 45 degrees to the object, not to obscure or make the original object unreadable. Place the new object in its correct location and clearly annotate the intent of the change.

(4) Place a Revision Symbol at the location of each modification on the drawing sheet along with descriptive annotations of the revision.

(5) For details, sections or schedules which are added to a drawing sheet, place a Revision Symbol by the detail, section or schedule title.

(6) For major changes to a drawing, place a Revision Symbol by the title of the affected plan, section, or detail at each location.

(7) For changes within schedules, place a Revision Symbol by the change in the schedule.

(8) The Revision Symbol shall be a Delta sized to allow for a capital letter to fit within. The letter shall have a height of not less than 1/8-inch when plotted.

(9) The revision symbol letter shall be consistent for all drawing modifications for each monthly billing cycle. Drawing modifications for the first monthly bill cycle shall be designated as "A" for all modifications throughout the drawing package. The next month's revisions shall be designated as "B" throughout the drawing package, and so on.

1.3.1.3 Drawing Preparation

At project completion, provide 2 sets of the approved hard copy paper contract drawings modified to reflect the final as-built conditions of the project to the Contracting Officer. Modify the contract drawings as necessary to correctly show the features of the project as it has been constructed by bringing the contract drawings into agreement with the second set of approved working as-built drawings. The second set of approved working as-built drawings are also part of the permanent records of this project and must be returned to the Contracting Officer after final approval of the Record Drawings by the Government. Any drawings or drawing files damaged, lost or corrupted by the Contractor must be satisfactorily replaced by the Contractor at no expense to the Government.

1.3.1.4 Computer Aided Design and Drafting (CADD) Drawings

Only employ personnel proficient in the preparation of CADD drawings to modify the contract drawings or prepare any additional drawings sheets required. Modifications, to the Record Drawings must be equal in quality and detail to that of the original contract drawings. Line colors, line weights, lettering, layering conventions, and symbols shall remain consistent throughout the record drawing set, regardless of either as-built or record drawing. The contractor shall modify the original contract drawing files to reflect the construction contract as-built conditions reviewed and accepted by **the Contracting Officer.** Each as-built condition added to a drawing file shall be encapsulated by a closed polygon or "revision cloud. A revision symbol shall be placed outside the "revision cloud" with the appropriate letter designating the revision sequence. The contractor shall annotate in the "revision block" of each drawing file modified as to the type of revisions made to the drawing file. The contract drawings are to be edited to reflect the as-built conditions only. No part of the original drawings shall be deleted, erased or rendered illegible. Parts of the contract drawing found to be in error or modified during construction, shall be over struck using methods described not to obscure the original drawing, and annotations will be added adjacent that clearly explain the modification, including accurate dimensions locating the feature. If additional drawings are required, the drawings shall be prepared using the specified electronic file format applying, the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final record drawings shall be identical to that used to create the contract drawings. Modifications, additions and corrections to the contract drawings shall be made to the electronic AutoCAD file(s). The Contractor shall be furnished with the original contract drawing files in the AutoCAD software format currently in use by PWD-ME. The electronic

files shall be supplied on compact disc, (CD). The Contractor shall provide all computer software and hardware necessary to prepare final record drawing set. The Contracting Officer shall review final record drawing set for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

a. Provide Record Drawings (CADD) in the following format:

(1) As-built Layering; follow original drawing layer naming conventions followed by "-AB".

(2) Deletions (Cyan) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

(3) Additions (Cyan) - Added items, lettering in notes and leaders.

(4) Special (Cyan) - Items requiring special information, coordination, or special detailing or detailing notes.

(5) The Contractor shall furnish the contract record drawing files in the AutoCAD software format currently in use by PWD-ME.

b. Drawing files modified for as-built condition shall be renamed by adding an underscore and the letters "AB" to the end of the existing file name. Drawing files where no modifications were required shall be renamed by adding an underscore and the letters "RD" to the end of the existing file name.

c. When final revisions have been completed to the record drawing set, add the wording "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high in the lower left hand corner of the cover sheet drawing. Mark all other contract drawings in the same location and manner as either "Record Drawing" denoting no revisions on the sheet or "As built Drawing" denoting modifications, additions or corrections have been made to the drawing sheet. Modify the revision block to reflect either "record drawing", for no changes or "as built drawing", for changes and date for submittal.

d. Within 20 working days after Government approval of all of the working record drawings for a phase of work, prepare the CADD electronic files for that phase of work and submit for Government review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 working days revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government.

e. Within 20 working days of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit one set of electronic files on compact disc, read-only memory (CD-ROM), one set of mylars and one set of the approved working record drawings. They must be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Any transactions or adjustments necessary to accomplish this is the responsibility of the Contractor. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record drawing files and marked

prints as specified will be cause for withholding any payment due the Contractor under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made to the Contractor.

1.3.2 As-Built Record of Equipment and Materials

Furnish one copy of preliminary record of equipment and materials used on the project 15 working days prior to final inspection. This preliminary submittal will be reviewed and returned 5 working days after final inspection with Government comments. Submit two sets of final record of equipment and materials 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

1.3.3 Final Approved Shop Drawings

Furnish final approved project shop drawings 30 calendar days after transfer of the completed facility.

1.3.4 Construction Contract Specifications

Furnish final record (as-built) construction contract specifications, including modifications thereto, 30 calendar days after transfer of the completed facility.

1.3.5 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 30 calendar days after transfer of the completed facility.

1.3.6 Red Zone Documents

Submit Red Zone Documents per Section 01 30 00 ADMINISTRATIVE REQUIREMENTS (PWD ME).

1.4 SPARE PARTS DATA

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.

Supply 2 items of each part for spare parts inventory. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.5 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance and Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

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 Contracting Officer 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.

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

1.6 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); and
4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product)."

1.7 WARRANTY MANAGEMENT

1.7.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the clause Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit the warranty management plan for Government approval. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has

been submitted or was accomplished. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of project acceptance and continue for the full product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Include within the warranty management plan, but not limited to, the following:

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subContractors, manufacturers or suppliers involved.

b. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.

c. A list for each warranted equipment, item, feature of construction or system indicating:

    1. Name of item.
    2. Model and serial numbers.
    3. Location where installed.
    4. Name and phone numbers of manufacturers or suppliers.
    5. Names, addresses and telephone numbers of sources of spare parts.
    6. Warranties and terms of warranty. Include one-year overall warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
    7. Cross-reference to warranty certificates as applicable.
    8. Starting point and duration of warranty period.
    9. Summary of maintenance procedures required to continue the warranty in force.
    10. Cross-reference to specific pertinent Operation and Maintenance manuals.
    11. Organization, names and phone numbers of persons to call for warranty service.
    12. Typical response time and repair time expected for various warranted equipment.

d. The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

e. Procedure and status of tagging of all equipment covered by extended warranties.

f. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.7.2 Performance Bond

The Contractor's Performance Bond must remain effective throughout the construction period.

a. In the event the Contractor fails to commence and diligently pursue

any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.7.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.7.4 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attached each tag with a copper wire and spray with a silicone waterproof coating. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

a. Type of product/material_____.

b. Model number_____.

c. Serial number_____.

d. Contract number_____.

e. Warranty period_____from_____to_____.

f. Inspector's signature_____.

g. Construction Contractor_____.

Address_____.

Telephone number_____.

h. Warranty contact_____.

Address_____.

Telephone number_____.

i. Warranty response time priority code_____.

j. WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.

1.8 COMMISSIONING

1.8.1 Building Commissioning

All contract requirements for building commissioning shall be completed prior to contract completion.

1.9 OPERATION AND MAINTENANCE MANUALS

Submit 6 copies of the project operation and maintenance manuals 30 calendar days prior to testing the system involved. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

1.9.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Bind information in manual format and grouped by technical sections. Test data must be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals must have 0.3937-inch holes and be bound in 3-ring, loose-leaf binders. Organize data by separate index and tabbed sheets, in a loose-leaf binder. Binder must lie flat with printed sheets that are easy to read. Caution and warning indications must be clearly labeled.

1.9.2 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. Contracting Officer will be given 7 calendar 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 Contracting Officer.

1.10 CLEANUP

Provide final cleaning in accordance with ASTM E 1971 and submit two copies of the listing of completed final clean-up items. Leave premises "broom clean." Comply with GS-37 for general purpose cleaning and

bathroom cleaning. 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. Replace 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.

1.11 REAL PROPERTY RECORD

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete and submit an accounting of all installed property with Interim Form DD1354 "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations from the Draft DD Form 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD Form 1354. Refer to UFC 1-300-08 for instruction on completing the DD Form 1354. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site:
http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf

Submit the completed Checklist for Form DD1354 of Installed Building Equipment items. Attach this list to the updated DD Form 1354.

1.12 NAVFAC SUSTAINABLE & ENERGY DATA RECORD CARD

Within 60 days of the completion of Project, complete an electronic copy of the NAVFAC Sustainable & Energy Data Record Card, and submit to the Contracting Officer. Draft Record card for this project should be available from Designer of Record (DOR) or Contracting Officer. Instructions and a blank DD Form (fill-able) in ADOBE (PDF) may be obtained at the Whole Building Design Guide web site by navigating: Home > Participating Agencies > Department of Defense (DoD) > NAVFAC Sustainable Development Program > Contract Documents > NAVFAC Sustainable & Energy Data Record Card; or directly at http://www.wbdg.org/pdfs/navfac_sustainable_energy_data_record_card.pdf.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

07/06

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMISSION OF OPERATION AND MAINTENANCE DATA
1.2.1 Package Quality
1.2.2 Package Content
1.2.3 Changes to Submittals
1.2.4 Review and Approval
1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES
1.3.1 Operating Instructions
1.3.1.1 Safety Precautions and Hazards
1.3.1.2 Operator Prestart
1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures
1.3.1.4 Normal Operations
1.3.1.5 Emergency Operations
1.3.1.6 Operator Service Requirements
1.3.1.7 Environmental Conditions
1.3.1.8 Operating Log
1.3.2 Preventive Maintenance
1.3.2.1 Lubrication Data
1.3.2.2 Preventive Maintenance Plan and Schedule
1.3.2.3 Cleaning Recommendations
1.3.3 Corrective Maintenance (Repair)
1.3.3.1 Troubleshooting Guides and Diagnostic Techniques
1.3.3.2 Wiring Diagrams and Control Diagrams
1.3.3.3 Maintenance and Repair Procedures
1.3.3.4 Removal and Replacement Instructions
1.3.3.5 Spare Parts and Supply Lists
1.3.4 Corrective Maintenance Work-Hours
1.3.5 Appendices
1.3.5.1 Product Submittal Data
1.3.5.2 Manufacturer's Instructions
1.3.5.3 O&M Submittal Data
1.3.5.4 Parts Identification
1.3.5.5 Warranty Information
1.3.5.6 Extended Warranty Information
1.3.5.7 Personnel Training Requirements
1.3.5.8 Testing Equipment and Special Tool Information
1.3.5.9 Testing and Performance Data
1.3.5.10 Field Test Reports
1.3.5.11 Contractor Information
1.4 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES
1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES
1.5.1 Data Package 1
1.5.2 Data Package 2
1.5.3 Data Package 3

1.5.4 Data Package 4
1.5.5 Data Package 5

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E1971	(2005; R 2011) Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMISSION OF OPERATION AND MAINTENANCE DATA

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

1.2.1 Package Quality

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

1.2.2 Package Content

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

1.2.3 Changes to Submittals

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

submitted data within 30 calendar days of the notification of this change requirement.

1.2.4 Review and Approval

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

1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

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

1.3.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for all operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 26.00 22 GOVERNMENT SAFETY REQUIREMENTS (PWD ME). Provide recommended safeguards for each identified hazard.

1.3.1.2 Operator Prestart

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

1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures

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

1.3.1.4 Normal Operations

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

1.3.1.5 Emergency Operations

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

1.3.1.6 Operator Service Requirements

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

1.3.1.7 Environmental Conditions

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

1.3.1.8 Operating Log

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

1.3.2 Preventive Maintenance

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

1.3.2.1 Lubrication Data

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

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

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

c. A Lubrication Schedule showing service interval frequency.

1.3.2.2 Preventive Maintenance Plan and Schedule

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

1.3.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E1971.

1.3.3 Corrective Maintenance (Repair)

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

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

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

1.3.3.2 Wiring Diagrams and Control Diagrams

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

1.3.3.3 Maintenance and Repair Procedures

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

1.3.3.4 Removal and Replacement Instructions

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

1.3.3.5 Spare Parts and Supply Lists

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

1.3.4 Corrective Maintenance Work-Hours

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

1.3.5 Appendices

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

1.3.5.1 Product Submittal Data

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

1.3.5.2 Manufacturer's Instructions

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

1.3.5.3 O&M Submittal Data

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

1.3.5.4 Parts Identification

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

1.3.5.5 Warranty Information

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

1.3.5.6 Extended Warranty Information

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

1.3.5.7 Personnel Training Requirements

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

1.3.5.8 Testing Equipment and Special Tool Information

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

1.3.5.9 Testing and Performance Data

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

1.3.5.10 Field Test Reports

Provide Field Test Reports (SD-06) that apply to equipment associated with the system.

1.3.5.11 Contractor Information

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

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

Include Data Package 5 and the following for control systems:

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

b. Full as-built sequence of operations.

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

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

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

1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.5.1 Data Package 1

a. Safety precautions

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Contractor information

f. Spare parts and supply list

1.5.2 Data Package 2

a. Safety precautions

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan and schedule

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Contractor information

1.5.3 Data Package 3

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Lubrication data

h. Preventive maintenance plan and schedule

i. Cleaning recommendations

j. Troubleshooting guides and diagnostic techniques

k. Wiring diagrams and control diagrams

l. Maintenance and repair procedures

m. Removal and replacement instructions

n. Spare parts and supply list

o. Product submittal data

p. O&M submittal data

q. Parts identification

r. Warranty information

s. Testing equipment and special tool information

t. Testing and performance data

u. Contractor information

1.5.4 Data Package 4

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Lubrication data

i. Preventive maintenance plan and schedule

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Corrective maintenance man-hours

q. Product submittal data

r. O&M submittal data

s. Parts identification

t. Warranty information

u. Personnel training requirements

v. Testing equipment and special tool information

w. Testing and performance data

x. Contractor information

1.5.5 Data Package 5

a. Safety precautions

b. Operator prestart

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

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan and schedule

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Testing and performance data

s. Contractor information

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS (PWD ME)

12/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SCOPE OF COMMISSIONING WORK
1.3 SUBMITTALS
1.4 SUMMARY
1.4.1 Related Requirements
1.5 DEFINITIONS
1.6 COMMISSIONING TEAM
1.7 COMMISSIONING PROCESS
1.7.1 Commissioning Tasks
1.7.1.1 Commissioning Task Descriptions
1.7.2 Construction Contractor
1.7.2.1 Construction and Acceptance Phase
1.7.2.2 Warranty Period
1.7.3 HVAC, Plumbing, Electrical, and Controls
1.7.3.1 Construction and Acceptance Phases
1.7.3.2 Warranty Period
1.7.4 Controls Commissioning
1.7.4.1 Sequences of Operation Submittals
1.7.4.2 Control Drawings Submittal
1.7.4.3 As-Built Drawings
1.7.4.4 Written Plan
1.7.4.5 Certification
1.7.5 Equipment Suppliers
1.8 CCT'S RESPONSIBILITIES
1.9 CxA'S RESPONSIBILITIES
1.9.1 Specific Responsibilities of The CxA Include:
1.10 COMMISSIONING SCOPE
1.11 COMMISSIONING RESPONSIBILITIES
1.11.1 Construction Contracting Team (CCT)
1.11.2 Demonstrate Proper System Performance
1.11.3 Manufacturers Reps/Vendors (MR)

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

PART 3 EXECUTION

3.1 DESIGN REVIEW AND DOCUMENTATION
3.2 COMMISSIONING SCOPE MEETING
3.3 COMMISSIONING PLAN
3.4 SUBMITTAL REVIEWS
3.5 START-UP / PREFUNCTIONAL INSPECTION CHECKLISTS
3.6 FUNCTIONAL PERFORMANCE TESTING

3.6.1 Objectives and Scope
3.6.2 Execution of Functional Performance Tests
3.6.3 Coordination and Scheduling
3.6.4 Problem Solving
3.7 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTES
3.7.1 Non-Conformance
3.7.2 Cost of Retesting
3.7.3 Approval
3.8 DEFERRED TESTING
3.8.1 Unforeseen Deferred Tests
3.8.2 Seasonal Testing
3.8.3 End of Warranty Review
3.9 FINAL COMMISSIONING REPORT

-- End of Section Table of Contents --

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS (PWD ME)
12/14

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE Guideline O (2005) The Commissioning Process

1.2 SCOPE OF COMMISSIONING WORK

a. Commissioning building systems, as described herein and ASHRAE Guideline O.

b. Basis of Design (BOD): BOD documentation is included by reference for information only.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Commissioning Plan; G

SD-11 Closeout Submittals

Commissioning Report; G

1.4 SUMMARY

Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

1.4.1 Related Requirements

a. Air Barrier System for commissioning process activities for building exterior enclosure, roof, and foundation systems, assemblies, equipment, and components. See Appendix 1 of this section.

b. Division 21 for commissioning process activities for fire-suppression systems, assemblies, equipment, and components.

d. Section 23 08 00.00 10 COMMISSIONING OF HVAC SYSTEMS for commissioning

process activities for HVAC&R systems, assemblies, equipment, and components.

f. Division 26 for commissioning process activities for electrical systems, lighting and lighting controls.

1.5 DEFINITIONS

BOD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the RFP and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

CCT: Construction Contracting Team. The team headed by or are under the control of the General Contractor that will construct the project.

Commissioning - Commissioning is a comprehensive and systematic process to verify that the building systems perform as designed to meet the Owner's Project Requirements. Commissioning during the construction, acceptance, and warranty phases is intended to achieve the following specific objectives:

(i) Verify and document that equipment is installed and started per manufacturer's recommendations, industry accepted minimum standards, and the Contract Documents.
(ii) Verify and document that equipment and systems receive complete operational checkout by installing contractors.
(iii) Verify and document equipment and system performance.
(iv) Verify the completeness of operations and maintenance materials.
(v) Ensure that the Government's operating personnel are adequately trained on the operation and maintenance of building equipment.

The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors to provide a finished and fully functioning product.

Commissioning Plan: A document developed by the CxA that spells out the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

CxA: Commissioning Agent: A firm engaged by the Government to manage the commissioning process.

Deficiency - A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents, does not perform properly or is not complying with the Owner's Project Requirements.

Functional Performance Test - Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are

verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Agent develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. Functional Performance Tests are performed after prefunctional checklists and startup are complete.

Manual Test - Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

Monitoring - The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems. Non-Compliance -see Deficiency.

Non-Conformance - see Deficiency.

OPR: Owner's Project Requirements. A document that details the functional requirements of the project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Pre-functional Checklist - A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the Commissioning Agent to the contractor. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). The word "pre-functional" refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer's start-up checklist.

Seasonal Performance Test - Functional Performance Test that are deferred until the system(s) will experience conditions closer to their design conditions.

Warranty Period - Warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

Systems, Subsystems, Equipment, and Components. Where these terms are used together or separately, they mean both the design as well as the resulting "as-built" systems, subsystems, equipment, and components.

1.6 COMMISSIONING TEAM

Members Appointed by CCT: Individuals, each having the agent to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to,

representatives of the CCT, including Project Superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA, and with the assent of the Government.

1.7 COMMISSIONING PROCESS

Building commissioning activities and documentation include Fundamental Commissioning services. Commissioning is a multi-disciplined process of verifying accurate design, installation and operation of all building systems. The commissioning process should begin in the design phase and continues through occupancy and operation. Core areas encompassed in commissioning include:

a. HVAC components and equipment.

d. Building Automation System (BAS): Control hardware and software, sequence of operations, and integration of factory controls with BAS.

e. Light fixtures and lighting control systems.

h. Building Envelope.

1.7.1 Commissioning Tasks

The following activities outline the commissioning tasks and the general order in which they occur. The Commissioning Agent shall coordinate all activities.

a. Design Review and Documentation

(1) Documentation of Basis of Design and Owner’s Project Requirements
(2) Design Development Review
(3) Construction Document Review

b. Commissioning Scoping Meeting
c. Commissioning Plan
d. Submittals Review
e. Start-Up/Pre-Functional Checklists
f. Functional Performance Testing
g. Short-Term Diagnostic Testing
h. Efficiency Report and Resolution Record
i. Operations and Maintenance Training

(1) O&M Manual
(2) Training
(3) O&M Database

j. Record Documents Review
k. Final Commissioning Report
l. Deferred Testing

(1) Unforeseen Deferred Tests
(3) End-of-Warranty Review

1.7.1.1 Commissioning Task Descriptions

Basis of Design and Owner's Project Requirements - Update as necessary during the work to reflect the progress on the components and systems.

Scoping Meeting Minutes - Capture salient elements of discussion, principal hurdles and proposed solutions for each commissioning planning and coordination effort with the Designer of Record and Construction Integrator.

Commissioning Plan - Submit Commissioning Plan within 120 calendar days of authorization to proceed. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the CCT and Designer of Record in a timely manner.

Commissioning Schedule - Submit Schedule with Commissioning Plan. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the CCT and Designer of Record in a timely manner.

Pre-Functional Performance Test Forms - Submit minimum 30 calendar days prior to testing.

Functional Testing Coordination - Equipment shall not be "temporarily" started for commissioning. Functional performance testing shall not begin until pre-functional, start-up and TAB is completed for a given system. The controls system and equipment it controls shall not be functionally tested until all points have been calibrated and pre-functional checklists are completed.

Deficiency Report and Resolution Record - Document items of non-compliance in materials, installation or operation. Document the results from start-up/pre-functional checklists, functional performance testing, and short-term diagnostic monitoring. Include details of the components or systems found to be non-compliant with the drawings and specifications. Identify adjustments and alterations required to correct the system operation, and identify who is responsible for making the corrective changes. Update as necessary during the work to reflect the progress on the components and systems. Forward updates to the CCT and Designer of Record in a timely manner.

Final Commissioning Report: Compile a final Commissioning Report. Summarize all of the tasks, findings, conclusions, and recommendations of the commissioning process. Indicate the actual performance of the building systems in reference to the Owner's Project Requirements and contract documents. Include completed pre-functional inspection checklists, functional performance testing records, diagnostic monitoring results, identified deficiencies, recommendations, and a summary of commissioning activities.

Operation and Maintenance (O&M) Submittals - Training Plan to include:

(i) Dates, start and finish times, and locations; Outline of the information to be presented;
(ii) Names and qualifications of the presenters;
(iii) List of texts and other materials required to support training.

1.7.2 Construction Contractor

1.7.2.1 Construction and Acceptance Phase

a. Facilitate coordination of commissioning work by CxA.

b. Attend commissioning scoping meeting, controls integration meeting and

additional meetings, as necessary.

c. Furnish copies of construction documents, addenda, change orders and approved submittals and design drawings related to commissioned equipment to CxA.

d. Ensure Subcontractor execute their commissioning responsibilities according to Project Manual and Commissioning Plan.

e. Coordinate training of Government personnel.

f. Work with Subcontractor to prepare operations and maintenance manuals, according to Project Manual, including updating original sequences of operation to Record (As-Built) conditions.

g. Develop start-up and checkout plan for commissioned equipment based on manufacturer's recommendations and pre-functional checklists from CxA.

h. Submit to CxA for review and approval prior to start-up.

1.7.2.2 Warranty Period

a. Ensure execution of required seasonal or deferred functional performance testing.

b. Ensure correction of deficiencies and make necessary adjustments to operations and maintenance manuals and As-Built Drawings for issues identified during warranty period.

1.7.3 HVAC, Plumbing, Electrical, and Controls

1.7.3.1 Construction and Acceptance Phases

a. Attend commissioning scoping meeting, controls integration meeting and additional meetings.

b. Provide additional requested documentation prior to normal operations and maintenance manual submittals, to CxA for development of start-up and functional testing procedures.

c. Assist in clarification of operation and control of commissioned equipment where Contract Documents, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

d. Assist to develop start-up and checkout plan for commissioned equipment based on manufacturer's recommendations and pre-functional checklists from CxA.

e. During startup and checkout process, execute pre-functional checklists for commissioned equipment.

(1) Perform and document completed startup and system operational checkout procedures.

f. Resolve master deficiency list items before functional testing, as developed by CxA.

(1) Air and water Testing, Adjusting, and Balancing to be completed

with discrepancies and problems resolved before functional testing.

g. Perform functional performance testing, under direction of CxA, for commissioned equipment. Resolve equipment or system deficiencies and retest as required to verify modified performance. Allow adequate time for training. Coordinate training schedules through the CxA.

h. Prepare operations and maintenance manuals according to Project Manual, including updating original sequences of operation to record conditions.

i. Provide training of the Government's operating personnel.

j. Coordinate with equipment manufacturers to determine requirements to maintain validity of warranties.

1.7.3.2 Warranty Period

a. Execute seasonal or deferred functional performance testing.

b. Correct deficiencies and make necessary adjustments to Operations And Maintenance Manuals and As-Built Drawings for issues identified during warranty period.

1.7.4 Controls Commissioning

Controls Commissioning is included as part of the CCT responsibilities during construction and acceptance phases in addition to those listed, which are:

1.7.4.1 Sequences of Operation Submittals

Temperature controls submittals to include complete and detailed sequences of operation for each piece of equipment, regardless of completeness and clarity of sequences in Specifications and include:

a. Narrative description of system, describing its purpose, components and function.

b. Interactions and interlocks with other systems.

c. Delineation of control interactions between packaged controls and building automation system, including listing of monitored points, controlled points, and adjustable points.

d. Written sequences of control for packaged controlled equipment.

e. Sequences of control for modes of operation (Start-up, Warm-up, Cool-down, Normal occupied, Unoccupied, Emergency Shutdown, etc.).

f. Capacity control sequences and equipment staging.

g. Temperature and pressure control sequences (setbacks, resets, etc.).

h. Sequences for control strategies (economizer control, optimum start/stop, optimization, demand limiting, etc.).

i. Effects of power or equipment failure with standby component functions.

j. Sequences for alarms and emergency shutdowns.

k. Seasonal operational requirements.

l. Trending, setup of points for trending purposes as coordinated and agreed on by Commissioning Teams coordination.

1.7.4.2 Control Drawings Submittal

a. Control drawings to have key to abbreviations which shall be consistent throughout the documentation.

b. Provide graphic schematic depictions of systems and each component.

c. Schematics to include system and component layout of equipment that control system monitors, enables or controls, even if equipment is primarily controlled by packaged or integral controls.

d. Provide full points list including the following:

(1) Controlled system
(2) Point abbreviation
(3) Point description
(4) Point type (digital/analog, input/output)
(5) Display unit
(6) Control point or setpoint (Yes/No)
(7) Monitoring point (Yes/No)
(8) Intermediate point (Yes/No)
(9) Calculated point (Yes/No)

1.7.4.3 As-Built Drawings

As-Built Drawing version of control drawings and sequences of operation to be included in final Controls Operations And Maintenance Manual Submittal in accordance with Section 01 78 00.00 22 CLOSEOUT SUBMITTALS (PWD ME).

1.7.4.4 Written Plan

Controls Contractor to prepare written plan indicating step-by-step manner, and procedures that will be followed to test, checkout and adjust control system prior to functional performance testing.

1.7.4.5 Certification

Signed and dated certification to CxA and the Government upon completion of control system checkout.

1.7.5 Equipment Suppliers

a. Provide requested submittal data, including detailed start-up procedures and specific responsibilities of the Government to keep warranties in effect.

b. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

c. Assist in equipment testing per agreements with suppliers.

1.8 CCT'S RESPONSIBILITIES

The CCT shall assign representatives with expertise and an agent to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

a. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

b. Cooperate with the CxA for resolution of issues recorded in the Issues Log.

c. Attend commissioning team meetings held on a biweekly basis.

d. Coordinate Contractor's testing, inspection, and quality assurance activities with related activities of the CxA.

e. Integrate and coordinate commissioning process activities with construction schedule.

f. Review, accept, and incorporate from construction checklists provided by the CxA.

g. Complete paper construction checklists as Work is completed and provide to the CxA and CMa on a weekly basis.

h. Review and accept commissioning process test procedures provided by the CxA.

i. Complete commissioning process test procedures and provide testing records.

1.9 CxA'S RESPONSIBILITIES

The CxA develops and leads a comprehensive and systematic process to verify that the building systems perform is designed to meet the Owner’s Project Requirements. Commissioning during the construction, acceptance, and warranty phases is intended to achieve the following specific objectives:

a. Verify and document that equipment is installed and started per manufacturer’s recommendations, industry accepted minimum standards, and the Contract Documents.

b. Verify and document that equipment and systems receive complete operational checkout by installing Contractors.

c. Verify and document equipment and system performance.

d. Verify the completeness of operations and maintenance materials.

e· Ensure that the Government’s operating personnel are adequately trained on the operation and maintenance of building equipment.

1.9.1 Specific Responsibilities of The CxA Include:

a. Provide Fundamental Commissioning.

c. Organize and lead the Commissioning Team.

d. Provide Commissioning Plan.

e. Convene commissioning team meetings.

f. Provide project-specific construction checklists and commissioning process test procedures.

g. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the RFP. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

h. Prepare and maintain the Issues Log.

i. Prepare and maintain completed Construction Checklist Log.

j. Witness systems, assemblies, equipment, and component startup.

k. Compile test data, inspection reports, and certificates; include them in the systems Manual and Commissioning Process Report.

1.10 COMMISSIONING SCOPE

Commissioning scope includes the following:

DDC Control System
Variable frequency drives
Roof Motors
Lighting fixtures and lighting controls
Emergency lighting
Building envelope testing [1]
Electrical systems [2]

[1] Building envelope testing, including thermal imaging, will be provided by the Contractor. The CxA will track the activities and include the final information in the commissioning report.

[2] These systems will be tested by the Contractor, except as noted above. CxA will track the activities and include the final information in the commissioning report.

1.11 COMMISSIONING RESPONSIBILITIES

1.11.1 Construction Contracting Team (CCT)

a. Facilitates commissioning process; ensures the contractor's team performs their responsibilities; and integrates commissioning into construction process and schedule.

(1) Integrates commissioning activities into construction process and schedule.
(2) Ensures Contractor's team executes their responsibilities,

including commissioning requirements.
(3) Perform normal review of submittals, management and resolution of Request for Information (RFI's) and tracking of change orders.
(4) Provide adequate accessibility to all mechanical/electrical equipment for maintenance and component replacement or repair.
(5) Ensures that Contractor's team witness start-up tests and pre-functional checklists of equipment and systems.
(6) Verify readiness for commissioning.
(7) Assist in training of Government personnel.
(8) Assemble and review O&M Manuals
(9) Remedy deficiencies identified during testing and commissioning.
(10) Ensure completion of punch list items.
(11) Obtain final inspection approvals.
(12) Warranty period responsibilities.

1.11.2 Demonstrate Proper System Performance

a. Integrates commissioning activities into construction process and schedule.
b. Ensure cooperation and participation of Contractor's team.
c. Ensure participation of major equipment manufacturers in appropriate training and testing activities
d. Perform start-up, pre-functional checkout and functional performance testing
e. Conduct appropriate trade system orientation and training.
f. Prepare and submit O & M manuals.
g. Remedy deficiencies identified during testing and commissioning.
h. Ensure completion of punch list items.

1.11.3 Manufacturers Reps/Vendors (MR)

a. Provide documentation to facilitate the commissioning work and perform contracted start-up.
b. Provide submittals and appropriate O & M manual sections.
c. Participate in training sessions.
d. Review test procedures developed for the commissioning process.
e. Demonstrate performance of equipment.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

a. Standard testing equipment required to perform startup and initial checkout and required functional performance testing to be provided by CCT for equipment being tested.

b. Testing equipment to be of sufficient quality and accuracy to test or measure system performance as required by the Specifications.

c. Data-logging equipment or software required to test equipment to be provided by Contractors but shall not become property of the Government.

PART 3 EXECUTION

3.1 DESIGN REVIEW AND DOCUMENTATION

a. Document basis of design and Owner's Project Requirements as they relate to environmentally responsive characteristics, including:

(1) Functionality
(2) Energy performance
(3) Water efficiency
(4) Maintainability
(5) System cost
(6) Indoor environmental quality
(7) Local environmental impacts

b. Review design documents to verify that each commissioned system meets the Owner's Project Requirements.

c. Review construction documents to verify that commissioning is adequately specified, that each commissioned system can be commissioned and is likely to meet the Owner's Project Requirements.

3.2 COMMISSIONING SCOPE MEETING

a. Schedule, coordinate, and facilitate a scoping meeting to sound out nature of systems that are included within the commissioning effort.

b. Review each building system to be commissioned, including its intended operation, commissioning requirements, and completion and start-up schedules.

c. Establish the scope of work, tasks, schedules, deliverables, and responsibilities for implementation of the Commissioning Plan.

3.3 COMMISSIONING PLAN

a. Develop a commissioning plan to identify how commissioning activities will be integrated into general construction and trade activities.

b. The commissioning plan shall identify how commissioning responsibilities are distributed. The intent of this plan is to evoke questions, expose issues, and resolve them with input from the entire commissioning team before construction even begins.

c. Identify who will be responsible for producing the various procedures, reports, Government notifications and forms.

d. Include the commissioning schedule.

e. Describe the test/acceptance procedure.

3.4 SUBMITTAL REVIEWS

Review the Contractor submittals to verify that the material, equipment and systems provided meet the requirements of the Contract Documents and Owner's Project Requirements.

3.5 START-UP / PREFUNCTIONAL INSPECTION CHECKLISTS

The following procedures apply to commissioned equipment.

a. Pre-functional Inspection Checklists are developed and completed for major equipment and systems being commissioned. Manufacturer's start-up checklists and other technical documentation guidelines may be used as the basis for pre-functional checklists.

(1) Checklist documents equipment nameplate and characteristics data and confirms as-built status of equipment or system.

(2) Checklists ensure systems are complete and operational, so functional performance testing can be scheduled.

b. Start-Up Plan. Develop detailed start-up plans to verify that the equipment and systems are complete and operational, so that the functional performance testing can be scheduled.

(1) Each start-up item will have a space for the appropriate Contractor to date and initial at time of completion of start-up procedures.

(2) Start-up plans and documentation to be provided to the Government and Design Team for review.

c. Completion of Pre-functional Inspection Checklists and Startup:

(1) CCT assures equipment suppliers schedule startup and checkout with the Government and CxA.

(a) Multiple Units: Sampling strategy may be used according to Commissioning Plan for lower level equipment components (i.e. VAV boxes, reheat coils).

(2) CCT with their Vendors execute startup and provide CxA with signed and dated copy of completed start-up and pre-functional inspection checklists.

(a) Only individuals who have completed or witnessed line item task to make initials or checks on forms.

d. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

(1) CCT to clearly list any items of start-up and pre-functional procedures not successfully completed at bottom of form or on an attached sheet.

(a) Procedures form and any outstanding deficiencies are provided to CxA within two days of test completion.

3.6 FUNCTIONAL PERFORMANCE TESTING

Following procedures apply to all equipment commissioned and to all commissioning functional performance testing.

3.6.1 Objectives and Scope

a. Demonstrate each system is operating according to documented design intent and Construction Documents.

b. Functional performance testing comprises tests to verify components, equipment, systems, and interfaces between systems operate correctly and includes operating modes, interlocks, control sequences, and responses to emergency conditions.

3.6.2 Execution of Functional Performance Tests

a. Test Methods: Functional performance testing and verification may be achieved by direct manipulation of system inputs (i.e. heating or cooling sensors), manipulation of system inputs with building automation system (i.e. software override of sensor inputs), trend logs of system inputs and outputs using building automation system, or short-term monitoring of system inputs and outputs using stand alone data loggers.

   (1) Combination of methods may be required to test complete sequence of operations, subject to Government determination of which method, or combination, is most appropriate.

b. Setup: Each test procedure is performed under conditions that simulate normal operating conditions as closely as possible.

   (1) Develop functional performance test procedures for equipment and systems. Identify specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Coordinate test procedures with the contractor for feasibility, safety, equipment and warranty protection. Functional performance test forms shall include the following information:

      - System and equipment or component name(s).
      - Equipment location and ID number.
      - Date.
      - Project name.
      - Participating parties.
      - Instructions for setting up the test, including special cautions, alarm limits, etc.
      - Specific step-by-step procedures to execute the test.
      - Acceptance criteria of proper performance with a Yes or No check box.
      - A section for comments.

   (2) Where equipment requires integral safety devices to stop/prevent equipment operation unless minimum safety standards or conditions are met, functional performance test procedures shall demonstrate the actual performance of safety shutoffs in a real or closely simulated conditions of failure.

   (3) Subcontractor executing test provides necessary system modifications to produce specified conditions (flows, pressures, temperatures, etc) necessary to execute test and, at completion of test, returns affected building equipment and systems to their pre-test conditions.

c. Sampling: Multiple identical pieces of non-life-safety or non-critical equipment may be functionally tested using a sampling strategy. The sampling strategy shall be developed by the Commissioning Agent. If, after three attempts at testing the specified sample percentage, failures are still present, then all remaining units shall be tested at the Contractors' expense.

d. Test Values: After three attempts at testing, if specified sample percentage, failures are still present, remaining units are tested at Contractors' expense.

3.6.3 Coordination and Scheduling

CCT provides sufficient notice to the government regarding completion schedule for pre-functional checklists and startup of equipment and systems.

a. The Government schedules functional tests and CCT conducts sequential priorities followed:

(1) Equipment is not "temporarily" started (for heating or cooling), until pre-start checklist items and manufacturer's pre-start procedures are completed and moisture, dust and other environmental and building integrity issues have been addressed.

(2) Functional performance testing does not begin until pre-functional, start-up and Testing, Adjusting and Balancing (TAB) are completed for given system.

(3) Controls system and equipment it controls are not functionally tested until points have been calibrated and pre-functional checklists are completed.

3.6.4 Problem Solving

As directed, CCT shall resolve, correct and retest deficiencies.

3.7 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTES

3.7.1 Non-Conformance

a. Results of functional testing are recorded by the CxA.

(1) Deficiencies identified during verification testing are documented on standard form and reported to the Government and CCT.

(2) Deficiency Report: Includes details of components or systems found to be non-compliant with parameters of test plans.

(3) Report details adjustments or alterations required to correct system operation, and identifies responsible party.

b. Corrections of minor deficiencies identified may be made during tests at discretion of CxA and deficiency and resolution documented on procedure form.

c. Make every effort to expedite testing process and minimize unnecessary delays, while not compromising integrity of procedures.

d. Identified deficiency resolution:

(1) No dispute on deficiency and responsibility to correct it if:

(a) CxA documents deficiency and adjustments or alterations required to correct it.
(b) CCT corrects deficiency and notifies CxA that equipment is ready to be retested.
(c) CxA reschedules test and test is repeated.

(2) Dispute about deficiency or who is responsible:

(a) Deficiency is documented on non-compliance form and copy given to the Government and CCT.
(b) Resolutions are made at lowest management level possible and additional parties are brought into discussions as needed.

Final interpretive authority is with the Government.
Final acceptance authority is with the Government.

(c) CxA documents resolution process.
(d) Once interpretation and resolution have been decided, appropriate party corrects deficiency and notifies CxA that equipment is ready to be retested.
(e) CxA reschedules test and test is repeated until satisfactory performance is achieved.

3.7.2 Cost of Retesting

a. CCT

(1) Responsible for costs to retest pre-functional or functional test, if they are responsible for deficiency.

(2) If not responsible for deficiency, cost recovery for retesting costs to be negotiated with CCT.

b. Time for CxA and the Government to approve any retesting recommended by the by the CCT because pre-functional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged.

3.7.3 Approval

The Government gives final approval on each test.

3.8 DEFERRED TESTING

3.8.1 Unforeseen Deferred Tests

Functional testing that cannot be completed due to building structure, required occupancy condition, or other deficiency may be delayed upon approval of the Government.

a. Tests are conducted in same manner as seasonal tests as soon as possible.

3.8.2 Seasonal Testing

Seasonal variation in operations or control strategies may require additional testing during opposite season to verify performance of HVAC system and controls.

a. During warranty period: Seasonal testing and other deferred testing is completed as required to fully test sequences of operation.

(1) CxA coordinates these activities.

b. Tests are executed and documented, with deficiencies corrected by

appropriate.

c. Final adjustments to OPERATIONS AND MAINTENANCE DOCUMENTATION.

3.8.3 End of Warranty Review

Conduct end of warranty review prior to the end of the warranty period. Review the current building operation with the facility maintenance staff.

a. The review shall include outstanding issues from original or seasonal testing. Interview facility staff to identify concerns with building operation.

b. Provide suggestions for improvements and assist Government in developing reports or documentation to remedy problems.

c. Update O&M manuals and Record Documents as necessary due to the testing.

3.9 FINAL COMMISSIONING REPORT

a. Final Commissioning Report: Compile final commissioning report. Summarize all of the tasks, findings, conclusions, and recommendations of the commissioning process.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 12 00

STRUCTURAL STEEL

05/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 AISC QUALITY CERTIFICATION
1.4 SEISMIC PROVISIONS
1.5 QUALITY ASSURANCE
1.5.1 Preconstruction Submittals
1.5.1.1 Erection Drawings
1.5.2 Fabrication Drawing Requirements
1.5.3 Certifications
1.5.3.1 Welding Procedures and Qualifications

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION
2.2 STEEL
2.2.1 Structural Steel
2.2.2 Structural Steel Tubing
2.2.3 Steel Pipe
2.3 BOLTS, NUTS, AND WASHERS
2.3.1 Common Grade Bolts
2.3.1.1 Bolts
2.3.1.2 Washers
2.3.2 High-Strength Bolts
2.3.2.1 Bolts
2.3.2.2 Nuts
2.3.2.3 Washers
2.4 STRUCTURAL STEEL ACCESSORIES
2.4.1 Welding Electrodes and Rods
2.4.2 Non-Shrink Grout
2.4.3 Pins and Rollers
2.5 GALVANIZING
2.6 FABRICATION
2.6.1 Markings
2.6.2 Shop Primer
2.6.2.1 Cleaning
2.7 DRAINAGE HOLES

PART 3 EXECUTION

3.1 ERECTION
3.1.1 STORAGE
3.2 CONNECTIONS
3.2.1 Common Grade Bolts
3.2.2 High-Strength Bolts

3.3 GAS CUTTING
3.4 WELDING
3.4.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips
3.5 SHOP PRIMER REPAIR
3.5.1 Field Priming
3.6 GALVANIZING REPAIR
3.7 FIELD QUALITY CONTROL
3.7.1 Welds
3.7.1.1 Visual Inspection
3.7.1.2 Nondestructive Testing
3.7.2 High-Strength Bolts
3.7.2.1 Testing Bolt, Nut, and Washer Assemblies
3.7.2.2 Inspection
3.7.2.3 Testing

-- End of Section Table of Contents --

SECTION 05 12 00

STRUCTURAL STEEL
05/14

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-17	(2002; Errata 2003; Errata 2005, 17th Edition) Standard Specifications for Highway Bridges

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2010) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2011) Steel Construction Manual
AISC 326	(2009) Detailing for Steel Construction
AISC 341	(2010) Seismic Provisions for Structural Steel Buildings
AISC 360	(2010) Specification for Structural Steel Buildings
AISC DESIGN GUIDE 10	(1997) Erection Bracing of Low-Rise Structural Steel Buildings

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B46.1	(2009) Surface Texture, Surface Roughness, Waviness and Lay

ASTM INTERNATIONAL (ASTM)

ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A1085	(2013) Standard Specification for

	Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)
ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A325	(2014) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A490	(2012) Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A563	(2007a, R2014) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A572/A572M	(2015) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A6/A6M	(2014) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A668/A668M	(2014) Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A786/A786M	(2005; R 2009) Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
ASTM A992/A992M	(2011) Standard Specification for Structural Steel Shapes
ASTM C1107/C1107M	(2014) Standard Specification for Packaged

	Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C827/C827M	(2010) Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
ASTM F2329	(2013) Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
ASTM F436	(2011) Hardened Steel Washers
ASTM F844	(2007a; R 2013) Washers, Steel, Plain (Flat), Unhardened for General Use

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(2002; E 2004) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)
SSPC Paint 29	(2002; E 2004) Zinc Dust Sacrificial Primer, Performance-Based

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2013) Structural Engineering
UFC 3-310-04	(2013) Seismic Design for Buildings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Erection Drawings; G, AE

SD-02 Shop Drawings

Fabrication drawings including description of connections; G, AE

SD-03 Product Data

Shop primer; G, AE

Welding electrodes and rods; G, AE

Non-Shrink Grout; G, AE

SD-06 Test Reports

Bolts, nuts, and washers; G, AE

Weld Inspection Reports; G

Bolt Testing Reports; G

SD-07 Certificates

Steel; G

Bolts, nuts, and washers; G

Galvanizing; G

Pins and rollers; G

AISC Fabrication Plant Quality Certification; G

AISC Erector Quality Certification; G

Welding procedures and qualifications; G

Welding electrodes and rods; G

1.3 AISC QUALITY CERTIFICATION

Work must be fabricated in an AISC Certified Fabrication Plant. Submit AISC fabrication plant quality certification.

Work must be erected by an AISC Certified Erector . Submit AISC erector quality certification.

1.4 SEISMIC PROVISIONS

The structural steel system must be provided in accordance with AISC 341, Chapter J as amended by UFC 3-310-04.

1.5 QUALITY ASSURANCE

1.5.1 Preconstruction Submittals

1.5.1.1 Erection Drawings

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing. The erection drawings must conform to AISC 303. Erection drawings must be reviewed, stamped and sealed by a registered professional engineer.

1.5.2 Fabrication Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326 and AISC 325. Fabrication drawings must 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. Use AWS A2.4 standard welding symbols. Shoring and temporary bracing if necessary to aid in erection must be designed and sealed by a registered professional engineer and submitted for record purposes, with calculations, as part of the drawings. Any deviations from the details shown on the contract drawings must be clearly highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings. If connections or

member sizes deviate from those shown on the contract drawings, provide calculations stamped by a licensed engineer demonstrating that the change meets or exceed the capacity of the elements shown on the contract drawings.

1.5.3 Certifications

1.5.3.1 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.

Conform to all requirements specified in AWS D1.1/D1.1M.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide the structural steel system, including shop primer, paint and galvanizing, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing must be provided in accordance with AISC 360, AISC 341, UFC 3-301-01 and UFC 3-310-04 except as modified in this contract.

2.2 STEEL

2.2.1 Structural Steel

Wide flange and WT shapes, ASTM A992/A992M. Angles, Channels and Plates, ASTM A36/A36M. Plate material used for Lifting Lugs, ASTM A572/A572M. Floor and Roof plate, ASTM A786/A786M

2.2.2 Structural Steel Tubing

ASTM A500/A500M, Grade B. ASTM A1085

2.2.3 Steel Pipe

ASTM A53/A53M, Grade B, weight class as indicated on the drawings.

2.3 BOLTS, NUTS, AND WASHERS

Submit 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.

2.3.1 Common Grade Bolts

2.3.1.1 Bolts

ASTM A307, Grade A. 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. ASTM A307 bolts may only be used in non structural applications or as indicated on the drawings.

2.3.1.2 Washers

ASTM F844.

2.3.2 High-Strength Bolts

2.3.2.1 Bolts

ASTM A325, Type 1 ASTM A490, Type 1 or 2.

2.3.2.2 Nuts

ASTM A563, Grade and Style as specified in the applicable ASTM bolt standard.

2.3.2.3 Washers

ASTM F436, plain carbon steel.

2.4 STRUCTURAL STEEL ACCESSORIES

2.4.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

2.4.2 Non-Shrink Grout

ASTM C1107/C1107M, with no ASTM C827/C827M shrinkage. Grout must be nonmetallic.

2.4.3 Pins and Rollers

ASTM A668/A668M, Class C, D, F, or G; ASTM A108, Grades 1016 to 1030. Provide as specified in AASHTO HB-17, Division II, Sections 10.26 and 10.27, except provide pins in lengths to extend a minimum of 0.25 inch beyond the outside faces of the connected parts.

2.5 GALVANIZING

ASTM F2329 for threaded parts or ASTM A123/A123M for structural steel members exposed to weather, unless specified otherwise galvanize after fabrication.

2.6 FABRICATION

Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible. Punch, subpunch and ream, or drill bolt and pin holes perpendicular to the surface of the member.

Compression joints depending on contact bearing must have a surface roughness not in excess of 500 micro inch as determined by ASME B46.1, and ends must be square within the tolerances for milled ends specified in ASTM A6/A6M.

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 Contracting Officer.

2.6.1 Markings

Prior to erection, members must be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections must 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

SSPC Paint 20 or SSPC Paint 29, (zinc rich primer). Shop prime & paint structural steel in accordance with SECTION 09 97 13.26, except as modified herein . Do not prime steel 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). If flash rusting occurs, re-clean the surface prior to application of primer.

Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer or paint in foggy or rainy weather; or conditions prohibited by the coating manufacturer/supplier. Repair damaged primed and painted surfaces as recommended by the coatings manufacturer/supplier..

2.6.2.1 Cleaning

Steel shall be cleaned as outlined in SECTION 09 97 13.26 or as required by the coatings supplier/manufacturer. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

2.7 DRAINAGE HOLES

Adequate drainage holes must be drilled to eliminate water traps. Hole diameter must be 1/2 inch and location must be indicated on the detail drawings. Hole size and location must not affect the structural integrity.

PART 3 EXECUTION

3.1 ERECTION

a. Erection of structural steel, except as indicated in item b. below, must be in accordance with the applicable provisions of AISC 325.

b. The structure must be erected in accordance with AISC DESIGN GUIDE 10.

After final positioning of steel members, provide full bearing under base plates and bearing plates using steel shims.

3.1.1 STORAGE

Material must be stored out of contact with the ground and standing water in such manner and location as will minimize deterioration.

3.2 CONNECTIONS

Except as modified in this section, connections not detailed must be designed in accordance with AISC 360. Build connections into existing work. Holes must not be cut or enlarged by burning. Bolts, nuts, and washers must be clean of dirt and rust, and lubricated immediately prior

to installation.

3.2.1 Common Grade Bolts

ASTM A307 bolts must 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 Contracting Officer for further instructions.

3.2.2 High-Strength Bolts

Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts must then be fully tensioned to 70 percent of their minimum tensile strength in accordance with RCSC Specification for Structural Joints Using High-Strength Bolts, progressing from the most rigid part of a connection to the free edges.

3.3 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 Contracting Officer.

3.4 WELDING

Welding must be in accordance with AWS D1.1/D1.1M. Grind exposed welds smooth as indicated. Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

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 must be submitted for approval.

3.4.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove backing strips from bottom flange of moment connections, backgouge the root pass to sound weld metal and reinforce with a 5/16 inch fillet weld minimum.

3.5 SHOP PRIMER REPAIR

Repair shop primer and paintin accordance with the paint manufacturer's recommendation for surfaces damaged by handling, transporting, cutting, welding, or bolting.

3.5.1 Field Priming

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat must be cleaned and primed with paint of the same quality as that used for the shop coat.

3.6 GALVANIZING REPAIR

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.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing, except that electric power for field tests (at PNSY only) will be furnished as set forth in Division 1. The Contracting Officer must be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of the inspection.

3.7.1 Welds

3.7.1.1 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.

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.

Inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use.

3.7.1.2 Nondestructive Testing

Nondestructive testing must be in accordance with AWS D1.1/D1.1M. All full penetration groove or butt welds shall be tested by ultrasonic testing. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder must be tested by ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing must be used only in areas inaccessible to ultrasonic testing. Retest defective areas after repair. Submit weld inspection reports.

3.7.2 High-Strength Bolts

3.7.2.1 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 AISC 360, depending on bolt size and grade. The bolt tension must be developed by tightening the nut. A representative of the manufacturer or supplier must be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements. Submit bolt testing reports.

3.7.2.2 Inspection

Inspection procedures must be in accordance with AISC 360. Confirm and report to the Contracting Officer 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.

The Government has the option to inspect calibration of torque wrenches for high-strength bolts.

Contractor shallinspect calibration of torque wrenches for high-strength bolts.

3.7.2.3 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. Provide the required access for the Government to perform the tests. 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 must be selected by the Contracting Officer. 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, must be tested at the Contractor's expense. Retest new bolts after installation at the Contractor's expense.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 21 19

OPEN WEB STEEL JOIST FRAMING

07/07

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 REGULATORY REQUIREMENT
1.4 DELIVERY AND STORAGE
1.5 QUALITY ASSURANCE
1.5.1 Drawing Requirements
1.5.2 Certification of Compliance

PART 2 PRODUCTS

2.1 JOISTS AND ACCESSORIES
2.2 PAINTING
2.2.1 Shop Painting

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Handling and Erection
3.1.2 Welding
3.2 PAINTING
3.2.1 Touch-Up Painting
3.2.2 Field Painting
3.3 VISUAL INSPECTIONS
3.3.1 Erection Inspection

-- End of Section Table of Contents --

SECTION 05 21 19

OPEN WEB STEEL JOIST FRAMING
07/07

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WELDING SOCIETY (AWS)

AWS B2.1/B2.1M	(2014) Specification for Welding Procedure and Performance Qualification
AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

STEEL JOIST INSTITUTE (SJI)

SJI LOAD TABLES	(2005; Errata 1 2006; Errata 2 2007; Errata 3 2007) 42nd Edition Catalog of Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders
SJI MANUAL	(2009) 80 Years of Open Web Steel Joist Construction
SJI TD 10	(2003) Technical Digest No. 10 - Design of Fire Resistive Assemblies with Steel Joists
SJI TD 8	(2008) Technical Digest No. 8 - Welding Of Open-Web Steel Joists And Joist Girders; 2nd Edition
SJI TD 9	(2008) Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; 3rd Edition

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

29 CFR 1910.1200	Hazard Communication
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.757	Steel Erection; Open Web Steel Joists

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office

that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Welder qualification;G, AE

Material Safety Data Sheet;G, AE (MSDS) per OSHA 29 CFR 1910.1200

SD-02 Shop Drawings

Steel joist framing; G, AE

SD-06 Test Reports

Erection inspection; G

Welding inspections; G

SD-07 Certificates

Accessories;G, AE

Certification of Compliance;G, AE

1.3 REGULATORY REQUIREMENT

All joist framing must conform to 29 CFR 1926.757. Secure all joist bridging and anchoring in place prior to the application of any construction loads. Distribute temporary loads so that joist capacity is not exceeded. Do not apply loads to bridging.

1.4 DELIVERY AND STORAGE

Handle, transport, and store joists in a manner to prevent damage affecting their structural integrity. Store all items off the ground in a well drained location protected from the weather and easily accessible for inspection and handling.

1.5 QUALITY ASSURANCE

All work must comply with the requirements set forth in 29 CFR 1926.

1.5.1 Drawing Requirements

Submit steel joist framing drawings. Show joist type and size, layout in plan, and erection details including methods of anchoring, framing at openings, type and spacing of bridging, requirements for field welding, and details of accessories as applicable.

1.5.2 Certification of Compliance

Prior to construction commencement, submit Material Safety Data Sheetper 29 CFR 1910.1200 for steel joists , and certification for welder qualification, compliance with AWS B2.1/B2.1M, welding operation, and tacker, 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.

Submit certification of compliance for the following:
SJI MANUAL
SJI TD 8
SJI TD 9
SJI TD 10
29 CFR 1926
29 CFR 1926.757

PART 2 PRODUCTS

2.1 JOISTS AND ACCESSORIES

2.2 PAINTING

2.2.1 Shop Painting

Clean and prime joists in accordance with Specification 09 97 13.26.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Handling and Erection

Conform to SJI LOAD TABLES for the joist series indicated.

3.1.2 Welding

All welding must conform to AWS B2.1/B2.1M and AWS D1.1/D1.1M.

3.2 PAINTING

3.2.1 Touch-Up Painting

After erection of joists , touch-up connections and areas of abraded shop coat with paint of the same type used for the shop coat.

3.2.2 Field Painting

Paint joists requiring a finish coat in conformance with the requirements of Section 09 97 13.26 .

3.3 VISUAL INSPECTIONS

3.3.1 Erection Inspection

AWS D1.1/D1.1M, Section 6. Perform erection inspection and field welding inspections with AWS certified welding inspectors. Welding inspectors must visually inspect and mark welds.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 30 00

STEEL DECKS

11/11

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY ASSURANCE
1.3.1 Deck Units
1.3.2 Certification of Powder-Actuated Tool Operator
1.3.3 Qualifications for Welding Work
1.3.4 Regulatory Requirements
1.3.4.1 Fire Safety
1.3.4.2 Wind Storm Resistance
1.3.5 Fabrication Drawings
1.4 DELIVERY, STORAGE, AND HANDLING
1.5 DESIGN REQUIREMENTS FOR ROOF DECKS
1.5.1 Properties of Sections
1.5.2 Allowable Loads

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Steel Sheet
2.1.2 Steel Coating
2.1.3 Mixes
2.1.3.1 Galvanizing Repair Paint for Floor Decks
2.1.4 Galvanized Steel Angles for Roof Decks
2.1.5 Joint Sealant Material for Roof Decks
2.1.6 Galvanizing Repair Paint for Roof Decks
2.1.7 Flexible Closure Strips for Roof Decks
2.2 ACCESSORIES
2.2.1 Adjusting Plates
2.2.2 End Closures
2.2.3 Sheet Metal Collar
2.2.4 Cover Plates
2.2.5 Column Closures
2.2.6 Access Hole Covers
2.2.7 Miscellaneous Accessories
2.3 FABRICATION
2.3.1 Length of Floor Deck Units
2.3.2 Roof Deck
2.3.2.1 Cant Strips for Roof Decks
2.3.2.2 Metal Closure Stripsfor Roof Decks
2.3.3 Touch-Up

PART 3 EXECUTION

3.1 EXAMINATION

3.2 INSTALLATION
3.2.1 Attachment
3.2.1.1 Welding
3.2.2 Openings
3.2.3 Deck Damage
3.2.4 Accessory Installation
3.2.4.1 Adjusting Plates
3.2.4.2 End Closures
3.2.4.3 Column Closures
3.2.4.4 Access Hole Covers
3.3 CANT STRIPS FOR ROOF DECKS
3.4 CLOSURE STRIPS FOR ROOF DECKS
3.5 ROOF INSULATION SUPPORT FOR ROOF DECKS
3.6 CLEANING AND PROTECTION FOR ROOF DECKS
3.7 FIELD QUALITY CONTROL
3.7.1 Decks Not Receiving Concrete

-- End of Section Table of Contents --

SECTION 05 30 00

STEEL DECKS
11/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100	(1991; R 2008) Cold-Formed Steel Design Manual
AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel
AWS D1.3/D1.3M	(2008; Errata 2008) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2013) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A792/A792M	(2010) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D746	(2013) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/
FM DS 1-28	(2002) Design Wind Loads

STEEL DECK INSTITUTE (SDI)

SDI 31	(2007) Design Manual for Composite Decks, Form Decks, and Roof Decks
SDI DDMO3	(2004; Errata 2006; Add 2006) Diaphragm Design Manual; 3rd Edition
SDI DDP	(1987; R 2000) Deck Damage and Penetrations
SDI MOC2	(2006) Manual of Construction with Steel Deck

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2013) Structural Engineering

UNDERWRITERS LABORATORIES (UL)

UL 209	(2011) Cellular Metal Floor Raceways and Fittings
UL 580	(2006; Reprint Oct 2013) Tests for Uplift Resistance of Roof Assemblies
UL Bld Mat Dir	(2012) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings;G, AE

Fabrication Drawings;G, AE

Flexible Closure Strips;G, AE

Cant Strips

Metal Closure Strips;G, AE

SD-03 Product Data

Accessories

Galvanizing Repair Paint;G, AE

Joint Sealant Material;G, AE

Powder-Actuated Tool Operator

Welder Qualifications;G, AE

SD-07 Certificates

. Welding Procedures;G, AE

Fire Safety;G, AE

Wind Storm Resistance;G, AE

1.3 QUALITY ASSURANCE

1.3.1 Deck Units

Furnish deck units and accessory products from a manufacturer regularly engaged in manufacture of steel decking. Provide manufacturer's certificates attesting that the decking material meets the specified requirements.

1.3.2 Certification of Powder-Actuated Tool Operator

Manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.

1.3.3 Qualifications for Welding Work

Follows Welding Procedures in accordance with AWS D1.1/D1.1M.

Submit qualified Welder Qualifications in accordance with AWS D1.1/D1.1M, or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, perform an immediate retest of two test welds until each test weld passes. Failure in the immediate retest will require the welder be retested after further practice or training, performing a complete set of test welds.

1.3.4 Regulatory Requirements

1.3.4.1 Fire Safety

Test roof deck as a part of a roof deck construction assembly of the type used for this project, listing as fire classified in the UL Bld Mat Dir, or listing as Class I construction in the FM APP GUIDE, and so labeled.

1.3.4.2 Wind Storm Resistance

Provide roof construction assembly capable of withstanding an uplift pressure of 60 pounds per square foot when tested in accordance with the uplift pressure test described in the FM DS 1-28 or as described in UL 580 and in general compliance with UFC 3-301-01.

1.3.5 Fabrication Drawings

Show type and location of units, location and sequence of connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, size and location of holes to be cut and reinforcement to be provided, the manufacturer's erection instructions and other pertinent details.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver deck units to the site in a dry and undamaged condition. Store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage. Do not use decking for storage or as working platform until units have been fastened into position. Exercise care not to damage material or overload decking during construction. The maximum uniform distributed storage load must not exceed the design live load. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide drainage. Maintain deck finish at all times to prevent formation of rust. Repair deck finish using touch-up paint. Replace damaged material.

1.5 DESIGN REQUIREMENTS FOR ROOF DECKS

1.5.1 Properties of Sections

Properties of metal roof deck sections must comply with engineering design width as limited by the provisions of AISI D100.

1.5.2 Allowable Loads

Indicate total uniform dead and live load for detailing purposes.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Steel Sheet

Flat rolled carbon steel sheets of structural quality, thickness not less than indicated 0.035 inch before coating, meeting the requirements of AISI SG03-3, except as modified herein.

2.1.2 Steel Coating

ASTM A653/A653M designation G90 galvanized, or ASTM A792/A792M designation AZ55, aluminum-zinc alloy. Apply coating to both sides of sheet. Conform to UL 209 for coating on decking provided as wire raceways.

2.1.3 Mixes

2.1.3.1 Galvanizing Repair Paint for Floor Decks

Provide a high-zinc-dust content paint for regalvanizing welds in galvanized steel conforming to ASTM A780/A780M.

2.1.4 Galvanized Steel Angles for Roof Decks

Provide hot-rolled carbon steel angles conforming to ASTM A36/A36M, merchant quality, Grade Designation SAE/AISI 1023 or SAE/AISI 1025, and hot-dip galvanized in accordance with ASTM A123/A123M.

2.1.5 Joint Sealant Material for Roof Decks

Provide a nonskinning, gun-grade, bulk compound material as recommended by the manufacturer.

2.1.6 Galvanizing Repair Paint for Roof Decks

Provide a high zinc-dust content paint for regalvanizing welds in galvanized steel and shall conform to ASTM A780/A780M.

2.1.7 Flexible Closure Strips for Roof Decks

Provide strips made of elastomeric material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Provide a vulcanized, closed-cell, expanded chloroprene elastomer having approximately 3.5 psi compressive-deflection at 25 percent deflection (limits), conforming to ASTM D1056, Grade No. SCE 41, with the following additional properties:

Brittleness temperature of minus 40 degrees F when tested in accordance with ASTM D746.

Flammability resistance with a flame spread rating of less than 25 when tested in accordance with ASTM E84.

Resistance to ozone must be "no cracks" after exposure of a sample kept under a surface tensile strain of 25 percent to an ozone concentration of 100 parts per million of air by volume in air for 100 hours at 104 degrees F and tested in accordance with ASTM D1149.

Provide a elastomeric type adhesive with a chloroprene base as recommended by the manufacturer of the flexible closure strips.

2.2 ACCESSORIES

Provide accessories of same material as deck, unless specified otherwise. Provide manufacturer's standard type accessories, as specified.

2.2.1 Adjusting Plates

Provide adjusting plates, or segments of deck units, of same thickness and configuration as deck units in locations too narrow to accommodate full size units. Provide factory cut plates of predetermined size where possible.

2.2.2 End Closures

Fabricated of sheet metal by the deck manufacturer. Provide end closures minimum 0.028 inch thick to close open ends at and openings through deck.

2.2.3 Sheet Metal Collar

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.2.4 Cover Plates

Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominalthick before galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

2.2.5 Column Closures

Sheet metal, minimum 0.0358 inch thick or metal rib lath.

2.2.6 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

2.2.7 Miscellaneous Accessories

Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch welding washers, 0.0598 inch cant strip, 0.0295 inch other metal accessories, 0.0358 inch unless otherwise indicated. Accessories must include but not be limited to saddles, welding washers, fasteners, cant strips, butt cover plates, underlapping sleeves, and ridge and valley plates.

2.3 FABRICATION

2.3.1 Length of Floor Deck Units

Provide floor deck units of sufficient length to span three or more spacings where possible.

2.3.2 Roof Deck

Conform to ASTM A792/A792M or ASTM A1008/A1008M for deck used in

conjunction with insulation and built-up roofing. Fabricate roof deck units of 0.035 inch design thickness or thicker steel and galvanized or zinc-coated in conformance with ASTM A653/A653M orG90 coating class or aluminum-zinc coated in accordance with ASTM A792/A792M Coating Designation AZ55.

2.3.2.1 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0359 inch thick before galvanizing. Bend strips to form a 45-degree cant not less than 5 inch wide, with top and bottom flanges a minimum 3 inch wide. Length of strips 10 feet.

2.3.2.2 Metal Closure Stripsfor Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not less than nominal 0.0359 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

2.3.3 Touch-Up

Touchup galvanized surfaces with galvanizing repair paint including welds, weld scars, bruises and rust spots.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to installation of decking units and accessories, examine worksite to verify that as-built structure will permit installation of decking system without modification.

3.2 INSTALLATION

Install steel deck units in accordance with SDI 31 approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports before permanently securing in place. Damaged deck and accessories including material which is permanently stained or contaminated, deformed, or with burned holes shall not be installed. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Contracting Officer and make necessary corrections before permanently anchoring deck units. Locate deck ends over supports only. Lap floor deck a minimum of 2 inches Do not use unanchored deck units as a work or storage platform. Permanently anchor units placed by the end of each working day. Do not support suspended ceilings, light fixtures, ducts, utilities, or other loads by steel deck unless indicated. Distribute loads by appropriate means to prevent damage.

3.2.1 Attachment

Immediately after placement and alignment, and after correcting inaccuracies, permanently fasten steel deck units to structural supports and to adjacent deck units by welding with normal5/8 inch diameter puddle welds or fastened with screws, powder-actuated fasteners, or pneumatically driven fasteners as indicated on the design drawings and in accordance with manufacturer's recommended procedure. Clamp or weight deck units to provide firm contact between deck units and structural supports while

performing welding . Anchoring the deck to structural supports with powder-actuated fasteners or pneumatically driven fasteners is prohibited. Attachment of adjacent deck units by button-punching is prohibited.

3.2.1.1 Welding

Perform welding in accordance with AWS D1.3/D1.3M using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Ensure only operators previously qualified by tests prescribed in AWS D1.1/D1.1M and AWS D1.3/D1.3M make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Reference design drawingsfor location, size, and spacing of fastening. Do not use welding washers at the connections of the deck to supports. Do not use welding washers at sidelaps. Holes and similar defects will not be acceptable. Lap 2 inch deck ends. Attach all partial or segments of deck units to structural supports in accordance with Section 2.5 of SDI DDMO3. . Immediately clean welds by chipping and wire brushing. Heavily coat welds, cut edges and damaged portions of coated finish with zinc-dust paint conforming to ASTM A780/A780M .

3.2.2 Openings

Cut or drill all holes and openings required and be coordinated with the drawings, specifications, and other trades. Frame and reinforce openings through the deck in conformance with SDI DDP. Reinforce holes and openings 6 to 12 inch across by 0.0474 inch thick steel sheet at least 12 inch wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inch on center. Reinforce holes and openings larger than 12 inch by steel channels or angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Install steel channels or angles perpendicular to the deck ribs and fasten to the channels or angles perpendicular to the steel joists.

3.2.3 Deck Damage

SDI MOC2, for repair of deck damage.

3.2.4 Accessory Installation

3.2.4.1 Adjusting Plates

Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.

3.2.4.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.

3.2.4.3 Column Closures

Provide for spaces between floor decking and columns which penetrate the deck. Field cut closure plate to fit column in the field and tack weld to decking and columns.

3.2.4.4 Access Hole Covers

Provide access hole covers to seal holes cut in decking to facilitate

welding of the deck to structural supports.

3.3 CANT STRIPS FOR ROOF DECKS

Provide strips to be fusion welded to surface of roof decking, secured to wood nailers by galvanized screws or to steel framing by galvanized self-tapping screws or welds. Do not exceed spacing of welds and fasteners of 12 inch. Lap end joints a minimum 3 inch and secure with galvanized sheet metal screws spaced a maximum 4 inch on center.

3.4 CLOSURE STRIPS FOR ROOF DECKS

Provide closure strips at open, uncovered ends and edges of the roof decking and in voids between roof decking and top of walls and partitions where indicated. Install closure strips in position in a manner to provide a weathertight installation.

3.5 ROOF INSULATION SUPPORT FOR ROOF DECKS

Provide metal closure strips for support of roof insulation where rib openings in top surface of metal roof decking occur adjacent to edges and openings. Weld metal closure strips in position.

3.6 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

3.7 FIELD QUALITY CONTROL

3.7.1 Decks Not Receiving Concrete

Inspect the decking top surface for distortion after installation. For roof decks not receiving concrete, verify distortion by placing a straight edge across three adjacent top flanges. The maximum allowable gap between the straight edge and the top flanges is 1/16 inch; when gap is more than 1/16 inch, provide corrective measures or replacement. Reinspect decking after performing corrective measures or replacement.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 50 13

MISCELLANEOUS METAL FABRICATIONS

05/10

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALIFICATION OF WELDERS
1.4 DELIVERY, STORAGE, AND PROTECTION

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Structural Carbon Steel
2.1.2 Structural Tubing
2.1.3 Steel Pipe
2.1.4 Fittings for Steel Pipe
2.1.5 Gratings
2.1.6 Floor & Roof Plates
2.1.7 Anchor Bolts
2.1.7.1 Sleeve & Adhesive Anchors
2.1.7.2 Non structural Bolts, Nuts, Studs and Rivets
2.1.7.3 Powder Actuated Fasteners
2.1.7.4 Screws
2.1.7.5 Washers
2.2 Finishes
2.2.1 Galvanizing
2.2.2 Galvanize
2.2.3 Repair of Zinc-Coated Surfaces
2.2.4 Shop Cleaning and Painting
2.2.4.1 Surface Preparation
2.2.4.2 Pretreatment, Priming and Painting
2.2.5 Nonferrous Metal Surfaces
2.3 ACCESS DOORS AND PANELS
2.4 EXPANSION JOINT COVERS
2.5 FLOOR GRATINGS AND ROOF WALKWAYS
2.6 MISCELLANEOUS PLATES AND SHAPES
2.7 SAFETY CHAINS
2.8 STRUCTURAL STEEL DOOR FRAMES

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS
3.2 WORKMANSHIP
3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS
3.4 BUILT-IN WORK
3.5 WELDING
3.6 FINISHES
3.6.1 Dissimilar Materials

3.6.2 Field Preparation
3.6.3 Environmental Conditions
3.7 ACCESS PANELS
3.8 CONTROL-JOINT COVERS
3.9 COVER PLATES AND FRAMES
3.10 ROOF HATCH (SCUTTLES)
3.11 DOOR GUARD FRAME
3.12 INSTALLATION OF GUARD POSTS (BOLLARDS/PIPE GUARDS)
3.13 MOUNTING OF SAFETY CHAINS
3.14 STRUCTURAL STEEL DOOR FRAMES

-- End of Section Table of Contents --

SECTION 05 50 13

MISCELLANEOUS METAL FABRICATIONS
05/10

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2010) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.3	(2013) Operations - Safety Requirements for Powder Actuated Fastening Systems

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2010) Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.21.1	(2009) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.6.2	(1998; R 2010) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series
ASME B18.6.3	(2013) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A467/A467M	(2007; R 2012) Standard Specification for Machine Coil Chain
ASTM A47/A47M	(1999; R 2014) Standard Specification for Ferritic Malleable Iron Castings
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A786/A786M	(2005; R 2009) Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM C1513	(2013) Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM E488/E488M	(2010) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

MASTER PAINTERS INSTITUTE (MPI)

MPI 79	(Oct 2009) Alkyd Anti-Corrosive Metal Primer

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531 (2009) Metal Bar Grating Manual

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication drawings of structural steel door frames; G, AE

Access doors and panels, installation drawings; G, AE

Cover plates and frames, installation drawings; G, AE

Expansion joint covers, installation drawings; G, AE

Floor gratings and roof walkways, installation drawings; G, AE

Roof hatch; G, AE
Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation with relation to the building construction.

SD-03 Product Data

Access doors and panels; G, AE

Cover plates and frames; G, AE

Control-joint covers; G, AE

Expansion joint covers; G, AE

Floor gratings and roof walkways; G, AE

Structural steel door frames; G, AE

Roof hatch; G, AE

Provide full size samples , taken from manufacturer's stock, and be complete as required for installation in the structure. Samples may be installed in the work, provided each sample is clearly identified and its location recorded.

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A36/A36M.

2.1.2 Structural Tubing

ASTM A500/A500M.

2.1.3 Steel Pipe

ASTM A53/A53M, Type E or S, Grade B.

2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A47/A47M.

2.1.5 Gratings

a. Metal bar type grating NAAMM MBG 531.

2.1.6 Floor & Roof Plates

Floor & Roof plate ASTM A786/A786M. Steel plate shall not be less than 1/4 inch.

2.1.7 Anchor Bolts

2.1.7.1 Sleeve & Adhesive Anchors

Provide type 318 stainless steel internally threaded sleeve anchors where noted. Minimum concrete embedment shall be 8in. Design values listed shall be as tested according to ASTM E488/E488M.

a. Minimum allowable pullout value shall be 8,000lb.

b. Minimum allowable shear value shall be 4,000lb.

2.1.7.2 Non structural Bolts, Nuts, Studs and Rivets

ASME B18.2.2 or ASTM A307.

2.1.7.3 Powder Actuated Fasteners

Follow safety provisions of ASSE/SAFE A10.3.

2.1.7.4 Screws

ASME B18.2.1, ASME B18.6.2, ASME B18.6.3 and ASTM C1513.

2.1.7.5 Washers

Provide plain washers to conform to ASME B18.21.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.1.

2.2 Finishes2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A123/A123M, ASTM A153/A153M, ASTM A653/A653M or ASTM A924/A924M, G90, as applicable.

2.2.2 Galvanize

Grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780/A780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.2.4 Shop Cleaning and Painting

2.2.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete shall be free of dirt and grease.

2.2.4.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

2.2.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.3 ACCESS DOORS AND PANELS

Provide flush type access doors and panels unless otherwise indicated. Fabricate frames for access doors of steel not lighter than 14 gage with

welded joints and anchorage for securing into construction. Provide access doors with a minimum of 14 by 20 inches and of not lighter than 14 gage steel, with stiffened edges and welded attachments. Provide access doors hinged to frame and with a flush-face, turn-screw-operated latch. Provide exposed metal surfaces with a shop applied prime coat.

2.4 EXPANSION JOINT COVERS

Provide expansion joint covers constructed of extruded aluminum with anodized satin aluminum finish for walls and ceilings and with standard mill finish for floor covers and exterior covers. Furnish plates, backup angles, expansion filler strip and anchors as indicated.

2.5 FLOOR GRATINGS AND ROOF WALKWAYS

Design steel grating in accordance with NAAMM MBG 531 for bar type grating or manufacturer's charts for plank grating. Galvanize steel floor gratings.

a. Design floor gratings to support a live load of 125 pounds per square foot for the spans indicated, with maximum deflection of L/240.

b. NAAMM MBG 531, band edges of grating with bars of the same size as the bearing bars. Weld banding in accordance with the manufacturer's standard for trim unless otherwise indicated. Design tops of bearing bars, cross or intermediate bars to be in the same plane and match grating finish.

c. Anchor gratings to structural members with bolts, toggle bolts, or expansion shields and bolts.

d. Slip resistance requirements must exceed both wet and dry a static coefficient of friction of 0.50.

2.6 MISCELLANEOUS PLATES AND SHAPES

Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames.

2.7 SAFETY CHAINS

Construct safety chains of galvanized steel, straight link type, 3/16 inch diameter, with at least twelve links per foot, and with snap hooks on each end. Test safety chain in accordance with ASTM A467/A467M, Class CS. Provide snap hooks of boat type. Provide galvanized 3/8 inch bolt with 3/4 inch eye diameter for attachment of chain, anchored as indicated. Supply two chains, 4 inches longer than the anchorage spacing, for each guarded area. Locate safety chain where indicated. Mount the top chain feet 42 inches above the floor and mount the lower chain 2 feet above the floor.

2.8 STRUCTURAL STEEL DOOR FRAMES

a. Provide frames as indicated. If not otherwise shown, construct frames of structural shapes, or shape and plate composite, to form a full depth channel shape with at least 1 1/2 inchoutstanding legs. For single swing doors, provide continuous 5/8 by 1 1/2 inch bar stock

stops at head and jambs.

b. Where track, guides, hoods, hangers, operators, and other such accessories are required, provide support as indicated.

c. Provide jamb anchors near top, bottom, and at not more than 24 inch intervals. Provide the bottom of each jamb member with a clip angle welded in place with two 1/2 inchdiameter floor bolts for adjustment.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners shall be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Form joints exposed to the weather shall be formed to exclude water. Items listed below require additional procedures.

3.2 WORKMANSHIP

Provide miscellaneous metalwork that is well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Provide continuous welding along the entire area of contact except where tack welding is permitted. Do not tack weld exposed connections of work in place and ground smooth. Provide a smooth finish on exposed surfaces of work in place and unless otherwise approved, flush exposed riveting. Mill joints where tight fits are required. Corner joints shall be coped or mitered, well formed, and in true alignment. Accurately set work to established lines and elevations and securely fastened in place. Install in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

3.5 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.6 FINISHES

3.6.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D1187/D1187M, asphalt-base emulsion.

3.6.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, shall be free of rust, grease, dirt and other foreign matter.

3.6.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

3.7 ACCESS PANELS

Install a removable access panel not less than 12 by 12 inches directly below each valve, flow indicator, damper, or air splitter that is located above the ceiling, other than an acoustical ceiling, and that would otherwise not be accessible.

3.8 CONTROL-JOINT COVERS

Provide covers over control-joints and fasten on one side only with fasteners spaced to give positive contact with wall surfaces on both sides of joint throughout the entire length of cover.

3.9 COVER PLATES AND FRAMES

Install the tops of cover plates and frames flush with floor.

3.10 ROOF HATCH (SCUTTLES)

Provide zinc-coated steel sheets not less than 14 gage, with 3 inch beaded flange, welded and ground at corner. Provide a minimum clear opening of 30 by 36 inches. Construction and accessories as follows:

a. Insulate cover and curb with one inch thick rigid fiberboard insulation covered and protected by zinc-coated steel liner not less than 26 gagewith 12 inches high curb, formed with 3 inch mounting flange with holes provided for securing to the roof deck. Equip the curb with an integral metal cap flashing of the same gage and metal as the curb, full welded and ground at corners for weather tightness.

b. Provide hatch completely assembled with pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles on inside and outside, and neoprene draft seal. Provide fasteners for padlocking on the inside. Equip the cover with an automatic hold-open arm complete with grip handle to permit one-hand release. Cover action shall be smooth through its entire range with an operating pressure of approximately 30 pounds.3.11 DOOR GUARD FRAME

Mount door guard frame over the glazed opening using 1/4 inch lag bolts on the interior of wood doors or tamperproof through bolts on the interior of metal doors.

3.12 INSTALLATION OF GUARD POSTS (BOLLARDS/PIPE GUARDS)

Set pipe guards vertically in concrete piers. Construct piers of, and the hollow cores of the pipe filled with, concrete having a compressive strength of 3000 psi.

3.13 MOUNTING OF SAFETY CHAINS

Mount safety chains 3 feet 6 inches and 2 feet above the floor.

3.14 STRUCTURAL STEEL DOOR FRAMES

Secure door frames to the floor slab by means of angle clips and expansion bolts. Weld continuous door stops to the frame or tap screwed with countersunk screws at no more than 18 inchcenters, assuring in either case full contact with the frame. Make any necessary reinforcements and drill and tap the frames as required for hardware.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 51 00

METAL STAIRS

02/12

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALIFICATIONS FOR WELDING WORK

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
2.2 STRUCTURAL STEEL PLATES, SHAPES AND BARS
2.3 STRUCTURAL STEEL TUBING
2.4 STEEL PIPE
2.5 FASTENERS
2.6 GENERAL FABRICATION
2.7 PROTECTIVE COATING
2.8 STEEL STAIRS
2.8.1 General
2.8.2 Stair Framing
2.8.3 Steel Floor Plate Treads And Platforms
2.8.4 Steel Stairs
2.8.4.1 Design Loads

PART 3 EXECUTION

3.1 STEEL STAIRS
3.2 FIELD WELDING
3.3 TOUCHUP GALVANIZING

-- End of Section Table of Contents --

SECTION 05 51 00

METAL STAIRS
02/12

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360	(2010) Specification for Structural Steel Buildings

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.21.1	(2009) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.6.3	(2013) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283/A283M	(2013) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop DrawingsIron and Steel Hardware; G, AE

Steel Shapes, Plates, Bars and Strips; G, AE

Metal Stair System; G, AE

SD-03 Product Data

Structural Steel Plates, Shapes, and Bars; G, AE

Structural Steel Tubing; G, AE

Protective Coating; G

Steel Stairs; G, AE

SD-07 Certificates

Welder Qualification; G

1.3 QUALIFICATIONS FOR WELDING WORK

Certify welder qualification by tests in accordance with AWS D1.1/D1.1M, or under an equivalent approved qualification test. In addition, perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, ensure that an immediate retest of two test welds and each test weld is made and passes. Failure in the immediate retest requires that the welder be retested after further practice or training and a complete set of test welds made.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Submit complete and detailed fabrication drawings for all iron and steel hardware, and for all steel shapes, plates, bars and strips used in accordance with the design specifications referenced in this section.

Pre-assemble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

For the fabrication of work exposed to view, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes, including zinc coatings.

2.2 STRUCTURAL STEEL PLATES, SHAPES AND BARS

Structural-size shapes and plates, conforming to ASTM A36/A36M, unless otherwise noted, except bent or cold-formed plates.

Steel plates - bent or cold-formed, conforming to ASTM A283/A283M, Grade C.

Steel bars and bar-size shapes, conforming to ASTM A36/A36M, unless otherwise noted for steel bars and bar-size shapes.

2.3 STRUCTURAL STEEL TUBING

Structural steel tubing, hot-formed, welded or seamless, conforming to ASTM A500/A500M, Grade B, unless otherwise noted.

2.4 STEEL PIPE

Steel pipe conforming to ASTM A53/A53M, type as selected, Grade B; primed finish, unless galvanizing is required; standard weight (Schedule 40).

2.5 FASTENERS

Standard/regular hexagon-head bolts and nuts conforming to ASTM A307, Grade A.

Machine screws cadmium-plated steel conforming to ASME B18.6.3.

Plain washers, round, general-assembly-grade, carbon steel conforming to ASME B18.21.1.

2.6 GENERAL FABRICATION

Prepare and submit metal stair system shop drawings with detailed plans and elevations at not less than 1 inch to 1 foot with details of sections and connections at not less than 3 inches to 1 foot. Also detail placement drawings, diagrams, templates for installation of anchorage, including but not limited to, concrete inserts, anchor bolts, and miscellaneous metal items having integral anchorage devices.

Use materials of size and thicknesses indicated or, if not indicated, of required size and thickness to produce adequate strength and durability in finished product for intended use. Work materials to dimensions indicated on approved detail drawings, using proven details of fabrication and support. Use type of materials indicated or specified for the various components of work.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch, and bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

Continuously weld corners and seams in accordance with the recommendations of AWS D1.1/D1.1M. Grind smooth exposed welds and flush to match and blend with adjoining surfaces.

Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk)

screws or bolts.

Provide and coordinate anchorage of the type indicated with the supporting structure. Fabricate anchoring devices, space as indicated and required to provide adequate support for the intended use of the work.

Use hot-rolled steel bars for work fabricated from bar stock unless work is indicated or specified as fabricated from cold-finished or cold-rolled stock.

2.7 PROTECTIVE COATING

Shop prime steelwork as indicated in accordance with Section 09 97 13.26 COATINGS OF STEEL WATERFRONT STRUCTURES except surfaces of steel encased in concrete, welded surfaces, high-strength bolt connected surfaces, and surfaces of crane rails.
Hot dip galvanize steelwork as indicated in accordance with ASTM A123/A123M. Touch up abraded surfaces and cut ends of galvanized members with zinc-dust, zinc-oxide primer, or an approved galvanizing repair compound.

2.8 STEEL STAIRS

2.8.1 General

Use welding for joining pieces together. Fabricate units so that bolts and other fastenings do not appear on finish surfaces. Make joints true and tight, and connections between parts lightproof tight. Grid smooth continuous welds where exposed.

Construct metal stair units to sizes and arrangements indicated to support a minimum live load of 100 pounds per square foot. Provide framing, hangers, columns, struts, clips, brackets, bearing plates, and other components as required for the support of stairs and platforms.

Stairs shall be constructed in accordance with OSHA requirements (CFR 29.1910).

2.8.2 Stair Framing

Fabricate stringers of structural steel channels, or plates, or a combination thereof as indicated.

Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt headers to stringers and newels and framing members to stringers and headers.

2.8.3 Steel Floor Plate Treads And Platforms

Provide raised pattern steel floor plate fabricated from steel complying with ASTM A36/A36M. Provide pattern as indicated or, if not indicated, as selected from manufacturer's standard patterns.

Form treads of 1/4-inch thick steel floor plate with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and treads to brackets.

2.8.4 Steel Stairs

Provide steel stairs complete with stringers,steel-plate treads and risers, landings, columns, handrails, and necessary bolts and other fastenings.

All steel stair landings and appurtenances shall be galvanized. All welds shall be 'closed' so that rust will not bleed from any connection joints.

2.8.4.1 Design Loads

Design stairs to sustain a live load of not less than 100 pounds per square foot, or a concentrated load of 300 lb applied where it is most critical on a 4 square inch loading area. Conform to AISC 360 with the design and fabrication of steel stairs, other than a commercial product.

PART 3 EXECUTION

3.1 STEEL STAIRS

Provide anchor bolts, grating fasteners, washers, and all parts or devices necessary for proper installation. Provide lock washers under nuts.

3.2 FIELD WELDING

Execute procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work in compliance with AWS D1.1/D1.1M.

3.3 TOUCHUP GALVANIZING

Immediately after installation, clean all field welds, bolted connections, and abraded areas of the shop painted material, and repair exposed areas with Cold Galvanizing Compound to provide a minimum dry-film thickness of as required by manufacturer.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 51 33

METAL LADDERS

05/10

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALIFICATION OF WELDERS
1.4 DELIVERY, STORAGE, AND PROTECTION

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Structural Carbon Steel
2.1.2 Structural Tubing
2.1.3 Steel Pipe
2.1.4 Fittings for Steel Pipe
2.2 FABRICATION FINISHES
2.2.1 Galvanizing
2.2.2 Galvanize
2.2.3 Repair of Zinc-Coated Surfaces
2.2.4 Shop Cleaning and Painting
2.2.4.1 Surface Preparation
2.2.4.2 Pretreatment, Priming and Painting
2.2.5 Nonferrous Metal Surfaces
2.3 LADDERS
2.3.1 Ladder Cages

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS
3.2 WORKMANSHIP
3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS
3.4 WELDING
3.5 FINISHES
3.5.1 Dissimilar Materials
3.5.2 Field Preparation
3.5.3 Environmental Conditions
3.6 LADDERS

-- End of Section Table of Contents --

SECTION 05 51 33

METAL LADDERS
05/10

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2014) Standard Specification for Ferritic Malleable Iron Castings
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base

Emulsions for Use as Protective Coatings for Metal

MASTER PAINTERS INSTITUTE (MPI)

MPI 79 (Oct 2009) Alkyd Anti-Corrosive Metal Primer

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3 (1982; E 2004) Power Tool Cleaning

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

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

29 CFR 1910.27 Fixed Ladders

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Ladders; G, AE, installation drawings

SD-03 Product Data

Ladders; G, AE

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A36/A36M.

2.1.2 Structural Tubing

ASTM A500/A500M.

2.1.3 Steel Pipe

ASTM A53/A53M, Type E or S, Grade B.

2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A47/A47M.

2.2 FABRICATION FINISHES

2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A123/A123M, ASTM A153/A153M, ASTM A653/A653M or ASTM A924/A924M, G90, as applicable.

2.2.2 Galvanize

Anchor bolts, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780/A780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.2.4 Shop Cleaning and Painting

2.2.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean.

2.2.4.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

2.2.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.3 LADDERS

Fabricate vertical ladders conforming to Section 7 of 29 CFR 1910.27. Use 2 1/2 by 3/8 inch steel flats for stringers and 3/4 inch diameter steel

rods for rungs. Rungs to be not less than 16 inches wide, spaced one foot apart, plug welded or shouldered and headed into stringers. Install ladders so that the distance from the rungs to the finished wall surface will not be less than 7 inches. Provide heavy clip angles riveted or bolted to the stringer and drilled for not less than two 1/2 inch diameter expansion bolts. Provide intermediate clip angles not over 48 inches on centers.

2.3.1 Ladder Cages

Conform to 29 CFR 1910.27. Fabricate 2 by 1/4 inchhorizontal bands and 1 1/2 by 3/16 inch vertical bars. Provide attachments for fastening bands to the side rails of ladders or directly to the structure. Provide and fasten vertical bars on the inside of the horizontal bands. Extend cages not less than 27 inches or more than 28 inches from the centerline of the rungs, excluding the flare at the bottom of the cage, and not less than 27 inches in width. Clear the inside of the cage of projections.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Provide Exposed fastenings of compatible materials, generally matching in color and finish, and harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners will be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports must provide strength and stiffness. Formed joints exposed to the weather to exclude water. Items listed below require additional procedures.

3.2 WORKMANSHIP

Metalwork must be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching must produce clean true lines and surfaces. Continuously weld along the entire area of contact. Do not tack weld exposed connections of work in place. Grid smooth exposed welds. Provide smooth finish on exposed surfaces of work in place, unless otherwise approved. Where tight fits are required, mill joints. Cope or miter corner joints, well formed, and in true alignment. Install in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion anchors,and powder-actuated fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine bolts, carriage bolts and powder-actuated threaded studs for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.5 FINISHES

3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D1187/D1187M, asphalt-base emulsion.

3.5.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, must be free of rust, grease, dirt and other foreign matter.

3.5.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

3.6 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. Secure to masonry or concrete with not less than two 1/2 inch diameter expansion bolts. Install intermediate clip angles not over 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete. Ends of ladders must not rest upon finished roof or floor.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 52 00

METAL RAILINGS

02/11

PART 1 GENERAL

1.1 REFERENCES
1.2 ADMINISTRATIVE REQUIREMENTS
1.2.1 Pre-Installation Meetings
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Welding Procedures
1.4.2 Welder Qualification

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION
2.2 GENERAL FABRICATION
2.3 STRUCTURAL STEEL PLATES, SHAPES AND BARS
2.4 STRUCTURAL STEEL TUBING
2.5 HOT-ROLLED CARBON STEEL BARS
2.6 COLD-FINISHED STEEL BARS
2.7 COLD-DRAWN STEEL TUBING
2.8 STEEL PIPE
2.9 FASTENERS
2.10 PROTECTIVE COATING
2.11 STEEL RAILINGS AND HANDRAILS
2.11.1 Steel Handrails

PART 3 EXECUTION

3.1 INSTALLATION INSTRUCTIONS
3.2 PREPARATION
3.3 STEEL HANDRAIL
3.4 FIELD WELDING
3.5 TOUCHUP PAINTING

-- End of Section Table of Contents --

SECTION 05 52 00

METAL RAILINGS
02/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISC/AISI 121	(2004) Standard Definitions for Use in the Design of Steel Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A283/A283M	(2013) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A512	(2006) Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A575	(1996; E 2013; R 2013) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 521	(2001) Pipe Railing Manual

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Pre-Installation Meetings

Within 30 days of Contract Award, submit fabrication drawings to the Contracting Officer for the following items:

a. Iron and Steel Hardware

b. Steel Shapes, Plates, Bars and Strips

c. Steel Railings and Handrails

d. Aluminum Railings and Handrails

e. Anchorage and fastening systems

Submit manufacturer's catalog data, including two copies of manufacturers specifications, load tables, dimension diagrams, and anchor details for the following items:

a. Structural steel plates, shapes, and bars

b. Structural steel tubing

c. Cold finished steel bars

d. Hot-Rolled carbon steel bars

e. Cold-Drawn steel tubing

f. Concrete inserts

g. Masonry anchorage devices

h. Protective coating

i. Steel railings and handrails

k. Anchorage and fastening systems

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G, AE

Iron and Steel Hardware; G, AE

Steel Shapes, Plates, Bars and Strips; G, AE

SD-03 Product Data

Structural Steel Plates, Shapes, and Bars; G, AE

Structural Steel Tubing; G, AE

Cold-Finished Steel Bars; G, AE

Hot-Rolled Carbon Steel Bars; G, AE

Cold-Drawn Steel Tubing; G, AE

Concrete Inserts; G, AE

Masonry Anchorage Devices; G, AE

Protective Coating; G, AE

Steel Railings and Handrails; G, AE

Anchorage and Fastening Systems; G, AE

SD-07 Certificates

Welding Procedures; G

Welder Qualification; G

SD-08 Manufacturer's Instructions

Installation Instructions; G

1.4 QUALITY ASSURANCE

1.4.1 Welding Procedures

Submit welding procedures testing in accordance with AWS D1.1/D1.1M made in the presence of the Contracting Officer and by an approved testing laboratory at the Contractor's expense.

1.4.2 Welder Qualification

Submit certified welder qualification by tests in accordance with

AWS D1.1/D1.1M, or under an equivalent approved qualification test. In addition be performed on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, make an immediate retest of two test welds and ensure each test weld passes. Failure in the immediate retest will require that the welder be retested after further practice or training and make a complete set of test welds.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide complete, detailed fabrication and installation drawings for all iron and steel hardware, and for all steel shapes, plates, bars and strips used in accordance with the design specifications referenced in this section.

Pre-assemble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

For the fabrication of work exposed to view, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes, including zinc coatings.

2.2 GENERAL FABRICATION

Provide railings and handrails detail plans and elevations at not less than 1 inch to 1 foot. Provide details of sections and connections at not less than 3 inches to 1 foot. Also detail setting drawings, diagrams, templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchors.

Use materials of size and thicknesses indicated or, if not indicated, of required size and thickness to produce adequate strength and durability in finished product for intended use. Work materials to dimensions indicated on approved detail drawings, using proven details of fabrication and support. Use type of materials indicated or specified for the various components of work.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ensure all exposed edges are eased to a radius of approximately 1/32 inch. Bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

Weld corners and seams continuously and in accordance with the recommendations of AWS D1.1/D1.1M. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk) screws or bolts.

Provide anchorage of the type indicated and coordinated with the supporting structure. Fabricate anchoring devices and space as indicated and as required to provide adequate support for the intended use of the

work.

Use hot-rolled steel bars for work fabricated from bar stock unless work is indicated or specified to be fabricated from cold-finished or cold-rolled stock.

2.3 STRUCTURAL STEEL PLATES, SHAPES AND BARS

Provide structural-size shapes and plates, except plates to be bent or cold-formed, conforming to ASTM A36/A36M, unless otherwise noted.

Provide steel plates, to be bent or cold-formed,conforming to ASTM A283/A283M, Grade C.

Provide steel bars and bar-size shapes conforming to ASTM A36/A36M, unless otherwise noted.

2.4 STRUCTURAL STEEL TUBING

Provide structural steel tubing, hot-formed, welded or seamless, conforming to ASTM A500/A500M, Grade B, unless otherwise noted.

2.5 HOT-ROLLED CARBON STEEL BARS

Provide bars and bar-size shapes conforming to ASTM A575, grade as selected by the fabricator.

2.6 COLD-FINISHED STEEL BARS

Provide cold-finished steel bars conforming to ASTM A108, grade as selected by the fabricator.

2.7 COLD-DRAWN STEEL TUBING

Provide tubing conforming to ASTM A512, sunk drawn, butt-welded, cold-finished, and stress-relieved.

2.8 STEEL PIPE

Provide pipe conforming to ASTM A53/A53M, type as selected, Grade B; primed finish, unless galvanizing is required; standard weight (Schedule 40).

2.9 FASTENERS

Provide galvanized zinc-coated fasteners in accordance with ASTM A153/A153M used for exterior applications or where built into exterior walls or floor systems. Select fasteners for the type, grade, and class required for the installation of steel stair items.

Provide standard hexagon-head bolts, conforming to ASTM A307, Grade A.

Provide helical spring, carbon steel lockwashers conforming to ASME B18.2.1.

2.10 PROTECTIVE COATING

Shop prime steelwork as indicated in accordance with AISC/AISI 121 and Section 09 97 13.26 COATING OF STEEL WATERFRONT STRUCTURES except surfaces to be welded, contact surfaces to be high-strength bolt connected, and

surfaces of crane rails.

Provide hot dipped galvanized steelwork as indicated in accordance with ASTM A123/A123M. Touch up abraded surfaces and cut ends of galvanized members with zinc-dust, zinc-oxide primer, or an approved galvanizing repair compound.

2.11 STEEL RAILINGS AND HANDRAILS

Design handrails to resist a concentrated load of250 lbs in any direction at any point of the top of the rail or 20 lbs per footapplied horizontally to top of the rail, whichever is more severe. NAAMM AMP 521, provide the same size rail and post. Provide pipe collars of the same material and finish as the handrail and posts.

2.11.1 Steel Handrails

Provide steel handrailssteel pipe conforming to ASTM A53/A53M. Provide steel railings of1 1/2 inches nominal size, hot-dip galvanizedandshop painted.

a. Fabrication: Joint posts, rail, and corners by one of the following methods:

   (1) Flush-type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews.

   (2) Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight fitting interior sleeve not less than 6 inches long.

   (3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

b. Provide removable sections as indicated.

Provide kickplates between railing posts where indicated, and consist of 1/8-inch steel flat bars not less than 6 inches high. Secure kickplates as indicated.

Provide galvanized exterior and interior railings where indicated, including pipe, fittings, brackets, fasteners, and other ferrous metal components. Provide black steel pipe for interior railings not indicated as galvanized.

PART 3 EXECUTION

3.1 INSTALLATION INSTRUCTIONS

Submit manufacturer's installation instructions for the following products to be used in the fabrication of steelstair railingandhand rail work:

a. Structural steel plates, shapes, and bars

b. Structural steel tubing

c. Cold finished steel bars

d. Hot-Rolled carbon steel bars

e. Cold-Drawn steel tubing

f. Protective coating

h. Steel railings and handrails

j. Anchorage and fastening systems

Provide complete, detailed fabrication and installation drawings for all iron and steel hardware, and for all steel shapes, plates, bars and strips used in accordance with the design specifications referenced in this section.

3.2 PREPARATION

Adjust stair railings and handrails prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than8 feet on center. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.

Anchor rail ends to steel with steel oval or round flanges welded to tail ends and bolted to the structural steel members.

Install toe boards and brackets where indicated. Make splices, where required, at expansion joints. Install removable sections as indicated.

3.3 STEEL HANDRAIL

Install by means of base plates bolted to stringers or structural steel frame work. Secure rail ends by steel pipe flanges through-bolted to a back plate or by 1/4 inch lag bolts to studs or solid backing.

3.4 FIELD WELDING

Ensure procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work comply with AWS D1.1/D1.1M.

3.5 TOUCHUP PAINTING

Immediately after installation, clean field welds, bolted connections, abraded areas of the shop paint, and exposed areas painted with the paint used for shop painting. Apply paint by brush or spray to provide a minimum dry-film thickness of 2 mils.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 59 10

RETRACTABLE ROOF

02/10

PART 1 GENERAL

1.1 SYSTEM OPERATION
1.2 ADMINISTRATIVE REQUIREMENTS
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Workmanship
1.4.2 Detail Drawings

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT
2.1.1 Wheelblock Assemblies, Gearmotors, and Control System
2.1.1.1 Wheelblocks
2.1.1.2 Custom Mounting Weldment
2.1.1.3 Wheels
2.1.1.4 Cam Followers
2.1.1.5 Bumpers
2.1.1.6 Limit Switches
2.1.1.7 Gearmotors
2.1.1.8 Control Panel
2.2 FABRICATION
2.2.1 General
2.2.2 Dimensional Tolerances
2.3 TESTING
2.3.1 Assembly Tests

PART 3 EXECUTION

3.1 ASSEMBLY
3.2 ACCEPTANCE TESTING

-- End of Section Table of Contents --

SECTION 05 59 10

RETRACTABLE ROOF
02/10

PART 1 GENERAL

This specification covers the fabrication, assembly, operation, and testing requirements for retractable roof sections. The main components of the retractable roof system consist of wheelblock assemblies, gearmotors, end-of-travel and speed shift limit switches, variable frequency drives, and a control panel. The control system is described in more detail in section 40 95 00 ROOF CONTROL.

1.1 SYSTEM OPERATION

The roof retraction system shall be enabled from a key switch on the front door of the control panel. The traction motors shall be operated from momentary, illuminated pushbuttons on the control panel. One or both roof panels can be operated at any time they are enabled. The roof panels shall be capable of changing direction in mid travel. The pushbuttons must be held in to operate the motors. Releasing the pushbutton shall stop the motors. The pushbutton L.E.D. shall be illuminated when the roof panel is moving and shall turn off when it reaches its end position.

A maintained E-stop pushbutton shall be wired in series to a motor contactor with mechanically-linked contacts, located between the VFD and motor. Activation of the E-stop pushbutton will immediately remove power to the motors, which will coast to a stop. An auxiliary contact on the motor contactor shall be wired to the PLC for monitoring purposes and to reset the drive to Stop mode in the event that the E-stop switch is activated. A normally open contact on the E-stop pushbutton shall be wired to a PLC input for monitoring purposes. The drive shall be capable of sensing an open circuit between the VFD and the motor, and shall take approprate action to prevent a fault from being generated when the E-stop is activated.

The roof traction motors shall operate at two speeds, via variable frequency drives (VFDs), depending on the roof panel location along its travel. Initially the roofs open at a slow speed of 15 fpm (adjustable) and then shift to a faster speed of 30 fpm (adjustable) in between the end limits. The roofs slow to the slower speed when approaching either the open or closed position. Two limit switches located on each end of the roof travel limits shall be used for shifting the roof speed then stopping the panel at the end position.

The roofs shall be controlled through a PLC with hardwired inputs and outputs for the pushbuttons and run/stop commands to the VFDs. The PLC and VFD control power source shall be supplied through an uninteruptable power supply (UPS), which shall be sized for 30-minutes of operation at 75% load. In the event of a power failure the UPS shall provide control power to the PLC, and to the motor brake release circuit, which shall be activated from a keyswitch on the control panel. A "Trouble" L.E.D. shall flash at 1 Hz in the event of a VFD fault. The Trouble L.E.D. shall automatically stop flashing when the fault is cleared. The PLC shall monitor the VFDs over a daisy-chained serial communication network using

Modbus RTU protocol. Operation of the roof motors from the VFD operator interface terminal shall be disabled.

1.2 ADMINISTRATIVE REQUIREMENTS

Submit manufacturer's catalogue cuts and dimensional sheets. Include a description of the item, materials of construction, and dimensions. Provide data sufficient to indicate compliance with specifications. Mark items pertaining to specifications with a heavy black arrow.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Assembly Tests; G
Acceptance Testing; G

SD-02 Shop Drawings

Detail Drawings; G, AE

SD-03 Product Data

Gearmotors; G, AE
Wheelblock Assemblies; G, AE
Materials List; G, AE
Limit Switches; G, AE
Control Panel; G, AE

1.4 QUALITY ASSURANCE

1.4.1 Workmanship

Workmanship shall be of the highest grade and in accordance with the best modern practices to conform with the specifications for the item of work being furnished. Welding shall be continuous along the entire area of contact except where stitch welding is permitted per the Drawings. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish.

Control panel components shall be positioned in a neat and orderly manner. Conductors spanning a door hinge shall be protected with plastic spiral wrap. Panel wires shall be contained within wireways, which shall be sized per NEC requirements to prevent over-filling. Short sections of wire not located in wireways shall be afixed to the back panel with adhesive-backed cable-ties. Spare wires from multiconductor field cables shall be terminated on terminal blocks. There shall be no loose wires in the control panel enclosure. All major components on the back panel shall be labeled with a lamacoid plate for identification per the shop drawings. Wire labels matching the shop drawing wire numbers shall be affixed to each end of the wire at all terminations. Terminal blocks shall be labelled per the shop drawings.

1.4.2 Detail Drawings

Submit detail drawings for metalwork and machine work prior to fabrication. With the detail drawings submit a materials list for fabricated items. Detail drawings for metalwork and machine work shall include catalog cuts, templates, fabrication and assembly details, and type, grade, and class of material as appropriate. Also include a sketch showing final wheel to axle mounting (i..e., washers, nuts, spacers). Elements of fabricated items inadvertently omitted on contract drawings shall be detailed by the fabricator and indicated on the detail drawings.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Wheelblock Assemblies, Gearmotors, and Control System

Each roof panel travels on two parallel flat rails on four (4) wheelblock assemblies. The two wheelblocks located at the split between the two roof panels shall be driven with gearmotors, which are controlled by a PLC and VFDs for two-speed operation. The PLC and VFDs shall be housed in a common enclosure.

2.1.1.1 Wheelblocks

The wheel block housing shall provide for top-type connection to the structure and connection with the custom weldment as shown on the drawings. Each wheel block shall have a 10,000 lb load capacity (minimum) with lubricated for life anti-friction wheel bearings. The non-driven wheelblocks shall be fitted with short, splined shafts adapted for use with a 1-inch hex-head wrench for manually operating the wheels in the event of a power failure.

2.1.1.2 Custom Mounting Weldment

Each wheel block assembly shall be mounted to a custom mounting weldment. The custom mounting weldments shall be welded directly to the roof framing as shown on the drawings. Stainless steel shim packs shall be used between the wheel blocks and custom mounting weldments for vertical adjustments.

2.1.1.3 Wheels

The wheels be as specified on the drawings. The wheels shall be solid metal that are spheroidal graphite cast iron. The wheels shall have a hardness rating of 56 +- 2 HRc. The wheels shall have roller bearings and shall be lubricated for life. The wheels shall work in a temperature range of -40 to +150 degrees F. The entire wheel assembly shall be symmetrical and shall spin concentrically around the bearing. Finish metal centers with either an epoxy paint, a powder coating, or manufacture galvanized.

2.1.1.4 Cam Followers

Each wheel block shall include a pair of cam follower guides with sealed bearings. The cam followers shall be as shown on drawings and have minimum ratings of 2000 lb loading. Cam followers shall be chrome plated on rolling surfaces and sides of outer ring. The cam followers shall be mounted to the wheel blocks as shown on the Drawings.

2.1.1.5 Bumpers

Urethane bumpers shall be installed on each end of the roof panels as indicated on the drawings to prevent the panels from travelling off the rails in the event of a limit switch circuit failure. The spacing between the bumper and roof panel at each end position shall be as shown on the drawings to prevent contact with the bumpers during normal operation.

2.1.1.6 Limit Switches

Two, photoelectric-type end-of-travel limit switches shall be provided for each roof section for each direction of travel (eight total). The limit switches shall be as shown on drawings and rated NEMA 4X. Contacts shall be rated 10 amperes. Switch shall be rated for operation from -40 to +158 degrees F. Switches shall be provided with a six (6)-foot factory-attached flexible cable. A NEMA type 4X stainless steel junction box, with terminal blocks,shall be provided as required for connecting the limit switch cables to the roof conduit system. Switches shall trigger the stop signal repeatably to within +/- 1 mm. Each limit switch shall contain at least one normally-open contact for indication, and one normally-closed contact for interlocking (motor shutoff). The contacts shall be electrically isolated from each other.

The limit switches shall be installed such that they are protected from the weather and will provide proper operation in all conditions.

2.1.1.7 Gearmotors

Two gearmotors are required per movable roof panel. Each gearmotor shall be mounted to its respective wheel block with torque transmission accomplished through a splined shaft connection or similar positive connection. Gearmotors shall be inverter-duty rated and powered through VFDs with a speed range of 0 to 30 feet per minute. Each gearmotor shall be powered from one VFD configured for sensorless vector control mode. Refer to Section 26 29 23 VARIABLE FREQUENCY DRIVE SYSTEMS UNDER 600 VOLTS for VFD specifications. The gearmotors shall be equipped with integral brakes and manual releases. Each motor brake shall be capable of resisting a 350 lb horizontal force applied to the roof section in the direction of travel. All gearing shall be totally enclosed, helical type, oil bath lubricated, with anti-friction bearings. The orientation of the gearmotors shall be as shown on the drawings.

2.1.1.8 Control Panel

A control panel shall be provided to control the roof movement. The control panel shall comply with UL 508A and the NEC. Short circuit rating of the panel shall be as required based on the short circuit capacity of the supply circuit. The control panel enclosure shall house the PLC, VFDs, contactors and relays, and all necessary componts for a fully functioning, UL508A-approved control panel. The control panel electronic components shall be protected form condensation with an electric heater. The heater shall have the capacity to maintain the enclosure space to 45 °F with a -4 °F ambient air temperature.

The control panel enclosure shall be free-standing and rated NEMA type 4X (stainless steel) with an integral disconnect switch operator. Dimensions shall be as required to house all the required components with the recommended spacing between components per UL 508A and the NEC Article 409.

A PLC shall be provided for control and monitoring of the roof retraction system. The PLC shall have sufficient memory and CPU speed for the application. A PLC fault shall cause both "Trouble" LEDs to turn on without flashing. The PLC shall have 20% spare digital input/output channels. The PLC shall have Modbus RTU serial communication capability as a minimum. Refer to Section 40 95 00 ROOF CONTROL for detailed PLC specifications.

A three-phase motor contactor with mechanically-linked contacts shall provide electromechanical disconnection of the motor from the drive. An auxilliary contact on the contactor shall monitor its status via the PLC. Activation of the E-stop circuit shall cause both "Trouble" LEDs to flash at 1 Hz.

Control switches, pushbuttons, and pilot lights shall be 30mm, heavy duty, oiltight and corrosion resistant NEMA type NEMA 4X. Contacts of switches and pushbuttons shall be rated 10 amperes. Pilot lights shall be push-to-test type with L.E.D. lamps. Pushbuttons shall be the illuminated type. The devices shown on the Drawings shall be provided, and mounted in the door of the control panel. All devices shall be provided with engraved plastic nameplates. Devices shall be grouped together and clearly identified according to the roof panel that they are associated with.

An E-stop pushbutton shall be used to open the contacts on the motor contactor. The E-stop pushbutton shall utilize direct-opening contacts and shall latch in the open state when the contacts open. The E-stop pushbutton shall be red with a yellow background.

A keyswitch shall be provided on the control panel to enable or disable control power to the VFDs and gearmotors. Disabling the control power to the VFDs shall prevent operating the roof motors. Both "Trouble" L.E.D.s on the control panel shall be illumated and solid when control power is removed from the VFDs.

A keyswitch shall be provided on the control panel to enable or disable the gearmotor brakes in the event of a gearmotor or power failure. The keyswitch serves the purpose of electrically engaging the brake solenoid to allow movement of the roof panel in lieu of manually disengaging the brakes at the gearmotor.

2.2 FABRICATION

2.2.1 General

Material must be straight before being laid off or worked. If straightening is necessary it shall be done by methods that will not impair the metal. Sharp kinks or bends shall be cause for rejection of the material. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Bends shall be made by approved dies, press brakes or bending rolls. Where heating is required, precautions shall be taken to avoid overheating or warping the metal and it shall be allowed to cool in a manner that will not impair the original properties of the metal. Proposed flame cutting of material other than structural steel shall be subject to approval and shall be indicated on detail drawings. Shearing shall be accurate and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown on the drawings. Re-entrant cuts shall be filleted to a minimum radius of 3/4 inch unless otherwise approved.

Finished members shall be free of twists, bends and open joints. Bolts, nuts and screws shall be tight.

2.2.2 Dimensional Tolerances

Dimensions shall be measured by a calibrated steel tape of approximately the same temperature as the material being measured. The overall dimensions of an assembled structural unit shall be within the tolerances indicated on the drawings or as specified in the particular section of these specifications for the item of work. Where tolerances are not specified in other sections of these specifications or shown, an allowable variation of 1/32 inch is permissible in the overall length of component members with both ends milled and component members without milled ends shall not deviate from the dimensions shown by not more than 1/16 inch for members 30 feet or less in length and by more than 1/8 inch for members over 30 feet in length.

The roof rails in the installed position shall be straight to within +/- 1/8-inch from end to end and within +/- 1/16-inch per 20-feet of length. Rail elevation shall be within +/- 1/8-inch from end to end and within +/- 1/16-inch per 20-feet of length. The difference in elevation of parallel rails shall be within +/- 1/32-inch. The rails shall be parallel to within +/- 1/32-inch.

All wheelblock axes shall be parallel to within +/- 0.010 inch. Pairs of wheels on a common rail and roof panel shall be in line within a parallel offset of +/- 1/32 inch. All four (4) wheel blocks on each roof panel shall be centered on the rail and shall have firm contact with the rail at all times.

The roof panels shall come to a complete stop within 1/4 inch after the stop command has been given or when the end-limit switches are activated, and shall be repeatable to within +/- 1/8 inch.

2.3 TESTING

2.3.1 Assembly Tests

Each rolling roof including the shell, carrier, frame, and temporary brackets shall be assembled and tested to determine the correctness of the fabrication and matching of the component parts. Tolerances shall not exceed those shown on the drawings or per manufacturer's recommendations. Each roof assembly shall be closely checked to ensure that all necessary clearances have been provided and that binding does not occur in any moving part. Assembly and testing shall be done on a straight and level floor or platform, the frame shall be mounted on temporary supports in a level position. The carrier shall move smoothly and with minimal effort. Misalignment or poor operation, or defects disclosed shall be immediately remedied by the Contractor without cost to the Government. Assembly, testing, and disassembly work shall be performed in the presence of the Contracting Officer unless waived in writing. Provide ten working days notice, in writing, of the first and each proceeding rolling roof assembly to the Contracting Officer.

PART 3 EXECUTION

3.1 ASSEMBLY

All parts to be assembled shall be thoroughly cleaned. Packing compounds,

rust, dirt, grit and other foreign matter shall be removed. Holes and grooves for lubrication shall be cleaned. Enclosed chambers or passages shall be examined to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected prior to installation. Pipe wrenches, cold chisels or other tools likely to cause damage to the surfaces of rods, nuts or other parts shall not be used for assembling and tightening parts. Bolts and screws shall be tightened firmly and uniformly but care shall be taken not to overstress the threads. When a half nut is used for locking a full nut the half nut shall be placed first and followed by the full nut. Threads of all bolts, nuts and screws shall be lubricated with a lubricant before assembly. Threads of corrosion-resisting steel bolts and nuts shall be coated with an approved antigalling compound. Driving and drifting bolts or keys will not be permitted.

3.2 ACCEPTANCE TESTING

The rolling roof shall be tested to ensure proper wheel adjustments to eliminate binding and track misalignment. In addition, demonstrate to the Contracting Officer that the roof, and roof tracks are level. The rolling roof shall be rolled the full distance of the tracks to demonstrate that the roof sections slow down to a lower speed before contacting the end stops at the open and closed positions. The test shall be repeated a sufficient number of times (minimum of three) to demonstrate proper operation, including the operation of the end-stop and over-travel limit switches. Misalignment or poor operation, or defects disclosed shall be immediately remedied without cost to the Government. Provide all personnel necessary to conduct the tests. Testing shall be performed in the presence of Contracting Officer. Notify the Contracting Officer, in writing, at least 7 days prior to testing operations.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 42 63

FABRICATED WALL PANEL ASSEMBLIES

05/11

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.3 DESCRIPTION OF FABRICATED WALL PANEL ASSEMBLY SYSTEM
1.3.1 Metal Wall Panel General Performance
1.3.2 Structural Performance
1.3.3 Air Infiltration
1.3.4 Water Penetration Under Static Pressure
1.3.5 Water Penetration Under Dynamic Pressure
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Pre-Installation Conference
1.5.2 Manufacturer's Technical Representative
1.5.3 Qualification of Manufacturer
1.5.4 Qualification of Installer
1.5.4.1 Qualifications for Welding Work
1.5.5 Single Source
1.5.6 Surface-Burning Characteristics
1.5.7 Fire-Resistance Ratings
1.5.8 Fabrication
1.5.8.1 Sheet Metal Accessories
1.5.9 Finishes
1.6 DELIVERY, HANDLING, AND STORAGE
1.7 PROJECT CONDITIONS
1.8 WARRANTY

PART 2 PRODUCTS

2.1 PANEL MATERIALS
2.1.1 Foam-Insulation Core Wall Panel
2.1.2 Finish
2.2 MISCELLANEOUS METAL FRAMING
2.2.1 Fasteners for Miscellaneous Metal Framing
2.3 FASTENERS
2.3.1 General
2.3.2 Exposed Fasteners
2.3.3 Screws
2.3.4 Rivets
2.3.5 Attachment Clips
2.4 ACCESSORIES
2.4.1 General
2.4.2 Rubber Closure Strips
2.4.3 Metal Closure Strips
2.4.4 Joint Sealants
2.4.4.1 Sealants and Caulking

2.4.4.2 Shop-Applied
2.4.4.3 Field-Applied
2.4.4.4 Tape Sealant
2.5 SHEET METAL FLASHING AND TRIM
2.5.1 Fabrication
2.6 REPAIR OF FINISH PROTECTION

PART 3 EXECUTION

3.1 EXAMINATION
3.2 PREPARATION
3.3 WALL PANEL INSTALLATION
3.4 FASTENER INSTALLATION
3.5 FLASHING, TRIM AND CLOSURE INSTALLATION
3.5.1 General Requirements
3.5.2 Metal Flashing
3.5.3 Closures
3.6 WORKMANSHIP
3.7 ACCEPTANCE PROVISIONS
3.7.1 Erection Tolerances
3.7.2 Leakage Tests
3.7.3 Repairs to Finish
3.7.4 Paint-Finish Metal Siding
3.8 CLEAN-UP AND DISPOSAL

-- End of Section Table of Contents --

SECTION 07 42 63

FABRICATED WALL PANEL ASSEMBLIES
05/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501.1	(2005) Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 341	(2010) Seismic Provisions for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100	(2012) North American Specification for the Design of Cold-Formed Steel Structural Members

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M	(2012) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding
AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel
AWS D1.2/D1.2M	(2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2013) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A606/A606M	(2009a) Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A755/A755M	(2011) Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM C273/C273M	(2011) Shear Properties of Sandwich Core Materials
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1308	(2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D1621	(2010) Compressive Properties of Rigid Cellular Plastics
ASTM D1622/D1622M	(2014) Apparent Density of Rigid Cellular Plastics
ASTM D1667	(2005; R 2011) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D2247	(2011) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D2794	(1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

ASTM D3363	(2005; E 2011; R 2011; E 2012) Film Hardness by Pencil Test
ASTM D4214	(2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D6226	(2010) Standard Test Method for Open Cell Content of Rigid Cellular Plastics
ASTM D714	(2002; R 2009) Evaluating Degree of Blistering of Paints
ASTM D822	(2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D968	(2005; R 2010) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E119	(2014) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E136	(2012) Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
ASTM E1592	(2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2009) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA MBSM	(2002) Metal Building Systems Manual

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500	(2006) Metal Finishes Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

UNDERWRITERS LABORATORIES (UL)

UL 580	(2006; Reprint Oct 2013) Tests for Uplift Resistance of Roof Assemblies
UL Bld Mat Dir	(2012) Building Materials Directory

1.2 DEFINITIONS

Fabricated Wall Panel Assembly: Metal wall and liner panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories shop fabricated or field assembled for a complete weather-tight wall system.

1.3 DESCRIPTION OF FABRICATED WALL PANEL ASSEMBLY SYSTEM

Factory color finished, metal wall panel system with concealed fastening attachment. Panel profile must be smooth face and with stiffening ribs in the flat of the panel. Interior finish of panel assembly to be same as exterior.

1.3.1 Metal Wall Panel General Performance

Comply with performance requirements, conforming to AISI S100, without failure due to defective manufacture, fabrication, installation, or other defects in construction. Wall panels and accessory components must conform to the following standards:

ASTM A1008/A1008M
ASTM A123/A123M
ASTM A36/A36M
ASTM A653/A653M

ASTM A606/A606M
ASTM A755/A755M for metallic coated steel sheet for exterior coil pre-painted applications.
ASTM A780/A780M for repair of damage or uncoated areas of hot-dipped galvanized coating.
ASTM A924/A924M for metallic coated steel sheet
ASTM C273/C273M
ASTM D522/D522M for applied coatings
UL Bld Mat Dir

1.3.2 Structural Performance

Maximum calculated fiber stress must not exceed the allowable value in the AISI or AA manuals; a one third overstress for wind is allowed. Midspan deflection under maximum design loads is limited to L/180. Contract drawings show the design wind loads and the extent and general assembly details of the metal siding. Contractor must provide design for members and connections not shown on the drawings. Siding panels and accessories must be the products of the same manufacturer.

Provide metal wall panel assemblies complying with the load and stress requirements in accordance with ASTM E1592. Wind Load force due to wind action governs the design for panels.

Wall systems and attachments are to resist the wind loads as determined by UL 580 and ASCE 7 in the geographic area where the construction will take place, in pounds per square foot. Submit five copies of wind load tests and seismic tests to the Contracting Officer.

Provide metal wall panel assembly for seismic conditions complying with the applicable requirements of AISC 341.

1.3.3 Air Infiltration

Air leakage must conform to the limits through the wall assembly area when tested according to ASTM E283.

1.3.4 Water Penetration Under Static Pressure

No water penetration when tested according to ASTM E331.

1.3.5 Water Penetration Under Dynamic Pressure

No evidence of water leakage when tested according to AAMA 501.1.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualification of Manufacturer; G
Qualification of Installer; G
Qualifications for Welding Work; G

SD-02 Shop Drawings

Fabrication and Installation drawings; G, AE for the following items are to indicate completely dimensioned structural frame and erection layouts, openings in the wall, special framing details, and construction details at corners, building intersections and flashing, location and type of mastic and metal filler strips.

Wall Panel Assemblies; G, AE
Flashing and Accessories; G, AE
Anchorage Systems; G, AE

SD-03 Product Data

Submit Manufacturer's catalog data; G, AE for the following items:

Factory Color Finish; G
Sub-girts and Formed Shapes; G, AE
Closure Materials; G, AE

Insulation; G, AE
Pressure Sensitive Tape; G, AE
Sealants and Caulking; G, AE
Rated Wall Assembly; G, AE

Enamel Repair Paint; G, AE

Accessories; G, AE

SD-04 Samples

Submit as required each of the following samples:

Wall Panel Assemblies; G, 12 inches long by actual panel width
Fasteners; G
Metal Closure Strips; G, 10 inches long of each type
Insulation; G, approximately 8 by 11 inches

Submit manufacturer's color charts and chips; G, approximately 4 by 4 inches, showing full range of colors, textures and patterns available for wall panels with factory applied finishes.

SD-05 Design Data

wind design analysis; G, AE

SD-06 Test Reports

Submit test reports for the following in accordance with the referenced articles in this section.

Leakage Tests; G, AE
wind load tests; G, AE
seismic tests; G, AE

Coatings and base metals of metal wall type of test as specified in paragraphs entitled, "Steel Sheet Materials," and in various referenced standards in this section.

Factory Color Finish; G, AEPerformance Requirements

SD-07 Certificates

Submit certificates for the following items showing conformance with referenced standards contained in this section:

Fasteners; G

Enamel Repair Paint; G

Provide evidence that products used within this specification are manufactured in the United States.

Qualification of Manufacturer; G

Certify that the manufacturer of the metal wall panel system meets requirements specified under paragraph entitled "Qualification of Manufacturer."

Qualification of Installer; G

Certify that the applicator meets requirements specified under paragraph entitled "Qualification of Installation Contractor."

Submit the wall system assembly wind load and fire rating classification listings; G.

SD-08 Manufacturer's Instructions

Installation of Wall panels; G

Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

SD-11 Closeout Submittals

Instructions; G To:
Government and/or Contractor Personnel
Include copies of Material Safety Data Sheets; G for maintenance/repair materials.

Submit 20 year "No-Dollar-Limit" warranty; G for labor and materials.

1.5 QUALITY ASSURANCE

1.5.1 Pre-Installation Conference

After submittals are received and approved but before wall panel and insulation work, including associated work, is performed, the Contracting Officer will hold a pre-siding conference to review the following:

a. The drawings, including Fabrication and Installation drawings,showing complete Wall Panel Assemblies, and specifications.
Include details for the following for review:

flashing and accessories
anchorage systems
manufacturer's catalog data
Factory Color Finish

Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures and patterns available for wall panels with factory applied finishes.

Sub-girts and Formed Shapes
Closure Materials, including metal closure strips.
Insulation
Pressure Sensitive Tape
Rated Wall Assembly test data
Accessories
Fasteners

b. Finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

c. Methods and procedures related to metal wall panel installation, including manufacturer's written instructions for Installation of Wall panels, and verification of wall system assembly wind load and fire rating classification listings.

d. Support conditions for compliance with requirements, including alignment between and attachment to structural members. Provide details of wind design analysis including wind speed, exposure category, co-efficient, importance factor, designates type of facility, negative pressures for each zone, methods and requirements of attachment. Wind design analysis to include wall plan delineating dimensions and attachment patterns for each zone. Wind design analysis to be prepared and sealed by Licensed Project Engineer in the geographic area where the construction will take place.

e. Flashing, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.

f. Governing regulations and requirements for insurance, certificates, tests and inspections if applicable. Include certification for wall system assembly wind load and fire rating classification. Safety plan review must include applicable Material Safety Data Sheets.

g. Temporary protection requirements for metal wall panel assembly during and after installation.

h. Wall panel observation and repair procedures after metal wall panel installation. Include review of sample Enamel Repair Paint.

i. Sample 20 year "No-Dollar-Limit" warranty.

1.5.2 Manufacturer's Technical Representative

The representative must have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and installations in the geographical area where construction will take place.

1.5.3 Qualification of Manufacturer

Metal wall panel system manufacturer must have:

a. A minimum of five (5) years experience in manufacturing metal wall system and accessory products.

b. Provide engineering services by an authorized engineer; currently licensed in the geographical area where construction will take place, having a minimum of four (4) years experience as an engineer knowledgeable in wind load design analysis, protocols and procedures for the MBMA MBSM; ASCE 7, and ASTM E1592.

c. Provide certified engineering calculations using the products submitted for:

Wind load requirements in accordance with FM Wind Design Guide and ASCE 7.

1.5.4 Qualification of Installer

The installation contractor must be approved and certified by the wall panel manufacturer prior to beginning the installation of the metal wall system.

1.5.4.1 Qualifications for Welding Work

Welding procedures must conform to AWS A5.1/A5.1M, AWS D1.1/D1.1M for steel or AWS D1.2/D1.2M for aluminum.

1.5.5 Single Source

Obtain each type of metal wall and liner panels, clips, closures and other accessories from the standard products of the single source from a single manufacturer to operate as a complete system for the intended use.

1.5.6 Surface-Burning Characteristics

Provide metal wall panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 250 or less.

1.5.7 Fire-Resistance Ratings

Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
Combustion Characteristics: ASTM E136.

1.5.8 Fabrication

Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

Fabricate metal wall panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weather-tight and minimize noise from movements within panel assembly.

1.5.8.1 Sheet Metal Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 that apply to the design, dimensions, metal, and other characteristics of item indicated:

a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

b. End Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

c. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

e. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA or by metal wall panel manufacturer for application, but not less than thickness of metal being secured.

1.5.9 Finishes

Comply with NAAMM AMP 500 for recommendations for applying and designating finishes.

Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.6 DELIVERY, HANDLING, AND STORAGE

Deliver and package components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed and protected during transportation and handling.

Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

Stack and store metal wall panels horizontally on platforms or pallets, covered with suitable weather-tight and ventilated covering to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

Protect foam-plastic insulation as follows:

a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.

Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

Weather Limitations: Proceed with installation preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into existing walling system or building.

Field Measurements: Verify locations of wall framing and opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

Furnish manufacturer's no-dollar-limit warranty for the metal wall panel system. The warranty period is to be no less than twenty (20) years from the date of Government acceptance of the work. The warranty is to be issued directly to the Government. The warranty is to provide that if within the warranty period the metal wall panel system shows evidence of corrosion, perforation, rupture or excess weathering due to deterioration of the wall panel system resulting from defective materials and correction of the defective workmanship is to be the responsibility of the metal wall panel system manufacturer. Repairs that become necessary because of defective materials and workmanship while metal wall panel system is under warranty are to be performed within 24 hours after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within 24 hours of notification will constitute grounds for having emergency repairs performed by others and not void the warranty.

PART 2 PRODUCTS

2.1 PANEL MATERIALS

2.1.1 Foam-Insulation Core Wall Panel

Provide factory-formed steel wall panel assembly fabricated from two sheets of metal with modified polyisocyanurate or polyurethane foam insulation core foamed-in-place during fabrication with joints between panels designed to form weather-tight seals. Include accessories required for weather-tight installation.

a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.

b. Density: 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D1622/D1622M.

c. Compressive Strength: Minimum 20 psi when tested according to ASTM D1621.

d. Shear Strength: 26 psi when tested according to ASTM C273/C273M.

2.1.2 Finish

All panels are to receive a factory-appliedKynar 500/Hylar 5000 finish consisting of a baked-on top-coat with a manufacturer's recommended prime coat conforming to the following:

a. Metal Preparation: All metal is to have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with acid rinse, and thorough

drying.

b. Prime Coating: A base coat of epoxy paint, specifically formulated to interact with the top-coat, is to be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. This prime coat must be oven cured prior to application of finish coat.

c. Exterior Finish Coating: Apply the finish coating over the primer by roll coating to dry film thickness of 0.80 plus 5 mils (3.80 plus 0.50 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 plus 0.10 mils (4.00 plus 0.10 mils for Vinyl Plastisol). This finish coat must be oven-cured.

d. Interior Finish Coating: Apply a wash-coat on the reverse side over the primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry film thickness of 0.50 plus 0.10 mils. The wash-coat must be oven-cured.

e. Color: The exterior finish chosen from the manufacturer's standard color chart.

f. Physical Properties: Coating must conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

Chalking:	ASTM D4214
Color Change and Conformity:	ASTM D2244
Weatherometer:	ASTM G152, ASTM G153 and ASTM D822
Humidity:	ASTM D2247 and ASTM D714
Salt Spray:	ASTM B117
Chemical Pollution:	ASTM D1308
Gloss at 60:	ASTM D523
Pencil Hardness:	ASTM D3363
Reverse Impact:	ASTM D2794
Flexibility:	ASTM D522/D522M
Abrasion:	ASTM D968
Flame Spread:	ASTM E84

2.2 MISCELLANEOUS METAL FRAMING

2.2.1 Fasteners for Miscellaneous Metal Framing

Type, material, corrosion resistance, size and sufficient length to

penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to substrates in accordance with the wall panel manufacturer's and ASCE 7 requirements.

2.3 FASTENERS

2.3.1 General

Type, material, corrosion resistance, size and sufficient length to penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to substrates in accordance with the wall panel manufacturer's and ASCE 7 requirements.

2.3.2 Exposed Fasteners

Fasteners for wall panels to be corrosion resistant coated steel, aluminum, stainless steel, or nylon capped steel compatible with the sheet panel or flashing and of a type and size recommended by the manufacturer to meet the performance requirements and design loads. Fasteners for accessories to be the manufacturer's standard. Provide an integral metal washer matching the color of attached material with compressible sealing EPDM gasket approximately 3/32 inches thick.

2.3.3 Screws

Screws to be corrosion resistant coated steel, aluminum and/or stainless steel being the type and size recommended by the manufacturer to meet the performance requirements.

2.3.4 Rivets

Rivets to be closed-end type, corrosion resistant coated steel, aluminum or stainless steel where watertight connections are required.

2.3.5 Attachment Clips

Fabricate clips from steel hot-dipped galvanized in accordance with ASTM A653/A653M, or Series 305 stainless steel. Size, shape, thickness and capacity as required meeting the insulation thickness and design load criteria specified.

2.4 ACCESSORIES

2.4.1 General

All accessories to be compatible with the metal wall panels. Sheet metal flashing, trim, metal closure strips, caps and similar metal accessories must not be less than the minimum thickness specified for the wall panels. Exposed metal accessories/finishes to match the panels furnished, except as otherwise indicated. Molded foam rib, ridge and other closure strips to be non-absorbent closed-cell or solid-cell synthetic rubber or pre-molded neoprene to match configuration of the panels.

2.4.2 Rubber Closure Strips

Closed-cell, expanded cellular rubber conforming to ASTM D1056 and ASTM D1667; extruded or molded to the configuration of the specified wall panel and in lengths supplied by the wall panel manufacturer.

2.4.3 Metal Closure Strips

Factory fabricated steel closure strips to be the same thickness, color, finish and profile of the specified wall panel.

2.4.4 Joint Sealants

2.4.4.1 Sealants and Caulking

Sealants are to be an approved gun type for use in hand- or air-pressure caulking guns at temperatures above 40 degrees F (or frost-free application at temperatures above 10 degrees F) with minimum solid content of 85 percent of the total volume. Sealant is to dry with a tough, durable surface skin which permits it to remain soft and pliable underneath, providing a weather-tight joint. No migratory staining is permitted on painted or unpainted metal, stone, glass, vinyl, or wood.

Prime all joints to receive sealants with a compatible one-component or two-component primer as recommended by the wall panel manufacturer.

2.4.4.2 Shop-Applied

Sealant for shop-applied caulking must be an approved gun grade, non-sag one component polysulfide or silicone conforming to ASTM C920, Type II, and with a curing time to ensure the sealant's plasticity at the time of field erection.

2.4.4.3 Field-Applied

Sealant for field-applied caulking must be an approved gun grade, non-sag one component polysulfide or two-component polyurethane with an initial maximum Shore A durometer hardness of 25, and conforming to ASTM C920, Type II. Color to match panel colors.

2.4.4.4 Tape Sealant

Pressure sensitive, 100 percent solid with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the wall panel manufacturer.

2.5 SHEET METAL FLASHING AND TRIM

2.5.1 Fabrication

Shop fabricate sheet metal flashing and trim where practicable to comply with recommendations in SMACNA 1793 that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

2.6 REPAIR OF FINISH PROTECTION

Repair paint for color finish enameled wall panel must be compatible paint of the same formula and color as the specified finish furnished by the wall panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary wall framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal wall panel manufacturer, UL, ASTM, ASCE 7 and as required for the geographical area where construction will take place.

C. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

E. Submit to the Contracting Officer a written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install sub-purlins, girts, angles, furring, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's written instructions.

3.3 WALL PANEL INSTALLATION

Provide metal wall panels of full length from sill to eave as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement in accordance with MBMA Metal Building Systems Manual.

a. Steel Wall Panels: Use stainless-steel fasteners for exterior surfaces and galvanized steel fasteners for interior surfaces.

c. Anchor Clips: Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturer's written instructions.

d. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

e. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

Erect wall panel system in accordance with the approved erection drawings, the printed instructions and safety precautions of the manufacturer.

Sheets are not to be subjected to overloading, abuse, or undue impact. Bent, chipped, or defective sheets shall not be applied.

Sheets must be erected true and plumb and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with the indicated eave, and sill.

Work is to allow for thermal movement of the wall panel, movement of the building structure, and to provide permanent freedom from noise due to wind pressure.

Field cutting metal wall panels by torch is not permitted.

3.4 FASTENER INSTALLATION

Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturer's written instructions.

3.5 FLASHING, TRIM AND CLOSURE INSTALLATION

3.5.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

Sheet metalwork is to be accomplished to form weather-tight construction without waves, warps, buckles, fastening stresses or distortion, and allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades is to be performed by sheet metal mechanics.

3.5.2 Metal Flashing

Exposed metal flashing is to be installed at building corners, sills and eaves, junctions between metal siding and walling.

Exposed metal flashing is to be the same material, color, and finish as the specified metal wall panel.

Flashing is to be fastened at not more than 8 inches on center, except where flashing are held in place by the same screws that secure covering sheets.

Flashing is to be furnished in at least 8 foot lengths. Exposed flashing is to have 1 inch locked and blind-soldered end joints, and expansion

joints at intervals of not more than 16 feet.

Exposed flashing and flashing subject to rain penetration to be bedded in the specified joint sealant.

Flashing which is in contact with dissimilar metals to be isolated by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Drips to be formed to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

3.5.3 Closures

Install metal closure strips at open ends of corrugated or ribbed pattern walls, and at intersection of wall and wall unless open ends are concealed with formed eave flashing; and in other required areas.

Install mastic closure strips at intersection of the wall with metal walling; top and bottom of metal siding; heads of wall openings; and in other required locations.

3.6 WORKMANSHIP

Make lines, arises, and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight.

3.7 ACCEPTANCE PROVISIONS

3.7.1 Erection Tolerances

Erect metal wall panels straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions. Horizontal lines must not vary more than 1/8 inch in 40 feet.

3.7.2 Leakage Tests

Finished application of metal wall panels are to be subject to inspection and test for leakage by the Contracting Officer, Architect/Engineer. Inspection and tests will be conducted without cost to the Government.

Inspection and testing is to be made promptly after erection to permit correction of defects and the removal and replacement of defective materials.

3.7.3 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials. Finished repaired surfaces must be uniform and free from variations of color and surface texture.

Repaired metal surfaces that are not acceptable to the project requirements are to be immediately removed and replaced with new material.

3.7.4 Paint-Finish Metal Siding

Paint-finish metal siding will be tested for color stability by the Contracting Officer during the manufacturer's specified guarantee period.

Panels that indicate color changes, fading, or surface degradation, determined by visual examination, must be removed and replaced with new panels at no expense to the Government.

New panels will be subject to the specified tests for an additional year from the date of their installation.

3.8 CLEAN-UP AND DISPOSAL

Clean all exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from work area. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces to be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating.

Collect and place scrap/waste materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site; transport demolished materials from government property and legally dispose of them.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

08/08

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL REQUIREMENTS
1.3 SUBMITTALS
1.4 DELIVERY, HANDLING, AND STORAGE

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Exposed flashing Items
2.1.2 Aluminum Alloy Sheet and Plate
2.1.2.1 Finish
2.1.3 Fasteners

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Workmanship
3.1.2 Cleats
3.1.3 Screws
3.1.4 Seams
3.1.4.1 Flat Seams
3.1.5 Soldering
3.1.5.1 Edges
3.1.6 Welding and Mechanical Fastening
3.1.7 Expansion and Contraction
3.1.8 Flashings
3.2 CLEANING
3.3 REPAIRS TO FINISH
3.4 FIELD QUALITY CONTROL
3.4.1 Procedure

-- End of Section Table of Contents --

SECTION 07 60 00

FLASHING AND SHEET METAL
08/08

PART 1 GENERAL

1.1 REFERENCES

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

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

1.2 GENERAL REQUIREMENTS

Finished sheet metalwork will form a weathertight construction without waves, warps, buckles, fastening stresses or distortion, which allows for expansion and contraction. Sheet metal mechanic is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous roofing operations.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Flashing; G, AE

Indicate thicknesses, dimensions, fastenings and anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

SD-11 Closeout Submittals

Quality Control Plan; G

Submit for sheet metal work in accordance with paragraph entitled "Field Quality Control."

1.4 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to

the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Use as indicated on the drawings.

Furnish flashing items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used except as follows:

2.1.1 Exposed flashing Items

Consider the following as As indicated on the drawings.

2.1.2 Aluminum Alloy Sheet and Plate

2.1.2.1 Finish

All exterior flashing items must have a factory coating applied after metal substrates have been cleaned and pretreated. Provide finish coating and color as noted on the Paint Finish Schedule on Drawing A-601. .

2.1.3 Fasteners

Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Workmanship

Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.

3.1.2 Cleats

Provide cleats for flashing 18 inch and over in width. Space cleats evenly not over 12 inch on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inch wide by 3 inch long. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Pretin cleats for soldered seams.

3.1.3 Screws

Install screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Provide mechanically formed joints in aluminum sheets 0.040 inch or less in thickness.

3.1.4 Seams

Straight and uniform in width and height with no solder showing on the face.

3.1.4.1 Flat Seams

Make seams in the direction of the flow.3.1.5 Soldering

Pretin edges of sheet metal before soldering is begun.

3.1.5.1 Edges

Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux the edges of stainless steel to be pretinned. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.6 Welding and Mechanical Fastening

Mechanically fastened, and filled with sealantas recommended by the flashing manufacturer.

3.1.7 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fascias by expansion and contraction joints spaced not more than 12 feet apart.

3.1.8 Flashings

Prefabricate in the shapes and sizes indicated and in lengths not less that 8 feet. Provide prefabricated, mitered corners internal and external corners.

3.2 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.3 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

3.4 FIELD QUALITY CONTROL

Establish and maintain a Quality Control Plan for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification that specified material is provided and installed.

c. Inspection of sheet metalwork, for proper size(s) and thickness(es), fastening and joining, and proper installation.

3.4.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contracting Officer at the end of each day.

TABLE II. SHEET METAL JOINTS			
TYPE OF JOINT			
Item Designation	Steel		Remarks
Joint cap for building expansion seam, cleated joint at roof	1.25 inch single lock, standing seam, cleated		--
Flashings			
Base	One inch 3 inch lap for expansion joint		
Eave	One inch flat locked, cleated. One inch loose locked, sealed expansion joint, cleated.		
Edge strip	Butt		--
Sheet, smooth	Butt with 1/4 inch space		

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - OPENINGS

SECTION 08 11 13

STEEL DOORS AND FRAMES

02/10

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS
2.1.1 Classification - Level, Performance, Model
2.1.1.1 Heavy Duty Doors
2.2 INSULATED STEEL DOOR SYSTEMS
2.3 INSULATION CORES
2.4 STANDARD STEEL FRAMES
2.4.1 Welded Frames
2.4.2 Anchors
2.4.2.1 Wall Anchors
2.5 WEATHERSTRIPPING
2.6 HARDWARE PREPARATION
2.7 FINISHES
2.7.1 Factory-Primed Finish
2.7.2 Hot-Dip Zinc-Coated and Factory-Primed Finish
2.7.3 Electrolytic Zinc-Coated Anchors and Accessories
2.7.4 Field-Applied Epoxy Finish
2.8 FABRICATION AND WORKMANSHIP

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Frames
3.1.2 Doors
3.2 PROTECTION
3.3 CLEANING

-- End of Section Table of Contents --

SECTION 08 11 13

STEEL DOORS AND FRAMES
02/10

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A879/A879M	(2012) Standard Specification for Steel Sheet, zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM C578	(2012b) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C591	(2012a) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C612	(2010) Mineral Fiber Block and Board Thermal Insulation
ASTM D2863	(2012) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.115	(2006) Hardware Preparation in Steel Doors and Steel Frames

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR 113	(2001; R2006) Standard Practice for

	Determining the Steady State Thermal Transmittance of Steel Door and Frame Assemblies
SDI/DOOR A250.11	(2001) Recommended Erection Instructions for Steel Frames
SDI/DOOR A250.4	(2011) Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing
SDI/DOOR A250.6	(2003; R2009) Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
SDI/DOOR A250.8	(2003; R2008) Recommended Specifications for Standard Steel Doors and Frames

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors; G, AE

Frames; G, AE

Show elevations, construction details, metal gages, hardware provisions, and installation details.

Schedule of doors;

Schedule of frames

Schedule of Field-Applied Epoxy Finish; G, AE

Submit door and frame locations.

SD-03 Product Data

Doors; G, AE

Frames; G, AE

Weatherstripping; G, AE

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to SDI/DOOR A250.8 requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

SDI/DOOR A250.8, except as specified otherwise. Prepare doors to receive door hardware as specified in Section 08 71 00. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1-3/4 inch thick, unless otherwise indicated.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Heavy Duty Doors

SDI/DOOR A250.8, Level 2, physical performance Level B, Model 1 with core construction as required by the manufacturer for interior doors andfor exterior doors, of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners shall be filled with mineral board insulation.

2.2 INSULATED STEEL DOOR SYSTEMS

All doors are to be insulated steel doors and frames. Door size(s), design, and material shall be as specified for standard steel doors. Insulated steel doors shall have a core of polyurethane foam and an R factor of 15.0 or more face sheets, edges, and frames of galvanized steel not lighter than 23 gage, 16 gage, and 16 gage respectively; magnetic weatherstripping; nonremovable-pin hinges; thermal-break aluminum threshold; and vinyl door bottom. Doors and frames shall receive phosphate treatment, rust-inhibitive primer, and baked acrylic enamel finish. Doors shall have been tested in accordance with SDI/DOOR A250.4 and shall have met the requirements for Level C. Prepare doors to receive specified hardware.Doors shall be 1-3/4 inch thick. Provide insulated steel doors and frames at all door locations.n.

2.3 INSULATION CORES

Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI/DOOR 113 and shall conform to:

a. Rigid Cellular Polyisocyanurate Foam: ASTM C591, Type I or II, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D2863; or

b. Rigid Polystyrene Foam Board: ASTM C578, Type I or II; or

c. Mineral board: ASTM C612, Type I.

2.4 STANDARD STEEL FRAMES

SDI/DOOR A250.8, Level 1, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors, unless otherwise indicated.

2.4.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

Weld frames in accordance with the recommended practice of the Structural Welding Code Sections 1 through 6, AWS D1.1/D1.1M and in accordance with the practice specified by the producer of the metal being welded.

2.4.2 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.4.2.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Completed openings: Secure frames to previously placed steel with welds.

2.5 WEATHERSTRIPPING

As specified in Section 08 71 00 DOOR HARDWARE.

2.6 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in SDI/DOOR A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI/DOOR A250.8 and SDI/DOOR A250.6. For additional requirements refer to ANSI/BHMA A156.115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI/DOOR A250.8, as applicable. Punch door frames , with the exception of frames that will have weatherstripping or gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.7 FINISHES

2.7.1 Factory-Primed Finish

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in SDI/DOOR A250.8. , or paintable A25 galvannealed steel without primer. Where coating is removed by welding, apply touchup of factory primer.

2.7.2 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate exteriorandinterior doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A924/A924Mand ASTM A653/A653M. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40 Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in SDI/DOOR A250.8. Provide for exterior doorsand interior doors.

2.7.3 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A879/A879M, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in SDI/DOOR A250.8.

2.7.4 Field-Applied Epoxy Finish

Coatings shallbe as specified in Section 09 97 13.26. Color(s) of finish coat on both sides of doors shall be white. .

2.8 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI/DOOR A250.11. Plumb, align, and brace securely until permanent welding is complete. Coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that frames are filled with rock wool insulation before installation.

3.1.2 Doors

Hang doors in accordance with clearances specified in SDI/DOOR A250.8. After erection and glazing, clean and adjust hardware.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly.

Remove mastic smears and other unsightly marks.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - OPENINGS

SECTION 08 33 23

OVERHEAD COILING DOORS - (EXTERIOR MOUNTED)

07/07

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 OVERHEAD COILING DOOR DETAIL SHOP DRAWINGS
1.4 WARRANTY, OPERATION AND MAINTENANCE DATA
1.5 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 DESCRIPTION
2.2 PERFORMANCE REQUIREMENTS
2.2.1 Wind Loading
2.2.2 Operational Cycle Life
2.3 OVERHEAD COILING DOORS
2.3.1 Curtain Materials and Construction
2.3.2 Insulated Curtains
2.3.3 Curtain Bottom Bar
2.3.4 Locks
2.3.5 Weather Stripping
2.3.6 Locking Devices
2.3.7 Safety Interlock
2.3.8 Overhead Drum
2.3.9 Slats
2.4 HARDWARE
2.4.1 Guides
2.4.2 Equipment Supports
2.4.3 Hood
2.5 COUNTERBALANCING MECHANISM
2.5.1 Brackets
2.5.2 Counterbalance Barrels
2.5.2.1 Barrel
2.5.2.2 Spring Balance
2.5.3 Spring Balance
2.5.4 Torsion Rod for Counter Balance
2.5.5 Counterbalance Shaft Assembly
2.5.5.1 Barrel
2.5.5.2 Spring Balance
2.6 ELECTRIC DOOR OPERATORS
2.6.1 Door-Operator Types
2.6.2 Electric Motors
2.6.3 Motor Bearings
2.6.4 Motor Starters, Controls, and Enclosures
2.6.5 Control Enclosures
2.6.6 Transformer
2.6.7 Safety-Edge Device

2.6.8 Speed-Reduction Units
2.6.9 Chain Drives
2.6.10 Brakes
2.6.11 Clutches
2.6.12 Weather/Smoke Seal Sensing Edge
2.7 SURFACE FINISHING

PART 3 EXECUTION

3.1 GENERAL
3.2 FIELD PAINTED FINISH
3.3 ACCEPTANCE PROVISIONS
3.3.1 Maintenance and Adjustment
3.3.2 CLEANING
3.4 OPERATION AND MAINTENANCE

-- End of Section Table of Contents --

SECTION 08 33 23

OVERHEAD COILING DOORS - (EXTERIOR MOUNTED)
07/07

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE FUN IP	(2013; Addenda and Corrigendum 2013) Fundamentals Handbook, I-P Edition

ASME INTERNATIONAL (ASME)

ASME B29.400	(2001; R 2008) Combination, "H" Type Mill Chains, and Sprockets

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A27/A27M	(2013) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip

	Galvanized Coatings
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM D2000	(2012) Standard Classification System for Rubber Products in Automotive Applications
ASTM E330	(2002; R 2010) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F568M	(2007) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA MG 1	(2011; Errata 2012) Motors and Generators
NEMA ST 1	(1988; R 1994; R 1997) Specialty Transformers (Except General Purpose Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Overhead Coiling Doors; G, AE

Counterbalancing Mechanism; G, AE

Electric Door Operators; G, AE

Bottom Bars; G, AE

Guides; G, AE

Brackets; G, AE

Overhead Drum; G, AE

Hood; G, AE

Installation Drawings; G

Surface Finishing; G, AE

SD-03 Product Data

Overhead Coiling Doors; G, AE

Hardware; G, AE

Counterbalancing Mechanism; G, AE

Electric Door Operators; G, AE

SD-05 Design Data

Overhead Coiling Doors; G

Hardware; G

Counterbalancing Mechanism; G

Electric Door Operators; G, AE

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

Materials; G

Devices; G

Procedures; G

Manufacture's Brochures; G

Parts Lists; G

Cleaning; G

1.3 OVERHEAD COILING DOOR DETAIL SHOP DRAWINGS

Provide installation drawings for overhead coiling door assemblies which show: elevations of each door type, shape and thickness of materials, finishes, details of joints and connections, details of guides and fittings, rough opening dimensions, location and description of hardware, anchorage locations, and counterbalancing mechanism and door operator details. Show locations of replaceable fusible links on wiring diagrams for power, signal and controls. Include a schedule showing the location of each door with the drawings.

1.4 WARRANTY, OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance Manuals for Overhead Coiling Door Assemblies, including the following items:

Materials

Devices

Electric Door Operators

Hood

Counterbalancing Mechanism

Procedures

Manufacture's Brochures

Parts Lists

Furnish a written guarantee that the helical spring and counterbalance mechanism are free from defects in material and workmanship for not less than 5 years after completion and acceptance of the project.

Warrant that upon notification by the Government, any defects in material, workmanship, and door operation are immediately correct within the same time period covered by the guarantee, at no cost to the Government.

1.5 DELIVERY AND STORAGE

Deliver doors to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Store doors in an adequately ventilated dry location that is free from dirt and dust, water, or other contaminants. Store in a manner that permits easy access for inspection and handling.

PART 2 PRODUCTS

2.1 DESCRIPTION

Doors to be coiling exterior mounted type, with interlocking slats, complete with anchoring and door hardware, guides, hood, and operating mechanisms, and designed for use on openings as indicated. Use grease-sealed or self-lubricating bearings for rotating members.

2.2 PERFORMANCE REQUIREMENTS

2.2.1 Wind Loading

Design and fabricate door assembly to withstand the wind loading pressure of at least 120 pounds per square foot with a maximum deflection of 1/120 of the opening width. Provide test data showing compliance with ASTM E330. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested. Ensure complete assembly meets or exceeds the requirements of ASCE 7.

2.2.2 Operational Cycle Life

Design all portions of the door, hardware and operating mechanism that are subject to movement, wear, or stress fatigue to operate through a minimum number of 10 cycles per day . One complete cycle of door operation is defined as when the door is in the closed position, moves to the fully open position, and returns to the closed position.

2.3 OVERHEAD COILING DOORS

2.3.1 Curtain Materials and Construction

Provide curtain slats fabricated from Grade A steel sheets conforming to ASTM A653/A653M, with the additional requirement of a minimum yield point of 33,000 psi. Provide sheets, galvanized in accordance with ASTM A653/A653M and ASTM A924/A924M.

Fabricate doors from interlocking cold-rolled slats, with section profiles as specified, designed to withstand the specified wind loading. Ensure the provided slats are continuous without splices for the width of the door.

Provide slats filled with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, according to ASTM E84. Enclose insulation completely within slat faces on interior surface of slats.

2.3.2 Insulated Curtains

Form Curtains from manufacturer's standard shapes of interlocking slats. Supply slat system with a minimum R-value of 10____when calculated in accordance with ASHRAE FUN IP. Slats to consist of a urethane core not less than 11/16 inch thick, completely enclosed within metal facings. Ensure the exterior face of slats are the same gauge as specified for curtains. Select an interior face not lighter than 0.0219 inches. The insulated slat assembly requires a flame spread rating of not more than 25 and a smoke development factor of not more than 50 when tested in accordance with ASTM E84.

2.3.3 Curtain Bottom Bar

Install curtain bottom bars as pairs of angles from the manufacturer's standard steelnot less than 2.0 by 2.0 inches by 0.188 inch. Ensure steel extrusions conform to ASTM A36/A36M. Galvanize angles and fasteners in accordance with ASTM A653/A653M and ASTM A924/A924M. Coat welds and abrasions with paint conforming to ASTM A780/A780M.

Provide two 2 inch x 2 inch x 1/8 inch structural steel angles.

2.3.4 Locks

Provide end and/or wind locks of Grade B cast steel conforming to ASTM A27/A27M, galvanized in accordance with ASTM A653/A653M, ASTM A153/A153M and ASTM A924/A924M. Secure locks at every other curtain slat.

2.3.5 Weather Stripping

Ensure weather-stripping at the door-head and jamb is minimum 1/8-inch

thick sheet of natural or neoprene rubber with air baffles. Secure weather stripping to the insides of hoods with galvanized-steel fasteners through continuous galvanized-steel pressure bars at least 5/8-inch wide and1/8-inch thick.

Ensure threshold weather-stripping is 1/8-inch thick sheet natural or neoprene rubber secured to the bottom bars.

Provide weather-stripping of natural or neoprene rubber conforming to ASTM D2000.

2.3.6 Locking Devices

Ensure slide bolt engages through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from exterior side. Hasps shall accept 0.5" diameter locks.
Provide a locking device assembly which includes cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks on interior side.

2.3.7 Safety Interlock

Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.2.3.8 Overhead Drum

Fabricate drums from nominal 0.028-inch thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A653/A653M.

2.3.9 Slats

No. 5F, 18 gauge, Grade 40 steel, ASTM A653/A653M galvanized steel zinc coating.

2.4 HARDWARE

Ensure all hardware conforms to ASTM A153/A153M, ASTM A307, ASTM F568M, and ASTM A27/A27M.

2.4.1 Guides

Fabricate curtain jamb guides from the manufacturer's standard angles or channels of same material and finish as curtain slats unless otherwise indicated. Provide guides with sufficient depth and strength to retain curtain, and to withstand loading. Ensure curtain operates smoothly. Slot bolt holes for track adjustment.

Ensure guides are roll-formed steel channel bolted to angle or structural grade, three angle assembly of steelto form a slot of sufficient depth to retain curtains in guides to achieve 20 psf windload standard. Guides may be provided with integral windlock bars and removable bottom bar stops.

Fabricate withstructural steelangles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Flare the top of inner and outer guide angles outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

2.4.2 Equipment Supports

Fabricate door-operating equipment supports from the manufacturer's

standard steel shapes and plates conforming to ASTM A36/A36M, galvanized in accordance with ASTM A653/A653M and ASTM A924/A924M. Size the shapes and plates in accordance with the industry standards for the size, weight, and type of door installation.

2.4.3 Hood

Provide a hood with a minimum24-gauge galvanized sheet metal, flanged at top for attachment to header and flanged at bottom to provide longitudinal stiffness. The hood encloses the curtain coil and counterbalance mechanism.

Provide a 24-gauge galvanized steel hood with reinforced top and bottom edges. Provide minimum 1/4 inch steel intermediate support brackets as required to prevent excessive sag.

2.5 COUNTERBALANCING MECHANISM

Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted, around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed or self-lubricating bearings for rotating members.

2.5.1 Brackets

Brackets will be of 1/4 inch minimum thick steel plates, with permanently sealed ball bearings. Designed to enclose ends of coil and provide support of counterbalance pipe at each end.

2.5.2 Counterbalance Barrels

Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, conforming to ASTM A53/A53M. Ensure the barrel is of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats. Limit barrel deflection to not more than 0.03 inch per foot of span under full load.

Curtain to be coiled on a pipe of sufficient size to carry door load with deflection not to exceed of door span and to be correctly balanced by helical springs, oil tempered torsion type. Use cast iron barrel plugs to anchor springs to tension shaft and pipe.

2.5.2.1 Barrel

Provide steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per footof width.

2.5.2.2 Spring Balance

Provide an oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door. Ensure that effort to operate manually operated units does not exceed 25 lbs. Provide wheel for applying and adjusting spring torque.

2.5.3 Spring Balance

Install one or more oil-tempered, heat-treated steel helical torsion

springs within the barrel, capable of producing sufficient torque to assure easy operation of the door curtain. Provide and size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

2.5.4 Torsion Rod for Counter Balance

Fabricate rod from the manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

2.5.5 Counterbalance Shaft Assembly

2.5.5.1 Barrel

Provide steel pipe capable of supporting the curtain load with maximum deflection of 0.03 inches per foot of width.

2.5.5.2 Spring Balance

Provide an oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door. Ensure that maximum effort to operate does not exceed 25 pounds. Provide wheel for applying and adjusting spring torque.

2.6 ELECTRIC DOOR OPERATORS

Provide electrical wiring and door operating controls conforming to the applicable requirements of NFPA 70.

Electric door-operator assemblies needs to be the sizes and capacities recommended and provided by the door manufacturer for specified doors. Furnish complete assemblies with electric motors and factory-prewired motor controls, starter, gear reduction units, solenoid-operated brakes, clutch, remote-control stations, manual or automatic control devices, and accessories as required for proper operation of the doors.

Design the operators so that motors may be removed without disturbing the limit-switch adjustment and affecting the emergency auxiliary operators.

Provide a manual operator of crank-gear or chain-gear mechanisms with a release clutch to permit manual operation of doors in case of power failure. Arrange the emergency manual operator so that it may be put into and out of operation from floor level, and its use does not affect the adjustment of the limit switches. Provide an electrical or mechanical device that automatically disconnects the motor from the operating mechanism when the emergency manual operating mechanism is engaged.

2.6.1 Door-Operator Types

Provide an operator mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.

2.6.2 Electric Motors

Provide motors which are the high-starting-torque, reversible,

constant-duty electrical type with overload protection of sufficient torque and horsepower to move the door in either direction from any position. Ensure they produce a door-travel speed of not less than 8 nor more than 12 inches per second without exceeding the horsepower rating.

Provide motors which conform to NEMA MG 1 designation, temperature rating, service factor, enclosure type, and efficiency to the requirements specified.

2.6.3 Motor Bearings

Select bearings with bronze-sleeve or heavy-duty ball or roller antifriction type with full provisions for the type of thrust imposed by the specific duty load.

Pre-lubricate and factory seal bearings in motors less than 1/2 horsepower.

Equip motors coupled to worm-gear reduction units with either ball or roller bearings.

Equip bearings in motors 1/2 horsepower or larger with lubrication service fittings. Fit lubrication fittings with color-coded plastic or metal dust caps.

In any motor, bearings that are lubricated at the factory for extended duty periods do not need to be lubricated for a given number of operating hours. Display this information on an appropriate tag or label on the motor with instructions for lubrication cycle maintenance.

2.6.4 Motor Starters, Controls, and Enclosures

Provide each door motor with: a factory-wired, unfused, disconnect switch; a reversing, across-the-line magnetic starter with thermal overload protection; 120-volt operating coils with a control transformer limit switch; and a safety interlock assembled in a NEMA ICS 6 type enclosure as specified herein. Ensure control equipment conforms to NEMA ICS 2.

Provide adjustable switches, electrically interlocked with the motor controls and set to stop the door automatically at the fully open and fully closed position.

2.6.5 Control Enclosures

Provide control enclosures that conform to NEMA ICS 6 for general purpose NEMA Type 1.

2.6.6 Transformer

Provide starters with 230/460 to 115 volt control transformers with one secondary fuse when required to reduce the voltage on control circuits to 120 volts or less. Provide a transformer conforming to NEMA ST 1.

2.6.7 Safety-Edge Device

Provide each door with a pneumatic safety device extending the full width of the door and located within a U-section neoprene or rubber astragal, mounted on the bottom rail of the bottom door section. Device needs to immediately stop and reverse the door upon contact with an obstruction in the door opening during downward travel and cause the door to return to

full-open position. A safety device is not a substitute for a limit switch.

Connect safety device to the control circuit through a retracting safety cord and reel.

2.6.8 Speed-Reduction Units

Provide speed-reduction units consisting of hardened-steel worm and bronze worm gear assemblies running in oil or grease and inside a sealed casing, coupled to the motor through a flexible coupling. Drive shafts need to rotate on ball- or roller-bearing assemblies that are integral with the unit.

Provide minimum ratings of speed reduction units in accordance with AGMA provisions for class of service.

Ground worm gears to provide accurate thread form; machine teeth for all other types of gearing. Surface harden all gears.

Provide antifriction type bearings equipped with oil seals.

2.6.9 Chain Drives

Provide roller chains that are a power-transmission series steel roller type conforming to ASME B29.400, with a minimum safety factor of 10 times the design load.

Heat-treat or otherwise harden roller-chain side bars, rollers, pins, and bushings.

Provide high-carbon steel chain sprockets with machine-cut hardened teeth, finished bore and keyseat, and hollow-head setscrews.

2.6.10 Brakes

Provide 360-degree shoe brakes or shoe and drum brakes. Ensure the brakes are solenoid-operated and electrically interlocked to the control circuit to set automatically when power is interrupted.

2.6.11 Clutches

Ensure clutches are either the 4-inch diameter, multiple face, externally adjustable friction type or adjustable centrifugal type.

2.6.12 Weather/Smoke Seal Sensing Edge

Provide automatic stop control by an automatic sensing switch within neoprene astragal extending the full width of door bottom bar.

Provide an electric sensing edge device. Ensure the door immediately stops downward travel when contact occurs before door fully closes. Provide a self-monitoring wireless sensing edge connection to the motor operator; eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator. Supervised system alters normal door operation; preventing damage, injury or death due to an inoperable sensing edge system.

2.7 SURFACE FINISHING

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Noticeable variations in the same metal component are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 GENERAL

Install overhead coiling door assembly, anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories in accordance with approved detail drawings and manufacturer's written instructions. Upon completion of installation, ensure doors are free from all distortion. Install overhead coiling doors, motors, hoods, and operators at the mounting locations as indicated for each door in the contract documents and as required by the manufacturer.

Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility and as required by the manufacturer.

3.2 FIELD PAINTED FINISH

Ensure field painted steel doors and frames are in accordance with Section 09 97 13.26 COATINGS of STEEL WATERFRONT STRUCTURES and manufacturer's written instructions. Protect weather stripping from paint. Ensure finishes are free of scratches or other blemishes.3.3 ACCEPTANCE PROVISIONS

After installation, adjust hardware and moving parts. Lubricate bearings and sliding parts as recommended by manufacturer to provide smooth operating functions for ease movement, free of warping, twisting, or distortion of the door assembly.

Adjust seals to provide weather-tight fit around entire perimeter.

Engage a factory-authorized service representative to perform startup service and checks according to manufacturer's written instructions.

Test the door opening and closing operation when activated by controls or alarm-connected fire-release system. Adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Reset door-closing mechanism after successful test.

Test and make final adjustment of new doors at no additional cost to the Government.

3.3.1 Maintenance and Adjustment

Not more than 90 calendar days after completion and acceptance of the project, examine, lubricate, test, and re-adjust doors as required for proper operation.

3.3.2 CLEANING

Clean doors in accordance with manufacturer's approved instructions.

3.4 OPERATION AND MAINTENANCE

Submit 6 copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the Overhead Coiling Door Assemblies. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

Provide operation and maintenance manuals which are consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Provide test data that is legible and of good quality.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - OPENINGS

SECTION 08 34 16.10

STEEL SLIDING HANGAR DOORS

04/06

PART 1 GENERAL

1.1 REFERENCES
1.2 DESIGN REQUIREMENTS
1.2.1 Door Design
1.2.2 Steel Design
1.2.3 Loading
1.2.3.1 Deflection
1.2.4 Connections
1.2.5 Cold-Formed Steel Members
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Manufacturer's Qualifications
1.4.2 Installer's Qualifications
1.5 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 HANGAR DOORS
2.1.1 Structural Steel
2.1.2 Formed Steel
2.1.3 Sheet Steel
2.1.4 Galvanized Steel
2.1.5 Exterior Covering
2.1.6 Interior Covering
2.1.7 Insulation
2.1.8 Hardware
2.1.8.1 Wheel Assemblies
2.1.8.2 Fixed Pancake Top Guide Rollers
2.1.8.3 Vertical Floating Head Top Guide Rollers
2.1.9 Weather Stripping
2.1.9.1 Neoprene
2.1.9.2 Metallic
2.1.9.3 Hanging Head Flashing
2.1.10 Fasteners
2.1.11 Sealant
2.1.12 Primer
2.1.13 Starters
2.1.14 Electrical
2.2 FABRICATION
2.2.1 Doors
2.2.1.1 Frames and Framing
2.2.1.2 Exterior Covering and Interior Liner Sheets
2.2.2 Locking Devices
2.2.3 Tractor Pulls
2.2.4 Track Cleaners

2.2.5 Insulation
2.2.6 Cable System for Group Doors
2.3 OPERATION
2.3.1 Hangar Door Types
2.3.1.1 Individually Operated Doors
2.3.1.2 Anchored Group Doors
2.3.2 Operating Units
2.3.3 Braking Systems
2.3.4 Controls
2.3.4.1 Push Buttons for Individually Operated Doors
2.3.5 Limit Switches
2.3.5.1 Lever Arm Type Limit Switches
2.3.6 Safety Edges
2.3.6.1 Electrical Safety Edges
2.3.7 Warning Device
2.3.8 Emergency Operation
2.3.9 Electrical Work
2.3.9.1 Trolley Ducts
2.3.9.2 Electrical Cables

PART 3 EXECUTION

3.1 PROTECTIVE COATINGS
3.1.1 Cleaning
3.1.2 Shop Painting
3.2 ERECTION
3.3 FIELD QUALITY CONTROL
3.3.1 Manufacturer's Field Services
3.3.2 Tests

-- End of Section Table of Contents --

SECTION 08 34 16.10

STEEL SLIDING HANGAR DOORS
04/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360	(2010) Specification for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

ASTM INTERNATIONAL (ASTM)

ASTM A1011/A1011M	(2014) Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability and Ultra-High Strength
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A366/A366M	(1997e1) Standard Specification for Commercial Steel (CS) Sheet, Carbon,(0.15 Maximum Percent) Cold-Rolled
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for

	Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2011) Enclosures

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1997; E 2004) Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

UNDERWRITERS LABORATORIES (UL)

UL 506	(2008; Reprint Oct 2013) Specialty Transformers

1.2 DESIGN REQUIREMENTS

1.2.1 Door Design

The hangar doors shall be designed by the manufacturer in accordance with the criteria specified. Doors shall operate without binding, interference, or damage to weatherstripping. Doors shall fit closely and be free from warping.

1.2.2 Steel Design

AISC 360, AISI SG03-3.

1.2.3 Loading

Design doors as a system to withstand an external wind load of 20 pounds per square foot (psf) or the design wind load indicated for the building, whichever is greater, and an internal wind load of not less than one-half of the external wind load. In both cases, the deflection shall not exceed the height of the door divided by 120. The deflection due to design wind load shall not exceed length divided by 120 for any door member. Fiber stresses due to combined dead load and wind load shall not exceed the recommended design stresses for the material used and type of loading sustained.

1.2.3.1 Deflection

Design doors as a system to withstand the upward and downward deflections of the cantilevered structure supporting and bracing the top of the hangar door system.

a. Positive deflection (wind uplift): 3 inches

b. Negative deflection (live load): 10 inches

1.2.4 Connections

Design connections at top and bottom guide rails to withstand an external and an internal wind load of not less than 33 psf, or the design wind load for the building, whichever is greater, and a seismic load equal to 0.5 times the weight of the door.

1.2.5 Cold-Formed Steel Members

Cold-formed steel main members and girts shall be not less than 1/4 inch thick.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Hangar doors; G, AE

Submit the door manufacturer's complete schematic wiring diagram, field wiring diagram, and a complete physical location drawing showing the location of controls with the runs of conduit, size of conduit, number and size of wires in each conduit, location of junction boxes, and full details of control mountings.

Submit drawings showing details of construction, installation, and operation; size, shapes, and thickness of materials; joints and connections; reinforcing; hardware; mechanical devices; electrical devices; and design and detail data for work of other trades affected by hangar doors.

SD-05 Design Data

Hangar doors; G, AE

Submit design drawings and structural, mechanical, and "U" value calculations.

SD-10 Operation and Maintenance Data

Hangar doors, Data Package 2; G

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Include wiring and control diagrams.

1.4 QUALITY ASSURANCE

1.4.1 Manufacturer's Qualifications

The hangar door manufacturer shall be one who is regularly engaged in the production of steel sliding hangar doors of type and size required for this project.

1.4.2 Installer's Qualifications

The installation supervisor shall be an authorized representative of the door manufacturer. Mechanics shall be skilled and experienced in the erection of hangar doors of type and size required for this project.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials which are not shop installed on the doors in original rolls, packages, containers, boxes, or crates bearing the manufacturer's name, brand, and model number. Store materials and equipment in dry locations with adequate ventilation, free from dust and water, and so as to permit access for inspection and handling. Handle doors carefully to prevent damage. Remove damaged items that cannot be restored to like-new condition and provide new items.

PART 2 PRODUCTS

2.1 HANGAR DOORS

2.1.1 Structural Steel

AISC 360 and ASTM A36/A36M.

2.1.2 Formed Steel

AISI SG03-3.

2.1.3 Sheet Steel

ASTM A1011/A1011M hot-rolled steel sheet, commercial quality, or ASTM A366/A366M cold-rolled steel sheet, commercial quality.

2.1.4 Galvanized Steel

ASTM A653/A653M, coating designation G 90 galvanized steel sheet, commercial quality.

2.1.5 Exterior Covering

Flat sheet steel, not lighter than 13 gage.

2.1.6 Interior Covering

Flat sheet steel liner sheets, not lighter than 16 gage.

2.1.7 Insulation

Provide insulation that:

a. Contains no asbestos;

b. Is permanently secured in place behind the exterior covering; and

c. Has a flame spread rating of 75 or less and a smoke-developed rating of 100 or less when tested in accordance with ASTM E84.

Do not use cellular plastics as exposed finish material. The doors shall have an "R" value of not less than __15___ and a sound transmission class (STC) of not less than _35____.

2.1.8 Hardware

Provide hangar door hardware to accommodate actual dead loads plus wind loads specified. Provide top guide rollers, bottom wheels, interleaf

bumpers, tractor pulls, track cleaners, and top bumpers as required for a complete and operational installation.

2.1.8.1 Wheel Assemblies

Bottom wheels shall be of steel plate or cast steel, having a minimum tread diameter as required for the actual wheel loading. Where the height-to-width ratio of the door leaf exceeds three, wheel assemblies shall be vertically adjustable. Construct wheel assemblies to permit removal of the wheel without removing the door leaf from its position on the rail.

a. Treads: Machine wheel treads concentric with bearing seats. The clear distance between flanges shall not exceed the width of the rail by more than 1/8 inch at the tread nor more than 1/4 inch at the edge of the flange. Machine internal bearing seats accurately for a press fit. Heat treat wheels 18 inches or greater in diameter to obtain a rim hardness of 320 Brinnel.

b. Wheel bearings: Provide tapered roller or spherical bearings, either internal or cartridge type, arranged so that both horizontal and vertical loads shall be transferred to the rail only through the bearing. Bearings shall be tightly sealed and equipped with high-pressure grease fittings.

2.1.8.2 Fixed Pancake Top Guide Rollers

Horizontal type; each with single or double steel rollers of a suitable diameter and thickness for satisfactory performance under the designated load conditions and top guide system used. Provide permanently lubricated bearings. Rollers shall be stainless steel.

2.1.8.3 Vertical Floating Head Top Guide Rollers

Provide top-roller assemblies to:

a. Move up and down within the specified live load positive and negative deflection of the roof in the vicinity of the door opening;

b. Allow easy removal through the top of the guide system; and

c. Include both horizontal and vertical rollers built into a frame which is connected in such a manner as to transmit the specified wind loads from the door to the hangar structure and to prevent disengagement of the door from the top guide.

Rollers shall be stainless steel.

2.1.9 Weather Stripping

Provide adjustable and readily replaceable material. Provide on vertical edges, sills, and heads to afford a weathertight installation.

2.1.9.1 Neoprene

Use flap-type, two-ply, cloth-inserted neoprene or extruded, double flap, single or dual opposed solid neoprene material on vertical edges and sills. The two-ply material shall have a minimum thickness of 1/8 inch and shall be retained continuously for its full length and secured with

rust-resistant fasteners 12 inches o.c. Extruded weather stripping with heavy center section shall be attached at 12 inches o.c., but continuous bar may be omitted. Clearance between metal parts on vertical edges of leaves and between leaves and jambs which are to be weather-stripped shall be as indicated.

2.1.9.2 Metallic

Form head weather stripping material between each leaf and the top guide system of not lighter than 18 gage galvanized sheet steel or flap-type, cloth-inserted neoprene, as indicated.

2.1.9.3 Hanging Head Flashing

Provide with the top guide system specified in Section 05 12 00 STRUCTURAL STEEL. Provide cloth-inserted neoprene weathering fastened to top of door leaves to engage the head flashing when doors are closed.

2.1.10 Fasteners

Either zinc-coated or cadmium-plated steel.

2.1.11 Sealant

Single-component or multicomponent elastomeric type conforming to ASTM C920, Type S or M, Grade NS, Class 12.5, Use NT. Provide a sealant that has been tested on the types of substrate to which it will be applied.

2.1.12 Primer

Red iron oxide, zinc oxide type, SSPC Paint 25.

2.1.13 Starters

Provide magnetic reversing starters in NEMA ICS 1, Type 12 enclosures equipped with access door-controlled, fused safety disconnect switches. Starters shall be factory wired with overload and undervoltage protection, mechanical and electrical interlocks, auxiliary contacts, relays and timing devices as required, control circuit transformers, and a numbered terminal strip. The control circuit transformer shall reduce the voltage in the control circuits to 115 volts or less, and shall conform to UL 506.

2.1.14 Electrical

Provide conduit, wire, flexible cables, boxes, devices, and accessories under Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.2 FABRICATION

2.2.1 Doors

2.2.1.1 Frames and Framing

Door leaves shall be of welded or bolted construction. Joints shall develop 100 percent of the strength of the framing members. Vertical members shall be continuous throughout the height of the door. When required, prepare splices to facilitate field assembly in accordance with standard practice. Frames and framing members shall be true to dimensions and square in all directions; no leaf shall be bowed, warped, or out of

line in the vertical or horizontal plane of the door opening by more than 1/8 inch in 20 feet. Provide diagonal bracing so that the completed leaf assembly will be braced to withstand shipping, assembly, and operational loads. Exposed welds and welds which interfere with the installation of various parts such as cover sheets shall be ground smooth.

2.2.1.2 Exterior Covering and Interior Liner Sheets

Flat sheets shall be fastened to the frame either by edge welding, plug welding, or threaded fasteners 12 inches o.c. Where flat sheets are attached as either exterior covering or interior liner sheets, the clear unsupported area shall not exceed 25 square feet. Make edges of exterior sheets weathertight with sealant.

2.2.2 Locking Devices

Do not provide locking devices on motor-operated hangar doors.

2.2.3 Tractor Pulls

Provide tractor pulls so that leaves can be towed by a tractor or similar equipment in the event of power failure. The tractor pull shall be designed for drive force to tow door or 5000 pounds whichever is greater. Minimum thickness steel plate shall be 3/8 inch.

2.2.4 Track Cleaners

Provide a device to clear debris from the rail head and wheel flange grooves as the leaf is moved.

2.2.5 Insulation

Secure insulation to doors with clips, studs, or adhesive. Protect insulation within 8 feet of floor with steel liner sheets secured to framing 12 inches o.c. at edges with zinc-coated, self-tapping screws.

2.2.6 Cable System for Group Doors

The minimum size for the cable which interconnects the leaves shall be 3/8 inch; the cables shall be improved plow steel with lubricated hemp centers or wire rope cores. Sheaves over which the cables operate shall have a diameter of at least 18 cable diameters and either sealed ball-or roller-type bearings or graphite bronze bearings of a sufficient capacity for the operating loads. Grease fittings shall be provided for the sheave bearings unless permanently lubricated bearings are used.

2.3 OPERATION

2.3.1 Hangar Door Types

Hangar doors shall be biparting.

2.3.1.1 Individually Operated Doors

Each door leaf shall have a separate, traction-drive operating unit driving one or more of the bottom wheels. Each leaf shall have a motor-mounted, spring-set, solenoid-released motor brake. Each leaf shall move independently of the other leaves.

2.3.1.2 Anchored Group Doors

Each group of leaves shall have a traction-drive operating unit located in the lead leaf of the group and driving one or more wheels of the lead leaf. The leaves in each group shall start to move at the same time and arrive at their fully open or fully closed positions simultaneously. Provide necessary cables, fittings, sheaves, housings, guards, pickups, brackets, anchors, and miscellaneous hardware.

2.3.2 Operating Units

Each operating unit shall move its leaf at a speed of approximately 60 feet per minute at zero wind load conditions and to be operable up to and including a maximum wind load of 8 pounds per square foot. The operating units shall consist of either a separate motor and gear reducer or a gearhead motor, high-speed shaft brake, and necessary roller chains and sprockets. The systems shall be provided with overload protection for the drive units and a means for emergency tractor towing operation.

a. Motors shall be single speed, squirrel-cage type of sufficient size to operate the leaves under zero wind load conditions at not more than 75 percent of their rated capacity.

b. Gear reduction units shall allow a reversal of effort through the gears without damage to the units.

c. Operating mechanisms shall be covered on the interior of the leaf by a hinged 16 gage flat steel cover.

2.3.3 Braking Systems

Braking systems shall be designed to ensure stoppage of the leaves under normal, dry rail conditions within the safety edge overtravel limit. The braking systems shall be either a magnetic, spring-set, solenoid-released brake or hydraulic type. Provide a hand release to release the brake when it becomes necessary to move the leaf with an outside force. The hand release shall be an automatic reset type so that the brake will be operable during subsequent electrical operation of the door.

2.3.4 Controls

Doors shall be controlled by constant pressure push buttons mounted on the door leaves. Removing pressure from the button shall stop the movement of the leaves. The control equipment shall conform to NEMA ICS 1 and NEMA ICS 2. Interior push buttons shall be mushroom head type, mounted in heavy-duty, oil-tight enclosures conforming to NEMA ICS 6, Type 13, except that enclosure for reversing starter with disconnect switch shall be Type 1 or Type 12.

2.3.4.1 Push Buttons for Individually Operated Doors

The button at each edge of a leaf shall allow the leaf to travel with that edge as the leading edge only. The controls shall not be reversible. Location of each control button shall be located interior.

2.3.5 Limit Switches

Provide limit switches to prevent overtravel and bumping. Safety edges shall not be used as limit switches.

2.3.5.1 Lever Arm Type Limit Switches

Provide for anchored group doors to stop the travel of each group in the fully open and fully closed positions. The limit switches shall be:

a. Positive acting, snap action, lever arm type with actuating cams designed with sufficient overtravel to permit the group to come to a complete stop without overtraveling the limit switches.

b. Mounted on the leaves, and the actuating cams mounted either on the top guides or on adjacent door leaves.

2.3.6 Safety Edges

Provide fail-safe safety edges on each edge of each leaf of individually operated doors from one inch above the floor to the top of the door leaf. For leaves 12 inches thick (including siding) or less, provide a single run of safety edge the full width of door. For leaves over 12 inches thick (including siding,) provide a double run of safety edge spaced to provide the maximum degree of safety in stopping the leaves. For leaves over 12 inches thick (including siding) provide a double run of safety edges on the outer edge of each side of door leaf covering no less than 80 percent of leaf.

a. Design: Provide safety edges to provide a minimum of 3 1/2 inches of overtravel after actuation until solid resistance is met and door motion comes to a complete stop. If door requires more than 3 1/2 inches to come to a complete stop, provide additional overtravel built into safety edge the distance required for door motion to come to a complete stop. Use electric safety edges.

b. Specs: Use sensing edges of reinforced polyvinyl chloride cover or other Government-approved material with chemical resistance to diesel and JP-4 fuel, hydraulic fluids, SAE-30 oil and salt water. Use cover that provides hermetic seal for weather and moisture resistant protection of internal foam and contact elements. Internal foam may be polyurethane and/or latex foam per military specification MIL-R-5001, medium density. Use two contact elements separated by perforated foam or other Government -approved materials and design to perform the switching function when the sensing edge encounters an obstruction along any portion of its active length.

c. Operation: Actuation of the safety edge on leading edge of a group of leaves shall stop movement of the group. Actuation of a safety edge shall lock out the motor control in the direction of travel until reset, but shall permit the door to be reversed away from the obstruction which tripped the safety edge. Safety edges shall be alive only when doors are moving. Safety edges shall be reset by moving doors away from the obstruction. The lower portion of the safety edges to a height of approximately 5 feet shall be independently removable for convenience in servicing or repair. The remainder of the edge may be in one piece up to a maximum of 20 feet.

d. Bumper(s): Each door leaf edge provided with a safety edge shall be protected by a spring type bumper(s). Bumper shall be designed to absorb 150 percent of the door drive force when door is pushed in an emergency. For continuous safety edges, bumpers shall extend to the sides. For sectional safety edges, the bumper can interrupt the

safety edge for a distance not greater than 12 inches.

e. Keyed bypass: Provide a keyed bypass to the door controls to render the safety edges in a temporary "repair" mode, if necessary. The door drive shall be restored from its "fail safe" mode by activation of the keyed bypass.

2.3.6.1 Electrical Safety Edges

Connect the safety edge in series with the necessary relays and resistors to make the system complete. The service shall be not more than 24 volts and the circuit shall be normally energized so that the malfunction of any of the component parts will make the door inoperative. Wire sensing edges to provide for control reliable 4-wire operation of hangar door so that any power loss to the sensing edges is experienced, then the door becomes inoperable until power is restored and a reset operation is initiated. Install sensing edges to operate through a normally energized relay so that when the sensing edge is compressed the relay contacts open. Install relay contacts to also open if any component in the sensing edge control circuit is broken so as to break continuity. Use 100 volts electrical service to the control circuit. Ensure service to the sensing edge does not exceed a nominal 24 volts. Install a large red indicator light and/or a loud siren, to be simultaneously activated with the actuation of any sensing edge, to indicate the presence of an obstruction.

2.3.7 Warning Device

Provide a clearly audible signal on each individually operated leaf. The warning device shall:

a. Operate when the push button is actuated for movement of the door in either direction;

b. Sound 5 seconds before the door moves, and while the door is moving; and

c. Consist of not less than a 6 inch diameter bell or equivalent decibel-rated horn, loud enough to be heard in the hangar and on the apron.

2.3.8 Emergency Operation

Doors shall be constructed and equipped so that they can be operated-manually or by cranes and/or lifts in case of power failure. Manual operation of doors shall be designed to avoid damage to safety edges.

2.3.9 Electrical Work

The door manufacturer shall provide the proper electrical equipment and controls built in accordance with the latest NEMA standards. Equipment, Manual or automatic control devices necessary for motor operation of the doors shall be provided, including push button stations, limit switches, combination fused disconnect switches and magnetic reversing starters, control circuit transformers, relays, timing devices, warning devices, and trolley ducts with collectors or trolleys.

2.3.9.1 Trolley Ducts

Provide one or more runs of trolley duct as required for the door system provided. Ducts shall have solid copper conductors in a protective steel housing. Locate ducts as shown on door manufacturer's drawings. Provide adequate clearances in the top guide system for the ducts.

a. Each run shall consist of the required number of sections of straight track, a section of dropout track, feed boxes, end caps, couplings, hangers, and other accessories to make the system complete and workable. Provide expansion tracks in each run where the system crosses a building expansion joint in the roof construction and in the top guides.

b. Furnish one track-supported tandem trolley or self-supporting collector for each individually motor-operated door, complete with spring-loaded brush contacts. Provide trolley pulling brackets and corrosion-protected chains attached from each side of the pulling bracket to each side of the tandem trolley or support bracket for self-supporting collectors.

2.3.9.2 Electrical Cables

Flexible cables or cable reels shall be provided under Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, in accordance with the door manufacturer's approved drawings and wiring diagrams.

PART 3 EXECUTION

3.1 PROTECTIVE COATINGS

3.1.1 Cleaning

After fabrication, clean metal surfaces in accordance with SSPC SP 6/NACE No.3 (Commercial Blast).

3.1.2 Shop Painting

After cleaning, coat steel surfaces other than machine-finished parts with priming paint. Keep paint off of finished bearing surfaces. Before assembly, prime surfaces that will be inaccessible after assembly. Handle painted materials with care to avoid scraping or breaking the protective film. Make match-marks on painted surfaces only.

3.2 ERECTION

Assemble doors and accessories in accordance with approved shop drawings. Do not erect doors until the work of other trades in preparing the opening has been completed, the hangar roof is under full dead load, and the top guide and rail systems are within specified tolerances. After completing erection and before starting field painting, clean interior and exterior door surfaces. Clean abraded surfaces, field welds, and field bolts; and coat with priming paint. Field painting as specified in Section 09 9 7 13.26 COATINGS OF STEEL WATERFRONT STRUCTURES.

3.3 FIELD QUALITY CONTROL

3.3.1 Manufacturer's Field Services

Provide an authorized representative of the door manufacturer to supervise erection of doors.

3.3.2 Tests

Immediately after the door installation is complete, the door manufacturer or his representative shall perform a complete operating test in the presence of the Contracting Officer. Correct defects disclosed by the test. Retest the doors and adjust them until the entire installation is fully operational and acceptable to the Contracting Officer.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - OPENINGS

SECTION 08 34 16.20

VERTICAL LIFT FABRIC DOORS

05/14

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DESIGN REQUIREMENTS
1.3.1 Door Design and Components
1.3.1.1 Steel Door Components
1.3.1.2 Aluminum Door Components
1.3.2 Loads
1.3.2.1 Wind Loads
1.3.2.2 Other Loads
1.3.3 Door Speed
1.3.4 Door Weight
1.4 QUALITY ASSURANCE
1.4.1 Manufacturer's Qualifications
1.4.2 Installer's Qualifications
1.4.3 Warranty
1.4.3.1 Maintenance and Repair Action Plan
1.4.4 Delivery, Storage and Handling
1.5 WELDING PROCEDURES AND QUALIFICATIONS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Steel Plate and Bars
2.1.2 Steel Sheet
2.1.3 Steel Shapes
2.1.4 Aluminum Extrusions
2.1.5 Aluminum Sheets and Strips
2.1.6 Aluminum Welding Rods and Bare Electrodes
2.1.7 Door Fabric
2.1.8 Steel Cable and Wire Rope
2.2 DOORS
2.2.1 Fabric Door Panels
2.2.2 Door Beams
2.2.3 Door Guides
2.3 ELECTRIC OPERATORS
2.3.1 Drive Units
2.3.2 Belt/Cable System
2.3.3 Safety Arresters
2.3.4 Slack Belt/Cable Breaker
2.3.5 Motors
2.3.6 Controls
2.3.6.1 Control Panel Enclosures
2.3.7 Limit Switches
2.3.8 Door Control Alarms

2.3.9 Control Transformers
2.3.10 Electrical Components
2.4 HEADER BOX
2.5 BOTTOM BEAM
2.6 WIND LOCK
2.7 OPERATION
2.7.1 Door Operation
2.7.2 Electrical Operation
2.8 FINISHES
2.8.1 Ferrous Metal
2.8.2 Aluminum
2.9 SIGNAGE

PART 3 EXECUTION

3.1 PROTECTIVE COATINGS
3.1.1 Cleaning
3.1.2 Shop Painting
3.1.3 Metal Protection
3.2 ERECTION
3.2.1 Assembly
3.2.2 Cleaning
3.2.3 Control Panel Installation
3.3 ACCEPTANCE TESTING PROCEDURE AND REPORT
3.3.1 General
3.3.2 Safety Arresters
3.3.3 Personnel Training
3.4 EXTRA MATERIALS
3.5 ELECTRICAL WORK

-- End of Section Table of Contents --

SECTION 08 34 16.20

VERTICAL LIFT FABRIC DOORS
05/14

PART 1 GENERAL

1.1 REFERENCES

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

ALUMINUM ASSOCIATION (AA)

AA ADM	(2010) Aluminum Design Manual
AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611	(1998; R 2004) Voluntary Specification for Anodized Architectural Aluminum

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325	(2011) Steel Construction Manual
AISC 360	(2010) Specification for Structural Steel Buildings

AMERICAN WELDING SOCIETY (AWS)

AWS A5.10/A5.10M	(2012) Welding Consumables - Wire Electrodes, Wires and Rods for Welding of Aluminum and Aluminum-Alloys - Classification
AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel
AWS D1.2/D1.2M	(2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A1023/A1023M	(2009; E 2012) Standard Specification for Stranded Carbon Steel Wire Ropes for General Purposes
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A992/A992M	(2011) Standard Specification for Structural Steel Shapes
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM D2136	(2002; R 2012) Coated Fabrics - Low-Temperature Bend Test
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 60034-1	(2010) Rotating Electrical Machines – Part 1: Rating and Performance
IEC 60034-14	(2007) Rotating Electrical Machines – Part 14: Mechanical Vibration of Certain Machines with Shaft Heights 56 mm and Higher – Measurement, Evaluation and Limits of Vibration Severity
IEC 60034-5	(2006) Rotating Electrical Machines – Part 5: Degrees of Protection Provided by the Integral Design of Rotating Electrical Machines (IP Code) – Classification
IEC 60034-6	(1991) Rotating Electrical Machines Part 6: Methods of Cooling (IC Code)

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500	(2006) Metal Finishes Manual

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA AB 1	(2002) Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 5	(2000; R 2010) Control Circuit and Pilot Devices
NEMA ICS 6	(1993; R 2011) Enclosures

NEMA KS 1	(2013) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA MG 1	(2011; Errata 2012) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 220	(2015) Standard on Types of Building Construction
NFPA 409	(2011; Errata 11-1) Standard on Aircraft Hangars
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NFPA 79	(2015) Electrical Standard for Industrial Machinery

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 1-200-01	(2013) General Building Requirements
UFC 3-301-01	(2013) Structural Engineering

UNDERWRITERS LABORATORIES (UL)

UL 1449	(2014) Surge Protective Devices
UL 248-1	(2011) Low Voltage Fuses - Part 1: General Requirements
UL 248-12	(2011) Low Voltage Fuses - Part 12: Class R Fuses
UL 489	(2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 508	(1999; Reprint Oct 2013) Industrial Control Equipment
UL 98	(2004; Reprint Oct 2014) Enclosed and Dead-Front Switches

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00.

SD-01 Preconstruction Submittals

Manufacturer's Qualifications; G

Installer's Qualifications; G

SD-02 Shop Drawings specific to this project, sealed by the Door Manufacturer's Registered Professional Engineer

Shop drawings of motors, all electrical control devices, and all electrical control panels, including schematic diagrams, dimensional drawings of control panels, details of control panel installations, internal wiring diagrams of control panels, and wiring diagrams indicating all external connections between control panels and from control panels to remote control devices. Furnish list of materials for all control devices, both inside and remote from control panels including manufacturer's model number, electrical ratings, location, and quantity of each item furnished.

Door Design; G, AE

Show all vertical lift fabric doors and components, including types, sizes, locations, fabric, supporting, bracing and framing steel and aluminum members, metal gages, fasteners, speed, hardware provisions, signage, installation details, and other details of construction. Include supporting brackets for motors, location of motors, and safety devices. Include personnel door, mullion pit and cover or retractable pin and strike if utilized. Provide details for the closure between bulkhead and doors. Include details for supporting and bracing the door assembly from the structure. Indicate finishes to be used.

SD-03 Product Data

Diagrams, performance curves and characteristic curves of equipment and systems.

Electric Operator; G, AE

Drive unit system horsepowers, belt type, and locations. Safety arrestor type, test reports, and brake system details.

Motors; G, AE

Motor characteristics including horsepower, service factor, safety factor and standards compliance.

Doors; G, AE

Controls; G,AE

Controls characteristics including all electrical components and devices used in the control system, enclosures, safety devices, transformer size and voltage, and emergency power connection.

Door Fabric; G, AE

Submit fabric panel samples for weight, strength and color approval.

Surge Protection Device (SPD) data for each incoming/outgoing

power feeder and each control circuit; G, AE

SD-05 Design Data

Calculations sealed by the Door Manufacturer's Registered Professional Engineer; G, AE

Door Load Diagrams (Open/Closed positions); G, AE

SD-06 Test Reports

Safety Arrester Operation Test; G

Door Fabric: ASTM D2136; G

Door Fabric: ASTM E84; G

SD-07 Certificates

Manufacturer's Qualifications; G

Installers Qualifications; G

Welding Procedures and Qualifications; G

SD-09 Manufacturer's Field Reports

Acceptance Testing Procedure and Report; G

SD-10 Operation and Maintenance Data

Door Operation, Data Package 2; G

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Including wiring diagrams and the complete manufacturer's instructions for operation and maintenance of the doors, door mullions where indicated, and accessories, including emergency operation, in the event of general building power failure to the doors.

Emergency and Routine Preventative Maintenance Plan; G

SD-11 Closeout Submittals

Acceptance Testing Procedure and Report; G

Manufacturer's Warranty; G

1.3 DESIGN REQUIREMENTS

1.3.1 Door Design and Components

The vertical lift fabric doors and components indicated in the construction documents are representative of a commercially-available door. Design and fabricate the door to fit within the space allocated and in accordance with the criteria specified herein. Door must operate properly without binding, interference, or damage to the adjacent structure. Door must be of limited combustible construction in accordance with NFPA 220 and NFPA 409.

1.3.1.1 Steel Door Components

All supporting, bracing and framing steel members must be designed by the door manufacturer's registered professional engineer for the specified loads according to the requirements of AISC 325 and AISC 360. Steel welding must be in accordance with the AWS D1.1/D1.1M Standards. Refer to Section 05 12 00 STRUCTURAL STEEL for requirements.

1.3.1.2 Aluminum Door Components

All supporting, bracing and framing aluminum members must be designed by the door manufacturer's registered professional engineer for the specified loads according to the requirements of the Aluminum Association (AA ADM). Aluminum welding must be in accordance with AWS D1.2/D1.2M standards.

1.3.2 Loads

The loads for the design of the door must be in accordance with UFC 1-200-01, UFC 3-301-01 and all other applicable criteria.

1.3.2.1 Wind Loads

In the closed position, doors and all components must be designed to withstand the wind pressures as indicated by the Engineer of Record. All door components must be designed to withstand both the highest positive and negative pressures based on actual tributary area from the wind load indicated.

In addition, doors and all components must be designed to be operational during wind events which cause a positive or negative service load pressure of 15 psf on the surface of the door. Also the jambs must be designed for an unbalanced positive or negative service load pressure of 15 psf load on the surface of a closed adjacent door with the other adjacent door being open.

Calculations sealed by the door manufacturer's registered professional engineer must be submitted for review.

1.3.2.2 Other Loads

The door mullions where indicated must be of adequate strength to transmit the forces from design wind load, in addition to the other loads resulting from door operations or the door's action as a tributary element, with no detrimental effect on the operation of the door. The door manufacturer must submit the loads imposed upon the building structure by the vertical lift fabric door and its components.

1.3.3 Door Speed

Door must open fully at a speed of 6 inches per second minimum under all design conditions. The door mullion when required must rotate with a cable retraction speed of 6 inches per second minimum.

1.3.4 Door Weight

The door manufacturer must provide load diagrams of the door in the closed and open positions. Details must also be provided showing clearance and attachment requirements for coordination with the structural steel and

miscellaneous steel shop drawings.

1.4 QUALITY ASSURANCE

1.4.1 Manufacturer's Qualifications

Use a vertical lift fabric door product from a manufacturer who is regularly engaged in the design, fabrication, erection, and service of vertical lift fabric doors of type and size required for this project. The manufacturer must have at least 5 years of similar vertical lift fabric door design experience. Similar doors must have comparable function and design including size, configuration, type of use, retractable or moving elements, safety features, controls, and other key engineering elements as the door being specified. It is acceptable to show that a series of similar doors collectively meet all comparable elements to the door being specified, although not necessarily individually. Manufacturer must submit written evidence on similar past door designs and installations listing the name, location, contact information of owners, installation dates, overall sizes, features, and other relevant information for experience and qualifications evaluation. Only manufacturers who can submit this evidence of actual installations where the products have proven practical, durable, and require a minimum of maintenance, will be qualified under this specification.

1.4.2 Installer's Qualifications

Installation of the door(s) must be supervised by a manufacturer's representative and must be in accordance with approved shop drawings. Installers must be skilled and experienced in the erection of vertical lift fabric doors of the type specified herein. Installers must submit written evidence of similar past door installations listing the name, locations, contacts information of owners, installation dates, overall sizes, features, and other relevant information for experience and qualifications evaluation.

1.4.3 Warranty

The door manufacturer must provide a three-year warranty for all mechanical and electrical components against defects in material and workmanship beginning on the date of Project Acceptance. The warranty for fabric must be ten years against defect in material.

1.4.3.1 Maintenance and Repair Action Plan

The door manufacturer must provide an Emergency and Routine Preventative Maintenance Plan. In addition to Data Package SD-10 "Operation and Maintenance Data", provide a list of phone numbers and personnel contacts. Also provide a list of suggested spare parts materials and tools to be purchased by the Contracting Officer. Submit vertical lift fabric door manuals in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.4.4 Delivery, Storage and Handling

The door manufacturer must provide shipment of all materials required for door installation in protective packaging. Protect door and accessories from damage during delivery, storage, and handling. Mark all packaging clearly with manufacturer's brand name, door model and job site location. Store in dry location with adequate ventilation, and free from dust and

water. Storage must permit easy access for inspection and handling. Remove damaged items that cannot be restored to like new condition or provide new items.

1.5 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.

Comply with applicable provisions of AWS D1.1/D1.1M for Steel.

Comply with applicable provisions of AWS D1.2/D1.2M for Aluminum.

PART 2 PRODUCTS

2.1 MATERIALS

Materials must be selected based on durability, low maintenance, weather resistance and strength (permanent deformation from loading not allowed). Doors must comply with ASTM E84 for limited combustible construction.

2.1.1 Steel Plate and Bars

ASTM A36/A36M

2.1.2 Steel Sheet

ASTM A653/A653M

2.1.3 Steel Shapes

ASTM A992/A992M

2.1.4 Aluminum Extrusions

ASTM B221, Alloy 6063-T6, Alloy 6005-T5 or 6000 Series Aluminum

2.1.5 Aluminum Sheets and Strips

ASTM B209, alloy and temper best suited for the purpose.

2.1.6 Aluminum Welding Rods and Bare Electrodes

AWS A5.10/A5.10M.

2.1.7 Door Fabric

The fabric material must be a one piece heavy-duty vinyl coated polyester fabric weighing not less than 19 oz/square yard, capable of carrying 250 lb/in per panel. Fabric must be impervious and resistant to solvents, fuel, lubricants and other similar fluids commonly found in aircraft maintenance hangars. It must be UV stabilized, self-extinguishing (0-75 flame spread), and suitable to withstand temperatures between plus 158 to minus 31 degrees F in compliance with ASTM D2136. Fabric color must be as selected by the Government from the manufacturer's standard colors. The door fabric must be pulled tight between the intermediate beams when the door is fully closed and the wind locks engaged. The fabric must have

been tested to meet the criteria of ASTM E84-94 (flame spread - Class A interior wall and ceiling finish) and ASTM D2136 (cold cracking, brittleness and temperature).

2.1.8 Steel Cable and Wire Rope

ASTM A1023/A1023M.

2.2 DOORS

Doors must consist of hoist up fabric doors with intermediate aluminum beams or trusses. Fabric must be gathered above the head of the opening. Maximum wind load deflection of steel structural members of the door must not exceed the member length divided by 120. Maximum wind load deflection of extruded aluminum members of the door must not exceed the member length divided by 30.

2.2.1 Fabric Door Panels

The fabric must be attached to both sides of the intermediate beams, top beam, and bottom beam with self-tapping screws through corrosion resistant anodized or coated aluminum batten strips.

2.2.2 Door Beams

The intermediate beams must be corrosion resistant, extruded aluminum and have a suitable depth dependent on the door width and the wind load requirements. They must be spaced 35 to 75 inches apart, dependent upon the wind load. At each end of the beams there must be a guide block of self-lubricating material or rollers that run along the guides. Built-up members meeting these requirements are acceptable. The intermediate door beams and guide block or rollers must be designed to carry the full design wind load without failure and being pulled from the door guides. The guide block or roller design must not put the intermediate beam into tension which would cause pulling forces on door jambs. Guide block material must be nylon, polyoxymethylene (POM), or Ultra High Molecular Weight (UHMW) polyethylene. Rollers must be galvanized steel with maintenance free, lifetime sealed ball-bearings in case-hardened steel races.

2.2.3 Door Guides

The vertical guides must be an integral part of the door, made of extruded aluminum with a suitable depth and width dependent on the size of the intermediate beams and wind load requirements. The guides must be designed to provide weather sealing on the inside and outside faces. There must also be a space inside the guides for the nylon belt, polyester belt, or steel cable of the drive unit and safety arresters. The installer must provide jamb anchorage of size and type required for attachment of the guide rails as shown on the approved shop drawings. The jamb anchorage and door guides must be designed to carry the full design wind load without failure and without permanent deformation.

2.3 ELECTRIC OPERATORS

2.3.1 Drive Units

Each door leaf must have a single or dual motor drive system with horsepower sized as appropriate for the weight of the door leaf. The gear

motor must be equipped with a drum on which the nylon belt, polyester belt, or steel cables are wound. If a single motor drive is used, the belts and cables must be wound on the same drum. Cables must be wound on a grooved drum. The belts and cables must be attached to the bottom beam via the safety arresters. A hand crank device or other manual means must be provided on the motor for manual operation of the door in the event of a power failure. The gear motor must be removable without disturbing limit switch adjustment. The drive units will be coordinated with the location of aircraft such that the drive units are accessible while aircraft are in the hangar.

2.3.2 Belt/Cable System

A maximum of two belts/cables per door, running inside the door guides, must be used to transmit motive force to the door unit. Similarly, the quantity of sheaves used to guide the belts/cables must be minimized to reduce maintenance requirements and spare parts inventories. Belts/cables must be installed free of any kinks and the system design and sheave diameter must be such to prevent the occurrence of any kinks and abnormal stress in the operating belts/cables. Where belts/cables pass through openings of the building structure, the openings must be constructed so as to prevent abrasion, wear, or damage to the belts and cables. Sheave units must be provided in accessible locations that allow inspection and preventive maintenance. Sheaves must not be located in enclosed locations, which are not readily accessible for visual inspection.

2.3.3 Safety Arresters

Each door leaf must be supplied with two safety arresters that automatically activate and support the door in case the door lifting system fails similar to a belt or cable breaking. A "Safety Arrestor Operation Test" must be performed on each set of safety arresters by an independent testing source to withstand at least 110 percent of the maximum door leaf weight.

The "Safety Arrestor Operation Test" must be deemed successful when it contains at least the minimum following criteria:

a. Test door weight must be at least 110 percent of the specific project's door weight.

b. Test must simulate the door lifting system abruptly disengaging similar to a belt or cable breaking.

c. The Safety Arresters must automatically engage.

d. The test door weight must be brought to rest after an initial downward movement (or drop) of not more than 12 inches and held firmly in this position.

e. Damage from activation of the Safety Arrestors must be limited to localized replaceable components and not cause a system failure which would require repair or replacement of the entire VLFD or the structural door jambs.

f. Independent testing source must submit documentation of successful " Safety Arrester Operation Test".

2.3.4 Slack Belt/Cable Breaker

A safety device must be used on all door leaf belts/cables that will send a slack belt/cable condition and cut power to the appropriate drive unit to prevent an unsafe condition.

2.3.5 Motors

NEMA MG 1 or IEC 60034-1, IEC 60034-5, IEC 60034-6, IEC 60034-14, high-starting torque, reversible type with sufficient horsepower and torque output to move the door in either direction from any position. Motor must produce a door travel speed of not less than 6 inches per second without exceeding the rated capacity. Motors must operate on voltage of the characteristics indicated at not more than 1800 rpm. Motor enclosures must be drip-proof type or NEMA totally-enclosed, fan-cooled (TEFC) type. A hand crank must be supplied which fits the motor for manual operation of the door in the event of a power failure. Install motors in approved locations. Motors must have a minimum service factor of 1.2 at continuous duty under maximum full load. The design of the door motor and door drive gear box must each have a safety factor of 2.5. Motors must be provided in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and requirement listed above.

2.3.6 Controls

Control equipment must conform to NEMA ICS 2 or IEC. Control enclosures must be NEMA ICS 6, Type 12 or Type 4X. The door electrical controls must comply with NEMA AB 1, NEMA ICS 2, NEMA ICS 5, and NEMA KS 1. The door electrical controls must comply with NEMA ICS 1, NEMA ICS 6, NFPA 70, NFPA 79, UL 98, UL 248-1, UL 248-12, UL 489, UL 508, and UL 1449. The door control components must all be UL listed.

Each Door Module must be provided with the following operators:

Master Control Panel (NEMA Type 12 enclosure)

a. Remote Push Button Station - at opposite end of hangar door.

b. Emergency Stop Buttons located outside at the end of each hangar bay.

c. "Open" operator located on the exterior of each bay door keyed for use by Fire Department personnel to allow entry in the event of an emergency.

The door supplier must provide all conduit and control wiring between master, slave, emergency stop controls, proximity switches, limit switches, and each door motor drive unit. Power and controls wiring and conduit must be provided in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.3.6.1 Control Panel Enclosures

Control panel enclosures must be NEMA ICS 6, Type 12. Each control panel must have an integral main power disconnect switch that is mechanically interlocked with the control panel door. Provide factory wired field wiring terminal strip in each control panel and instantaneous three-phase thermal overload relays. Provide each control panel enclosure including an internal motor starter or VFD with adequate integral ventilation (air conditioning if required) for operation in a 120 degree F ambient

environment. Provide NEMA rated control relays. Provide main control panel with relay logic.

Provide a three phase UL 1449 listed surge protection device (SPD) for the incoming power to each door control panel. Provide a UL 1449 listed surge suppression device (SPD) for each control circuit (limit switch, proximity switch, motor, brake, solenoid, indicating light, and pushbutton) that is routed external from each door main control panel.

The control panel must contain devices to control the logic and sequence of door to ensure safe operation. The control panel must also contain interlocks to preclude personnel injury, including an interlock between the power supply system and use of the hand crank for manual operation of the door. Constant-pressure type, fully guarded, illuminated push buttons must be provided on the control panel for both up and down operations. Mushroom type emergency stop button must be provided on each control panel.

2.3.7 Limit Switches

Provide limit switches or proximity switches to automatically stop doors at the fully open and fully closed positions. Limit switches or proximity switch positions must be readily adjustable. Limit switches or proximity switches for the wind lock must be provided with indicator lights installed on the control panel for each door leaf. The indicator must notify the door operator that the wind locks are engaged for all door leaves.

The door installer must demonstrate the operability of all limit switches prior to Government occupancy.

2.3.8 Door Control Alarms

Provide an audible alarm device on each door main control panel (minimum 100 dbA) that sounds 10 seconds before the door moves and continues to sound when the door is moving. Coordinate this audible signal such that it is clearly different from all of the other audible signals utilized in the hangar bay.

Provide a visual alarm device above each door main control panel (rotating beacon with 100 watt halogen lamp) that operates 10 seconds before the door moves and continues to operate when the door is moving. Coordinate the color of this visual signal such that it is clearly a different color than all of the other visual signals utilized in the hangar bay.

2.3.9 Control Transformers

Provide fused transformers inside of each Master Control Panel as necessary to reduce the voltage on the control circuits to 120 volts or less.

2.3.10 Electrical Components

NFPA 70. The door manufacturer must provide automatic control and safety devices. Cable reel type take-up devices must not be allowed. Control wiring must be in accordance with NFPA 70. The door supplier must provide conduit, wiring, and mounting of controls in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.4 HEADER BOX

Header boxes must be constructed of carbon steel and finished per the Section entitled, "Finishes".

2.5 BOTTOM BEAM

The bottom beam must be constructed of carbon steel and finished per the Section entitled, "Finishes". The bottom beam must be provided with a suitable width and depth to carry the load of the intermediate beams when the door is open, and to ensure full closing and a tight floor seal in heavy winds. A heavy-duty bottom rubber seal must be provided to form a tight seal with the floor.

2.6 WIND LOCK

Each door leaf must have wind locks at each jamb, which activate and lock the bottom beam into place when the door reaches its closed position. This locking action must act to maintain a tight floor seal and intermediate beam stability under design wind conditions. A limit switch or a proximity switch, with indicator must be provided to notify the door operator that all wind locks are engaged properly. Switches located below 18 inches AFF must be compliant with NFPA 70, Class I, Division 2 hazardous environment.

2.7 OPERATION

2.7.1 Door Operation

The vertical lift fabric door must guide up and down in the weather sealed vertical guides attached to the structure. The door must operate by lifting the bottom beam upwards, thereby stacking the intermediate beams one on top of the other, with the fabric panel folding in pleats. The fabric panel must go over the top beam, covering both sides of the door, and must be attached to the intermediate beams by screws and batten strips. When the door is fully closed, the intermediate beams must hang between the two fabric door panels thus pulling the fabric tight. The tension created in the fabric panels must stabilize the intermediate beams. The safety arresters must be attached to each end of the bottom beam and must travel in the vertical guide tracks. The safety arresters must immediately stop the downward movement of the door in case of belt/cable failure.

2.7.2 Electrical Operation

Provide the main control panel with control logic such that the control panel will automatically limit only one door lift motor.

When the door is completely opened it must stop on the primary top limit switch. In case of over travel, a secondary limit switch must stop the door to prevent damage. The drive unit must be stopped by the slack belt/cable breakers when the door is closed. The slack breakers must also stop the door in case of belt/cable rupture or if an obstruction should prevent the door from being closed. Weight or springs must activate the slack breakers. The control panel station(s) must be of the illuminated pushbutton type.

Door operation must be controlled by three buttons marked "OPEN", "CLOSE", and "STOP". The "OPEN" and "STOP" buttons must require only momentary

pressure to operate. The "CLOSE" button must require constant pressure to maintain the closing motion of the door. When the door is in motion and the "STOP" button is pressed or the "CLOSE" button is released, the door must stop instantly and remain in the stop position; from the stop position, the door must be operated in either direction by the "OPEN" or "CLOSE" buttons. Removing the pressure from the "CLOSE" button must stop the motor drive and set the brake.

Pushbuttons must be illuminated by LEDs and utilize simple flashing/solid illumination schemes to inform the operator of door status (fully open, closed, in motion, etc.). In lieu of illuminated pushbuttons, a large touchscreen display must be provided to select desired door leaf/mullion to operate and inform user of current door status. Pushbuttons must be full-guarded to prevent accidental operation.

2.8 FINISHES

2.8.1 Ferrous Metal

Ferrous metal surfaces must be cleaned, prepared and shop-finished in accordance with Section 09 97 13.26 EXTERIOR COATING OF WATERFRONT STRUCTURES . Follow coating system manufacturer’s written instructions. All coating of ferrous metal must be shop-finished and the only necessary field painting should be touch-up painting and coating of any unfinished accessories such as bolts and brackets. The following submittals if required by Section 09 97 13.26 are not required for shop-finished vertical lift fabric doors: Work Plans, Coating Inspection Reports, Test Reports, and Qualifications for Certified Industrial Hygienists, Protective Coating Specialists, Blasters, Painters and Inspectors.

2.8.2 Aluminum

Batten strip surfaces must receive a clear anodized finish, AA-M12-C22-A41 per Aluminum Association Designation System, AA DAF45, in accordance with NAAMM AMP 500 complying with AAMA 611.

2.9 SIGNAGE

Provide a placard sign immediately adjacent to the control panel indicating the following:

Notice:

Vertical lift fabric doors must be closed and not operated when wind speeds above 60 mph are expected.

PART 3 EXECUTION

3.1 PROTECTIVE COATINGS

3.1.1 Cleaning

After fabrication, clean all metal surfaces thoroughly of all mill scale, rust, oil, grease and other foreign substances. Apply rust-preventive primer to all steel parts immediately after cleaning.

3.1.2 Shop Painting

After cleaning, coat with primer all steel surfaces other than

machine-finished parts. Keep paint off finished bearing surfaces. Before assembly, prime surfaces that will be inaccessible after assembly. Handle painted materials with care to avoid scraping and breaking the protective film. Ferrous metal surfaces that will be exposed after fabrication must be shop coated and touch-up painted in the field by the vertical lift fabric door installer per the Section entitled, "Finishes".

3.1.3 Metal Protection

Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact masonry or concrete, protect against corrosion by painting contact surfaces with bituminous coating.

3.2 ERECTION

Coordinate the erection of the doors with the work of other trades. Ensure that all steel support, bracing and framing members are furnished and accurately installed for the proper installation of the door hardware.

3.2.1 Assembly

Assemble and install the doors and accessories in accordance with the manufacturer's recommendations and installation manual. Secure guides to the walls plum, level, and in-line. Anchor guides at spacing indicated on the manufacturer's installation drawings. Provide additional supports as necessary for attachment of guides, brackets, doors, and operation mechanisms. After erection is complete and before touch-up field painting is applied, thoroughly clean all abraded surfaces, field welds, and field bolts; coat per the Section entitled, "Finishes".

3.2.2 Cleaning

Clean both the interior and exterior of doors after erection.

3.2.3 Control Panel Installation

Locate each door main control panel indoors, adjacent to the door opening, and with an unobstructed line of sight for the entire door opening. All conduit entries must be into the bottom of the control panel. Contractor must mount master control panel and provide three phase power to the control panel.

3.3 ACCEPTANCE TESTING PROCEDURE AND REPORT

The door manufacturer must submit an Acceptance Testing Procedure for approval. After Government approval, the vertical lift fabric door manufacturer must perform the testing and submit a report of the results. The Acceptance testing must include all testing of the door and components performed by the door manufacturer and suppliers. The Acceptance testing will also include the following subparagraphs.

3.3.1 General

Upon completion of installation, including work by other trades, lubricate, adjust, and test doors to verify operation on accordance with manufacturer's product data. Manufacturer's authorized representative must make final adjustment. Adjust and re-test the doors until the entire

installation is fully operational and acceptable. Acceptance testing must consist of operating each door and mullion (when included) open and closed (one cycle) ten times successfully and consecutively within a nine-hour time interval in accordance with manufacturer's recommended time interval between open/close cycles. Provide Contracting Officer's Representative an acceptance testing report of completed tests.

3.3.2 Safety Arresters

Perform a non-destructive demonstration of the safety arrester function by engaging the installed safety arresters on the guiderails at a height of3 feet above closed position. Demonstration must be performed on all doors installed on Project in the presence of the COR.

3.3.3 Personnel Training

The door manufacturer must provide an 8-hour on-site training session for the door operating personnel and maintenance department. The training must outline door operation, troubleshooting and repair guidelines.

3.4 EXTRA MATERIALS

A door fabric patch kit must be supplied with approximately 45 square feet of fabric for each hangar door and all other materials required for door panel repair. Patch kit fabric color and associated materials must match door fabric color provided.

3.5 ELECTRICAL WORK

NFPA 70. Provide all conduit, wiring, and mounting of controls in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - OPENINGS

SECTION 08 71 00

DOOR HARDWARE

08/08

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 HARDWARE SCHEDULE
1.4 QUALITY ASSURANCE
1.4.1 Hardware Manufacturers and Modifications
1.5 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE
2.2 HARDWARE FOR EXIT DOORS
2.3 HARDWARE ITEMS
2.3.1 Hinges
2.3.2 Exit Devices
2.3.3 Closers
2.3.3.1 Identification Marking
2.3.4 Door Stops and Silencers
2.3.5 Padlocks
2.3.6 Thresholds
2.3.7 Weather Stripping Gasketing
2.3.7.1 Extruded Aluminum Retainers
2.3.7.2 Interlocking Type
2.3.7.3 Spring Tension Type
2.3.8 Air Infiltration Gasketing
2.3.9 Rain Drips
2.3.9.1 Door Rain Drips
2.3.9.2 Overhead Rain Drips
2.3.10 Special Tools
2.4 FASTENERS
2.5 FINISHES

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Weather Stripping Installation
3.1.1.1 Stop-Applied Weather Stripping
3.1.1.2 Interlocking Type Weather Stripping
3.1.1.3 Spring Tension Type Weather Stripping
3.1.2 Threshold Installation
3.2 EXIT DOORS
3.3 HARDWARE LOCATIONS
3.4 FIELD QUALITY CONTROL
3.5 HARDWARE SETS

-- End of Section Table of Contents --

SECTION 08 71 00

DOOR HARDWARE
08/08

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM F883	(2009) Padlocks

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.1	(2006) Butts and Hinges
ANSI/BHMA A156.16	(2008) Auxiliary Hardware
ANSI/BHMA A156.18	(2012) Materials and Finishes
ANSI/BHMA A156.21	(2009) Thresholds
ANSI/BHMA A156.3	(2008) Exit Devices
ANSI/BHMA A156.4	(2008) Door Controls - Closers
ANSI/BHMA A156.7	(2003; R 2009) Template Hinge Dimensions
BHMA A156.22	(2012) Door Gasketing and Edge Seal Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2015) Life Safety Code
NFPA 80	(2013) Standard for Fire Doors and Other Opening Protectives

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8	(2003; R2008) Recommended Specifications for Standard Steel Doors and Frames

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Hardware schedule; G,AE

SD-03 Product Data

Hardware items; G, AE

SD-08 Manufacturer's Instructions

Installation; G

SD-10 Operation and Maintenance Data

Hardware Schedule items, Data Package 1; G

Submit data package in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publi-cation Type No.	Finish	Mfr Name and Catalog No.	Key Control Symbols	UL Mark (If fire rated and listed)	BHMA Finish Desig-nation

1.4 QUALITY ASSURANCE

1.4.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Provide hardware to be applied to metal or to prefinished doors manufactured to template. Promptly furnish template information or templates to door and frame manufacturers. Conform to ANSI/BHMA A156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements indicated, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." P

2.3 HARDWARE ITEMS

Clearly and permanently mark with the manufacturer's name or trademark, hinges, pivots, locks, latches, exit devices, bolts and closers where the identifying mark will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

ANSI/BHMA A156.1, 4-1/2 by 4-1/2 inch unless otherwise indicated. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

2.3.2 Exit Devices

ANSI/BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide touch bars in lieu of conventional crossbars and arms. Provide escutcheons, not less than 7 by 2-1/4 inch.

2.3.3 Closers

ANSI/BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Closers to have hold-open device. Closers to be "coastal rated". Provide manufacturer's 10 year warranty.

2.3.3.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.3.4 Door Stops and Silencers

ANSI/BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair. Closers shall have a hold open device and shall be coastal rated.

2.3.5 Padlocks

ASTM F883.

2.3.6 Thresholds

ANSI/BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.3.7 Weather Stripping Gasketing

BHMA A156.22. Provide the type and function designation where specified in paragraph entitled "Hardware Schedule". Provide a set to include head and jamb seals, sweep strips,. Air leakage of weather stripped doors not to exceed 0.5 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E283. Refer to drawings for door threshold height. Provide weather stripping with one of the following:

2.3.7.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide anodized aluminum.

2.3.7.2 Interlocking Type

Zinc or bronze not less than 0.018 inch thick.

2.3.7.3 Spring Tension Type

Spring bronze or stainless steel not less than 0.008 inch thick.

2.3.8 Air Infiltration Gasketing

BHMA A156.22. Include adjustable doorstops at head and jambs and an automatic door bottom per set, both of extruded aluminum, bronze anodized, surface applied, with vinyl fin seals between plunger and housing. Provide doorstops with solid neoprene tube, silicone rubber, or closed-cell sponge gasket. Furnish door bottoms with adjustable operating rod and silicone rubber or closed-cell sponge neoprene gasket. Doorstops mitered at corners. Provide the type and function designation where specified in paragraph entitled "Hardware Sets".

2.3.9 Rain Drips

Extruded aluminum, not less than 0.08 inch thick, bronzeanodized. Set drips in sealant and fasten with stainless steel screws.

2.3.9.1 Door Rain Drips

Approximately 1-1/2 inch high by 5/8 inch projection. Align bottom with bottom edge of door.

2.3.9.2 Overhead Rain Drips

Approximately 1-1/2 inch high by 2-1/2 inch projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

2.3.10 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Provide stainless steel or nonferrous metal fasteners that are exposed to weather. Provide fasteners of type necessary to accomplish a

permanent installation.

2.5 FINISHES

ANSI/BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except aluminum paint finish for surface door closers, and except BHMA 652 finish (satin chromium plated) for steel hinges. Provide hinges for exterior doors in stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Furnish exit devices in BHMA 626 finish in lieu of BHMA 630 finish . Match exposed parts of concealed closers to lock and door trim.

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping to prevent damage. Provide full contact, weather-tight seals. Operate doors without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 9 inch on center after doors and frames have been finish painted.

3.1.1.2 Interlocking Type Weather Stripping

Provide interlocking, self-adjusting type on heads and jambs and flexible hook type at sills. Nail weather stripping to door 1 inch on center and to heads and jambs at 4 inch on center

3.1.1.3 Spring Tension Type Weather Stripping

Provide spring tension type on heads and jambs. Provide bronze nails with bronze, stainless steel nails with stainless steel. Space nails not more than 1-1/2 inch on center.

3.1.2 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves.

3.2 EXIT DOORS

Install hardware in accordance with NFPA 101 for exit doors

3.3 HARDWARE LOCATIONS

SDI/DOOR A250.8, unless indicated or specified otherwise.

a. Kick and Armor Plates: Push side of single-acting doors.

3.4 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.5 HARDWARE SETS

Hardware Set #1 - Doors 101A, 101B,303A, 303B, 501
- 3 - Hinges - non-removable pins
- 1 - Exit Device
- 1 - Door Switch Depressor on exterior - not locked
- 1 - Closer
- 1 - Threshold
- 1 - Set of Weatherstriping
- 1 - Set of door silences
- 2 - Kickplates

Hardware Set #2 - Overhead Coiling Doors
- 1 - Padlock

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09 97 13.26

COATING OF STEEL WATERFRONT STRUCTURES

04/06

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 ENVIRONMENTAL CONDITIONS
1.4 SAFETY AND HEALTH PRECAUTIONS

PART 2 PRODUCTS

2.1 COATING SYSTEMS
2.1.1 Coating
2.1.1.1 Epoxy-Polyamide

PART 3 EXECUTION

3.1 CLEANING AND PREPARATION OF SURFACES
3.1.1 Solvent Cleaning
3.1.2 Blast Cleaning
3.2 PROPORTIONING AND MIXING OF COATING SYSTEM
3.2.1 Proportioning of Epoxy-Polyamide System
3.2.2 Mixing of Epoxy-Polyamide System
3.3 COATING APPLICATION
3.3.1 General
3.3.1.1 Application Method for Epoxy-Polyamide System
3.3.2 Repair of Defects
3.3.3 Three-Coat Epoxy-Polyamide System
3.3.4 Dry Film Thickness
3.4 SURFACES TO BE COATED
3.4.1 Steel Waterfront Construction
3.5 FIELD TESTS
3.5.1 Holiday Testing
3.5.2 Dry Film Thickness

-- End of Section Table of Contents --

SECTION 09 97 13.26

COATING OF STEEL WATERFRONT STRUCTURES
04/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D7091	(2013) Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nondestructive Coatings Applied to Non-Ferrous Metals
ASTM E376	(2011) Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 1	(1982; E 2004) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2007) Near-White Blast Cleaning

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Epoxy-polyamide; G, AE

1.3 ENVIRONMENTAL CONDITIONS

Start work only when ambient and curing temperatures are within limits of coating manufacturer's recommendations and at least 5 degrees F above dew point temperature.

1.4 SAFETY AND HEALTH PRECAUTIONS

Materials listed in this section contain coal tar pitch volatiles, which are toxic. Follow safety procedures as recommended by manufacturer. Work in a well ventilated area. Provide, and require workers to use, impervious clothing, gloves, face shields (8 inch minimum), and other appropriate protective clothing necessary to prevent eye and skin contact

with coating materials. Keep coatings away from heat, sparks and flame.

PART 2 PRODUCTS

2.1 COATING SYSTEMS

2.1.1 Coating

Provide catalyst component for coating specific for resin component. Use thinners which are compatible with the coating.

2.1.1.1 Epoxy-Polyamide

Manufacturers name and model number are used for descriptive purposes only and are intended to indicate the standard of material or articles required. Design is predicated around listed manufacturers as noted on schedules and is not intended to limit the contractor to one manufacturer.

i. NFPA Flame Spread: Class A
ii. MIL-DTL-24441 (Type III)
iii. Surface Prep: As specified on drawing A-601

b. Paints: MIL-DTL-24441, (TYPE III) , Primer, Intermediate and Top CoatsMIL-

PART 3 EXECUTION

3.1 CLEANING AND PREPARATION OF SURFACES

3.1.1 Solvent Cleaning

SSPC SP 1. Remove visible oil, grease, and drawing and cutting compounds by solvent cleaning.

3.1.2 Blast Cleaning

SSPC SP 10/NACE No. 2. After solvent cleaning, complete surface preparation by near-white blast cleaning. Remove residual dust from blasted surface by blowing with dry, oil-free air, vacuuming, or sweeping. Provide surface profile of at least 1 1/2 -milthickness.

3.2 PROPORTIONING AND MIXING OF COATING SYSTEM

3.2.1 Proportioning of Epoxy-Polyamide System

Epoxy-polyamide coatings consist of a two-component system that includes a pigmented polyamide resin, Component A and an epoxy resin, Component B. Mix both components in a ratio of 1 to 1 by volume. Do not thin coatings when doing so will result in total volatile organic compounds exceeding limits enacted by local air pollution control district. When thinning is allowed and is necessary, such as during cold temperature application or to improve application characteristics, add up to one pint of ethylene glycol monoethyl (EGM) ether for each gallon of the coating.

3.2.2 Mixing of Epoxy-Polyamide System

Mix components of coating by power stirring until a smooth, uniform consistency results. Stir coating periodically during its induction period. Follow Table 1 for induction time and pot life of mixed batches.

TABLE 1	
JOB SITE AMBIENT TEMPERATURE AND INDUCTION TIME FOR EPOXY-POLYAMIDE SYSTEM	
Ambient Temperature Degrees F	Induction Time (in hours)
40 to 50	2 at 70 degrees F
50 to 60	2
60 to 70	1 to 1-1/2
70 and above	1/2 to 1

3.3 COATING APPLICATION

3.3.1 General

Apply primer coating to dry surfaces not more than 4 hours after near-white blast cleaning. Apply coats of each system so that finished surfaces are free from runs, sags, brush marks and variations in color.

3.3.1.1 Application Method for Epoxy-Polyamide System

Allow previous coat to dry to tack-free condition but not more than 72 hours before applying next coat. If more than 72 hours elapses between coats, clean surface, apply a 2 mil wet film thickness of previous coat, allow to cure to a tacky film, and apply a full thickness of next coat.

3.3.2 Repair of Defects

Repair detected coating holidays, thin areas, and exposed areas damaged prior to or during installation by surface treatment and application of additional coating or by manufacturer's recommendations. Allow a period of at least 72 hours to pass following final coat before placing in immersion service.

3.3.3 Three-Coat Epoxy-Polyamide System

Apply each coat at a dry film thickness of between 3 mils and 4 mils.

3.3.4 Dry Film Thickness

Provide total system minimum dry film thickness of 16 mils. Measure using a magnetic gage.

3.4 SURFACES TO BE COATED

3.4.1 Steel Waterfront Construction

Unless otherwise stated, coat all steel work.

3.5 FIELD TESTS

Conduct testing in presence of Contracting Officer.

3.5.1 Holiday Testing

Prior to installation, test for holidays in total coating system. Use a low-voltage holiday detector of less than 90 volts in accordance with manufacturer's instructions. After repair of holidays by surface treatment and application of additional coating or by manufacturer's recommendation, retest with a low-voltage holiday detector.

3.5.2 Dry Film Thickness

After repair of holidays, measure dry film thickness using a magnetic dry film thickness gage in accordance with ASTM D7091 and ASTM E376. Re-measure after an additional coat is applied, and add it to meet minimum thickness requirements.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13 34 21

TEMPORARY ROLLING ROOF ENCLOSURE

02/10

PART 1 GENERAL

1.1 REFERENCES
1.2 ADMINISTRATIVE REQUIREMENTS
1.3 COORDINATION
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Welder Qualifications
1.5.2 Workmanship
1.5.3 Manufacturer Qualifications
1.5.4 Erector Qualifications
1.6 PREINSTALLATION MEETINGS
1.7 SUBMITTAL INFORMATION
1.8 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MANUFACTURERS
2.2 SYSTEM DESCRIPTION
2.3 PERFORMANCE REQUIREMENTS

PART 3 EXECUTION

3.1 EXAMINATION
3.2 PREPARATION
3.3 ERECTION AND ASSEMBLY OF ROOF SYSTEM
3.4 CLEANING AND PROTECTION
3.5 DEMONSTRATIONS AND TESTING
3.6 CLOSEOUT SUBMITTALS

-- End of Section Table of Contents --

SECTION 13 34 21

TEMPORARY ROLLING ROOF ENCLOSURE
02/10

PART 1 GENERAL

This specification covers the factory fabrication, assembly, testing, and erecting requirements for custom Temporary Rolling Roof Enclosures as indicated on drawings. Design of the temporary rolling roof enclosures shall adhere to United Facilities Criteria (UFC) UFC 3-300-09n and UFC 3-301-01.

1.1 REFERENCES

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

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2010; Errata 2011) Structural Welding Code - Steel

1.2 ADMINISTRATIVE REQUIREMENTS

Submit manufacturer's catalogue cuts and dimensional sheets. Include a description of the item, materials of construction, and dimensions. Provide data sufficient to indicate compliance with specifications. Mark items pertaining to specifications with a heavy black arrow.

1.3 COORDINATION

Coordinate Temporary Rolling Roof system with Scaffolding system.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualification Data; G
Welder Qualifications; G

SD-02 Shop Drawings

Shop Fabrication Drawings; G, AE
Field Erection and Assembly Drawings; G, AE

SD-03 Product Data

Wheel Assembly; G, AE
Fabric Roof Covering; G, AE

SD-06 Test Reports

Material Test Reports; G, AE
Assembly Tests; G
Acceptance Testing; G

SD-07 Certificates

Calculations; G, AE
Lifting and Rigging Plan; G

SD-10 Operation and Maintenance Data

Roof Operating Instructions; G
Maintenance Data of Entire System; G
User and Operation Manual; G

1.5 QUALITY ASSURANCE

1.5.1 Welder Qualifications

Submit certification stating that the welders, welding operators and tack welders who will perform structural steel welding have been qualified for the particular type of work to be done in accordance with the requirements of AWS D1.1/D1.1M, Section 4, prior to commencing fabrication. The certificate shall list the qualified welders by name and shall specify the code and procedures under which qualified and the date of qualification. Prior qualification will be accepted if welders have performed satisfactory work under the code for which qualified within the preceding three months. Require welders to repeat the qualifying tests when their work indicates a reasonable doubt as to proficiency. Those passing the requalification tests will be recertified. Those not passing will be disqualified until passing. All expenses in connection with qualification and requalification shall be borne by the Contractor.

1.5.2 Workmanship

Workmanship shall be of the highest grade and in accordance with the best modern practices to conform with the specifications for the item of work being furnished. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish.

1.5.3 Manufacturer Qualifications

A qualified manufacturer with experience in the manufacturing of temporary rolling roof enclosure systems.

1.5.4 Erector Qualifications

An experienced erector with proof of manufacturers training who specializes in erecting and installing temporary rolling roof enclosure systems.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at the Project Site

1. Review methods and procedures related to temporary rolling roof systems including, but not limited to, the following:

a. Condition of drydock and other preparatory work performed by other trades.
b. Structural load limitations.
c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
d. Required tests, inspections, and certifications.
e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.

1.7 SUBMITTAL INFORMATION

A. Product Data: For the temporary rolling roof system and components.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the entire assembly including structural components, mechanical components and operable components. Submittals shall include but are not limited to:

a. Structural Components
b. Rolling and operable components including wheel assemblies
c. Roof fabric covering and attachment
d. Wheel Assembly
e. Fabric Roof Covering

B. Shop Fabrication Drawings

1. Submit detail drawings for metalwork and machine work prior to fabrication. With the detail drawings submit a materials list for fabricated items. Detail drawings for metalwork and machine work shall include catalog cuts, templates, fabrication and assembly details, and type, grade, and class of material as appropriate. Also include a sketch showing final wheel to axle mounting (i..e., washers, nuts, spacers). Elements of fabricated items inadvertently omitted on contract drawings shall be detailed by the fabricator and indicated on the detail drawings. Drawings shall include all dimensional and tolerance data.

C. Field Erection and Assembly Drawings

1. Show complete erection and assembly drawings clearly illustrating the complete erection method, erection sequencing and procedures.
2. Include written instructions to accompany the erection and assembly drawings. Include recommended safety procedures.
3. Erection and Assembly Drawings shall be signed and sealed by a registered professional structural engineer with experience with temporary rolling roof enclosure design. Clearly illustrate location and requirements of hold downs, ties and guys.

D. Roof Operating Instructions

1. Provide clear instructions of operating the rolling roof including safety procedures.
2. Operable roof system shall be capable of being opened at any position along the length of the temporary roof by hand without use of powered equipment.

E. Lifting and Rigging Plan

1. Provide clear instructions, procedures and limitations for lifting and rigging the assembled roof systems.

A. Qualification Data: For the erector and manufacturer/supplier.

B. Material Test Reports: For each of the following products:

1. Structural components including chemical and physical properties.
2. Bolts, nuts, washers and fasteners.

A. Design Criteria & System Limitations

1. Provide structural design criteria including all loading.
2. Clearly outline system limitations including environmental loading limitations and operation limitations.

B. Calculations: Signed and sealed by a qualified professional engineer. Include the following:

1. Name and location of Project.
2. Name of manufacturer.
3. Name of Contractor.
4. Roof dimensions including width, length, height, and roof slope.
5. Indicate compliance with applicable standards.
6. Governing building code(s) and year of edition.
7. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
8. Load Combinations.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver all components, fabric covering, and other manufactured items so as not to be damaged or deformed. Package components for protection during transportation and handling.

B. Unload, store, and erect all components in a manner to prevent bending, warping, twisting, and surface damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

Source Limitations: Obtain temporary rolling roof system components, including primary and secondary framing and covering medium, from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a temporary rolling roof system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure. The temporary rolling roof system shall be constructed with dimensions indicated on the contract drawings. The temporary rolling roof system shall ride on tracks with an integral

anti lift device which prevents uplift during movement of the temporary roof; the track is supported by scaffolding and be capable of moving by hand as shown on the contract drawings. Contractor is responsible for coordinating all dimensions, fit-up and compatibilty of the rolling roof system and the scaffolding system. The scaffolidng system is to be provided by Excel Modular System Scaffolding.

B. Structural Framing

1. Structural framing shall be composed of Aluminum Alloy beams that have preset positions on the beam vertical members into which the beam lacing frame is located.
The Diagonal Braces should be manufactured in such a way that the location onto the vertical members of the Aluminum beam ensures that the system cannot be erected "out of square"
The roof fabric should be "housed" within a slot of an Aluminum extrusion which is fixed via pre drilled holes onto the Aluminum beam and secured by spring pins.
The joints in the Aluminum extrusion must be in a different position to those in the beam to ensure a more effective weather proof joint.
2. Laying out and cutting of aluminum shall be in accordance with the AA ADM
3. Punching, drilling, reaming and bolting for bolted or pinned aluminum connections shall conform to the requirements of AA ADM.
4. Shop welding of aluminum shall conform to AA ADM or AWS D1.2/D1.2M, Sections 1 through 7, 9 and 10. The welding process and welding operators shall be prequalified as required by AWS D1.2/D1.2M, Section 5 or AA ADM in accordance with the methods described in ASME BPVC SEC IX, Section IX.

C. Enclosure Material

1. The structural frame shall be sheathed with manufacture's standard fabric enclosure or sheeting. The fabric enclosure or sheeting shall provide a very effective weather proof seal.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer who has been trained by the system manufacturer to design temporary rolling roof system.

B. Structural Performance: Temporary rolling roof systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Design Loads in accordance with UFC 301-01 and ASCE 7-10.
2. Deflection and Drift Limits: Design temporary rolling roof system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."

C. Seismic Performance: Temporary rolling roof system shall withstand the effects of earthquake motions determined according to ASCE 7-10.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky

heat loss.

1. Temperature Change: 125 degrees Fahrenheit.
2. Roof system shall be operable between -15 degrees Fahrenheit and 110 degrees Fahrenheit.

E. Impact and Dynamic Loading: Structure shall be designed to resist dynamic forces imparted from the operation of a rolling roof.

F. Fire Retardant Ratings: Fabric enclosure or sheeting shall be fire retardant and tested for fire resistance per ASTM E 119 or ASTM E 108 or approved by the Portsmouth Naval Shipyard Fire Department and/or the NAVFAC Fire Protection Engineer.

G. Structural Performance for Fabric enclosure or sheeting: Provide fabric sheeting capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine site conditions including condition of scaffolding, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of the scaffolding supports

1. Engage land surveyor to perform surveying if deemed necessary by Temporary rolling Roof manufacturer.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Provide temporary shores, guys, braces, and other supports during erection to keep roof system and scaffolding secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION AND ASSEMBLY OF ROOF SYSTEM

A. Erect temporary rolling roof system according to manufacturer's written instructions, procedures and drawings and in accordance with applicable OSHA Specifications.

B. Do not field cut, drill, or alter and members or components without written approval from temporary rolling roof system manufacturer.

C. Set structural framing accurately in locations and to elevations indicated.

D. Bracing: Install bracing and guying where indicated on manufacturer's erection/assembly drawings.

E. Erection Tolerances: Maintain erection tolerances as indicated by the manufacture.

F. Install and secure fabric sheeting as indicated on manufacturer's erection/assembly drawings and instructions.

3.4 CLEANING AND PROTECTION

A. Grease and/or lubricate all moving parts including wheels as specified by the manufacturer.

B. Aluminum in contact with carbon steel shall be protected against galvanic or corrosive action by being given a coat of zinc-chromate primer and a coat of aluminum paint.

C. Repair damaged areas of the roof system prior to project closeout.

D. The rolling roof system shall be field tested to ensure proper wheel adjustments to eliminate binding and track misalignment. Demonstrate to the Contracting Officer that the tracks are level and the roof system operates as intended. Each section of the rolling roof shall be rolled the full distance of the tracks. The test shall be repeated a sufficient number of times (minimum of three) to demonstrate proper operation. Misalignment or poor operation, or defects disclosed shall be immediately remedied without cost to the Government. Provide all personnel necessary to conduct the tests. Testing shall be performed in the presence of Contracting Officer. Notify the Contracting Officer, in writing, at least 7 days prior to testing operations.

3.5 DEMONSTRATIONS AND TESTING

Contractor shall perform the following tests and demonstrations:

Assembly Tests: Demonstrate the entire assembly construction and operation, at a location either off-site or on-site. Exact location to be coordinated with the Contracting Officer and PNSY.

Acceptance Testing: Government concurrence/acceptance of assembly tests.

3.6 CLOSEOUT SUBMITTALS

Provide the following closeout submittals, a minimum of 10 business days prior to testing and demonstrations:

Maintenance Data of Entire System
User and Operation Manual

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING

SECTION 23 05 15

COMMON PIPING FOR HVAC

02/09

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL REQUIREMENTS
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Material and Equipment Qualifications
1.4.2 Alternative Qualifications
1.4.3 Service Support
1.4.4 Manufacturer's Nameplate
1.4.5 Modification of References
1.4.5.1 Definitions
1.4.5.2 Administrative Interpretations
1.5 DELIVERY, STORAGE, AND HANDLING
1.6 INSTRUCTION TO GOVERNMENT PERSONNEL
1.7 ACCESSIBILITY

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS
2.1.1 Type BCS, Black Carbon Steel
2.1.2 Type BCS-125, 125-psi Service
2.2 PIPING SPECIALTIES
2.2.1 Expansion Vibration Isolation Joints
2.2.2 Flexible Metallic Pipe
2.2.3 Pressure Gages
2.3 VALVES
2.3.1 Ball and Butterfly Valves
2.3.2 Drain, Vent, and Gage Cocks
2.4 MISCELLANEOUS MATERIALS
2.4.1 Bolting
2.4.2 Flange Gaskets
2.4.3 Pipe Thread Compounds
2.5 SUPPORTING ELEMENTS
2.5.1 Building Structure Attachments
2.5.1.1 Anchor Devices, Concrete and Masonry
2.5.1.2 Beam Clamps
2.5.1.3 C-Clamps
2.5.2 Horizontal Pipe Attachments
2.5.2.1 Single Pipes
2.5.2.2 Parallel Pipes
2.5.3 Vertical Pipe Attachments
2.5.4 Hanger Rods and Fixtures
2.5.5 Supplementary Steel

PART 3 EXECUTION

3.1 PIPE INSTALLATION
3.2 VALVES
3.3 SUPPORTING ELEMENTS INSTALLATION
3.4 PAINTING OF NEW EQUIPMENT
3.4.1 Factory Painting Systems

-- End of Section Table of Contents --

SECTION 23 05 15

COMMON PIPING FOR HVAC
02/09

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325	(2011) Steel Construction Manual

AMERICAN WELDING SOCIETY (AWS)

AWS WHB-2.9	(2004) Welding Handbook; Volume 2, Welding Processes, Part 1

ASME INTERNATIONAL (ASME)

ASME B16.1	(2010) Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250
ASME B16.11	(2011) Forged Fittings, Socket-Welding and Threaded
ASME B16.3	(2011) Malleable Iron Threaded Fittings, Classes 150 and 300
ASME B16.39	(2009) Standard for Malleable Iron Threaded Pipe Unions; Classes 150, 250, and 300
ASME B16.5	(2013) Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard
ASME B16.9	(2012) Standard for Factory-Made Wrought Steel Buttwelding Fittings
ASME B31.3	(2012) Process Piping
ASME B36.10M	(2004; R 2010) Standard for Welded and Seamless Wrought Steel Pipe
ASME B40.100	(2005; R 2010) Pressure Gauges and Gauge Attachments
ASME BPVC SEC IX	(2010) BPVC Section IX-Welding and Brazing Qualifications

ASTM INTERNATIONAL (ASTM)

ASTM A105/A105M	(2012) Standard Specification for Carbon

	Steel Forgings for Piping Applications
ASTM A126	(2004; R 2009) Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A197/A197M	(2000; R 2011) Standard Specification for Cupola Malleable Iron
ASTM A234/A234M	(2011a) Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A312/A312M	(2012) Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A563	(2007a, R2014) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A6/A6M	(2014) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B62	(2009) Standard Specification for Composition Bronze or Ounce Metal Castings
ASTM F104	(2011) Standard Classification System for Nonmetallic Gasket Materials

FLUID SEALING ASSOCIATION (FSA)

FSA-0017	(1995e6) Standard for Non-Metallic Expansion Joints and Flexible Pipe Connectors Technical Handbook

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(2009) Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation
MSS SP-67	(2011) Butterfly Valves
MSS SP-69	(2003; Notice 2012) Pipe Hangers and Supports - Selection and Application (ANSI

	Approved American National Standard)
MSS SP-72	(2010a) Ball Valves with Flanged or Butt-Welding Ends for General Service

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1922	(Rev A; Notice 2) Shield, Expansion (Caulking Anchors, Single Lead)
CID A-A-1923	(Rev A; Notice 2) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-1924	(Rev A; Notice 2) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors
CID A-A-1925	(Rev A; Notice 2) Shield Expansion (Nail Anchors)
CID A-A-55614	(Basic; Notice 2) Shield, Expansion (Non-Drilling Expansion Anchors)
CID A-A-55615	(Basic; Notice 2) Shield, Expansion (Wood Screw and Lag Bolt Self-Threading Anchors

1.2 GENERAL REQUIREMENTS

Commencement of work constitutes Contractor's acceptance of the existing conditions.Submit Material, Equipment, and Fixture Lists for pipes, valves and specialties including manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information. Provide a complete list of construction equipment to be used.
Submit Record Drawings for pipes, valves and accessories providing current factual information including deviations and amendments to the drawings, and concealed and visible changes in the work.
Submit Coordination Drawings for pipes, valves and specialties showing coordination of work between different trades and with the structural and architectural elements of work. Detail all drawings sufficiently to show overall dimensions of related items, clearances, and relative locations of work in allotted spaces. Indicate on drawings where conflicts or clearance problems exist between various trades.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submit Material, Equipment, and Fixture Lists; G, AE for construction equipment to be used.

SD-02 Shop Drawings

Submit the following for pipes, valves and specialties showing conformance with the referenced standards contained within this section.

Record Drawings;G, AE

Coordination Drawings;G, AE

Installation Drawings;G, AE

Submit Installation Drawings for pipes, valves and specialties in accordance with the paragraph entitled, "Pipe Installation," of this section.

SD-03 Product Data

Submit equipment and performance data for the following items consisting of corrosion resistance, life expectancy, gage tolerances, and grade line analysis.

Submit Manufacturer's catalog data for the following items:

Pipe and Fittings;G, AE
Piping Specialties;G, AE
Valves;G, AE
Miscellaneous Materials;G, AE
Supporting Elements;G, AE

SD-05 Design Data

Submit design analysis and calculations for the following items consisting of surface resistance, rates of flow, head losses, inlet and outlet design, required radius of bend, and pressure calculations. Also include in data pipe size, shape, and dimensions, as well as temperature ratings, vibration and thrust limitations minimum burst pressures, shut-off and non-shock pressures and weld characteristics.

Pipe and Fittings;G, AE
Piping Specialties;G, AE
Valves;G, AE

SD-06 Test Reports

Submit test reports on the following tests in accordance with paragraph entitled, "Piping Installation," of this section.

Hydrostatic Tests;G, AE
Air Tests;G, AE

System Operation Tests;G, AE

1.4 QUALITY ASSURANCE

1.4.1 Material and Equipment Qualifications

Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which

are of a similar material, design and workmanship. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.4.2 Alternative Qualifications

Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, can be shown.

1.4.3 Service Support

The equipment items shall be supported by service organizations. Submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These service organizations shall be reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.4.4 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.4.5 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction", or words of similar meaning, to mean the Contracting Officer.

1.4.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall." Reference to the "code official" shall be interpreted to mean the "Contracting Officer." For Navy owned property, references to the "owner" shall be interpreted to mean the "Contracting Officer." For leased facilities, references to the "owner" shall be interpreted to mean the "lessor." References to the "permit holder" shall be interpreted to mean the "Contractor."

1.4.5.2 Administrative Interpretations

For ICC Codes referenced in the contract documents, the provisions of Chapter 1, "Administrator," do not apply. These administrative requirements are covered by the applicable Federal Acquisition Regulations (FAR) included in this contract and by the authority granted to the Officer in Charge of Construction to administer the construction of this project. References in the ICC Codes to sections of Chapter 1, shall be applied appropriately by the Contracting Officer as authorized by his

administrative cognizance and the FAR.

1.5 DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

1.6 INSTRUCTION TO GOVERNMENT PERSONNEL

When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Government personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and trained in operating theory as well as practical operation and maintenance work.

Give instruction during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system.

When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.7 ACCESSIBILITY

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, expansion joints, controls, dampers, and equipment requiring access, in locations freely accessible through access doors.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

2.1.1 Type BCS, Black Carbon Steel

Pipe 1/8 through 10 inches shall be Schedule 40 seamless or conforming to ASTM A53/A53M, Type S (seamless). Grade A should be used for permissible field bending, in both cases.

Fittings 2 inches and under shall be 150-pounds per square inch, gage (psig) working steam pressure (wsp) banded black malleable iron screwed, conforming to ASTM A197/A197M and ASME B16.3.

Unions 2 inches and under shall be 250 pounds per square inch, wsp female, screwed, black malleable iron with brass-to-iron seat, and ground joint, conforming to ASME B16.39.

Fittings 2-1/2 inches and over shall be Steel butt weld, conforming to ASTM A234/A234M and ASME B16.9 to match pipe wall thickness.

Flanges 2-1/2 inches and over shall be 150-pound forged-steel conforming to ASME B16.5, welding neck to match pipe wall thickness.

2.1.2 Type BCS-125, 125-psi Service

Pipe 1/2 through 10 inches shall be Schedule 80 steam, Schedule 80 condensate, seamless black carbon steel, conforming to ASTM A53/A53M Type S (seamless) and ASME B36.10M.

Fittings 1 through 2 inches shall be 2,000-or 3,000-psi water, oil, or gas (wog) to match pipe wall, forged carbon steel socket weld, conforming to ASTM A105/A105M and ASME B16.11.

Fittings 2-1/2 inches and over shall be wall thickness to match pipe, long radius butt weld, black carbon steel, conforming to ASTM A234/A234M, Grade WPB and ASME B16.9.

Couplings 2 inches and under shall be commercial standard weight for Schedule 40 pipe and commercial extra heavy weight for Schedule 80 pipe, black carbon steel where threaded, and 2,000-or 3,000-psi wog forged carbon steel, conforming to ASTM A105/A105M and ASME B16.11, where welded.

Flanges 2-1/2 inches and over shall be 150-pound, forged carbon-steel welding neck, with raised face or flat face and concentric serrated finish, conforming to ASTM A105/A105M and ASME B16.5.

2.2 PIPING SPECIALTIES

2.2.1 Expansion Vibration Isolation Joints

Single or multiple arch-flanged expansion vibration isolation joints shall be constructed of steel-ring reinforced chloroprene-impregnated cloth materials. Design joint to absorb the movement of the pipe sections in which installed with no detrimental effect on the pipe or connected equipment. Back flanges with ferrous-metal backing rings. Provide control rod assemblies to restrict joint movement. All nonmetallic exterior surfaces of the joint shall be coated with chlorosulphinated polyethylene. Provide grommets in limit bolt hole to absorb noise transmitted through the bolts.

Joints shall be suitable for continuous-duty working temperature of at least 250 degrees F.

Fill arches with soft chloroprene.

Joint, single-arch, movement limitations and size-related, pressure characteristics shall conform to FSA-0017.

2.2.2 Flexible Metallic Pipe

Flexible pipe shall be the bellows-type with wire braid cover and designed, constructed, and rated in accordance with the applicable requirements of ASME B31.3.

Working pressure minimum rating shall be 100 psi at 300 degrees F.

Minimum burst pressure shall be four times working pressure at 300 degrees F. Bellows material shall be AISI Type 316L corrosion-resistant steel. Braid shall be AISI 300 series corrosion-resistant steel wire.

Threaded end connections shall be hex-collared Schedule 40, AISI Type 316L corrosion-resistant steel, conforming to ASTM A312/A312M.

Flanged end connection rating and materials shall conform to specifications for system primary-pressure rating.

2.2.3 Pressure Gages

Pressure gages shall conform to ASME B40.100 and to requirements specified herein. Pressure-gage size shall be 3-1/2 inches nominal diameter. Case shall be corrosion-resistant steel, conforming to any of the AISI 300 series of ASTM A6/A6M, with an ASM No. 4 standard commercial polish or better. Equip gages with adjustable red marking pointer and damper-screw adjustment in inlet connection. Service-pressure reading shall be at midpoint of gage range. All gages shall be Grade B or better and be equipped with gage isolators.

Fit steam gages with black steel syphons and steam service pressure-rated gage cocks or valves.

2.3 VALVES

2.3.1 Ball and Butterfly Valves

Ball valves shall conform to MSS SP-72 for Figure 1A, 1 piece body , vertically split body , top entry , three piece body and shall be rated for service at not less than 175 psig at 200 degrees F. Valve bodies in sizes 2 inches and smaller shall be screwed-end connection-type constructed of Class A copper alloy. Valve bodies in sizes 2-1/2 inches and larger shall be flanged-end connection type, constructed of Class D material. Balls and stems of valves 2 inches and smaller shall be manufacturer's standard with hard chrome plating finish. Balls and stems of valves 2-1/2 inches and larger shall be manufacturer's standard Class C corrosion-resistant steel alloy with hard chrome plating. Balls of valves 6 inches and larger may be Class D with 900 Brinell hard chrome plating. Valves shall be suitable for flow from either direction and shall seal equally tight in either direction. Valves with ball seals held in place by spring washers are not acceptable. All valves shall have adjustable packing glands. Seats and seals shall be tetrafluoroethylene.

Butterfly valves shall conform to MSS SP-67. Valves shall be wafer type for mounting between specified flanges and shall be rated for 150-psig shutoff and nonshock working pressure. Bodies shall be cast ferrous metal conforming to ASTM A126, Class B, and to ASME B16.1 for body wall thickness. Seats and seals shall be of the resilient elastomer type designed for field removal and replacement.

2.3.2 Drain, Vent, and Gage Cocks

Drain, vent, and gage cocks shall be lever handle, ground key type, with washer and screw, constructed of polished ASTM B62 bronze, and rated 125-psi wsp. End connections shall be rated for specified service pressure.

Pump vent cocks, and where spray control is required, shall be UL umbrella-hood type, constructed of manufacturer's standard polished brass. Cocks shall be 1/2-inch ips male, end threaded, and rated at not less than 125 psi at 225 degrees F.

2.4 MISCELLANEOUS MATERIALS

2.4.1 Bolting

Flange and general purpose bolting shall be hex-head and must conform to ASTM A307, Grade B (bolts, for flanged joints in piping systems where one or both flanges are cast iron). Heavy hex-nuts shall conform to ASTM A563. Square-head bolts and nuts are not acceptable. Threads shall be coarse-thread series.

2.4.2 Flange Gaskets

Compressed non-asbestos sheet, conforming to ASTM F104, coated on both sides with graphite or similar lubricant, with nitrile composition, binder rated to 750 degrees F.

2.4.3 Pipe Thread Compounds

Use tetrafluoroethylene tape not less than 2 to 3 mils thick in potable and process water and in chemical systems for pipe sizes to and including 1-inch ips. Tetrafluoroethylene dispersions and other suitable compounds shall be used for all other applications upon approval by the Contracting Officer; however, no lead-containing compounds shall be used in potable water systems.

2.5 SUPPORTING ELEMENTS

Provide all necessary piping systems and equipment supporting elements, including but not limited to: building structure attachments; supplementary steel; hanger rods, stanchions, and fixtures; vertical pipe attachments; horizontal pipe attachments; anchors; guides; and spring-cushion, variable, or constant supports. All supporting elements shall be suitable for stresses imposed by systems pressures and temperatures and natural and other external forces normal to this facility without damage to supporting element system or to work being supported.

Supporting elements shall conform to requirements of ASME B31.3, MSS SP-58, and MSS SP-69 except as noted.

Attachments welded to pipe shall be made of materials identical to that of pipe or materials accepted as permissible raw materials by referenced code or standard specification.

Supporting elements exposed to weather shall be hot-dip galvanized or stainless steel. Materials shall be of such a nature that their apparent and latent-strength characteristics are not reduced due to galvanizing process. Supporting elements in contact with copper tubing shall be electroplated with copper.

Type designations specified herein are based on MSS SP-58 and MSS SP-69. Masonry anchor group-, type-, and style-combination designations shall be in accordance with CID A-A-1922, CID A-A-1923, CID A-A-1924, CID A-A-1925 , CID A-A-55614, and CID A-A-55615. Support elements, except for supplementary steel, shall be cataloged, load rated, commercially manufactured products.

2.5.1 Building Structure Attachments

2.5.1.1 Anchor Devices, Concrete and Masonry

Anchor devices shall conform to CID A-A-1922, CID A-A-1923, CID A-A-1924, CID A-A-1925 , CID A-A-55614, and CID A-A-55615

Cast-in, floor mounted, equipment anchor devices shall provide adjustable positions.

Powder-actuated anchoring devices shall not be used to support any mechanical systems components.

2.5.1.2 Beam Clamps

Beam clamps shall be center-loading MSS SP-58 Type 20 21 28 29 30 .

When it is not possible to use center-loading beam clamps, eccentric-loading beam clamps, MSS SP-58 Type 19 20 25 27 may be used for piping sizes 2 inches and less and for piping sizes 2 through 10 inches provided two counterbalancing clamps are used per point of pipe support. Where more than one rod is used per point of pipe support, rod diameter shall be determined in accordance with referenced standards.

2.5.1.3 C-Clamps

Do not use C-clamps.

2.5.2 Horizontal Pipe Attachments

2.5.2.1 Single Pipes

Support piping in sizes to and including 2-inch ips by MSS SP-58 Type 6 solid malleable iron pipe rings, except that split-band-type rings shall be used in sizes up to 1-inch ips.

Support piping in sizes through 8-inch ips inclusive by MSS SP-58 Type 1 3 4 attachments.

MSS SP-58 Type 1 and Type 6 assemblies shall be used on vapor-sealed insulated piping and shall have an inside diameter larger than pipe being supported to provide adequate clearance during pipe movement.

Where thermal movement of a point in a piping system 4 inches and larger would cause a hanger rod to deflect more than 4 degrees from the vertical or where a horizontal point movement exceeds 1/2 inch, MSS SP-58 Type 41 44 through 46 49 pipe rolls shall be used.

Support piping in sizes larger than 8-inch ips with MSS SP-58 Type 41 44 through 46 49 pipe rolls.

MSS SP-58 Type 40 shields shall be used on all insulated piping. Area of the supporting surface shall be such that compression deformation of insulated surfaces does not occur. Longitudinal and transverse shield edges shall be rolled away from the insulation.

Provide insulated piping without vapor barrier on roll supports with MSS SP-58 Type 39 saddles.

Spring supports shall be as indicated.

2.5.2.2 Parallel Pipes

Trapeze hangers fabricated from structural steel shapes, with U-bolts, shall be used in congested areas and where multiple pipe runs occur. Structural steel shapes shall be of commercially available, proprietary design, rolled steel.

2.5.3 Vertical Pipe Attachments

Vertical pipe attachments shall be MSS SP-58 Type 8.

Shop drawing data shall include complete fabrication and attachment details of any spring supports.

2.5.4 Hanger Rods and Fixtures

Only circular cross section rod hangers shall be used to connect building structure attachments to pipe support devices. Pipe, straps, or bars of equivalent strength shall be used for hangers only where approved by the Contracting Officer.

Turnbuckles, swing eyes, and clevises shall be provided as required by support system to accommodate temperature change, pipe accessibility, and adjustment for load and pitch. Rod couplings are not acceptable.

2.5.5 Supplementary Steel

Where it is necessary to frame structural members between existing members or where structural members are used in lieu of commercially rated supports, design and fabricate such supplementary steel in accordance with AISC 325.

PART 3 EXECUTION

3.1 PIPE INSTALLATION

Test reports for Hydrostatic Tests, Air Tests, Valve-Operating Tests, Drainage Tests, Pneumatic Tests, Non-Destructive Electric Tests and System Operation Tests shall be provided by the Contractor, in compliance with referenced standards contained within this section.

Fabricate and install piping systems in accordance with ASME B31.3, MSS SP-69, and AWS WHB-2.9.

Submit Installation Drawings for pipes, valves and specialties. Drawings shall include the manufacturer's design and construction calculations, forces required to obtain rated axial, lateral, or angular movements, installation criteria, anchor and guide requirements for equipment, and equipment room layout and design. Drawings shall specifically advise on procedures to be followed and provisions required to protect expansion joints during specified hydrostatic testing operations.

Connections between steel piping and copper piping shall be electrically isolated from each other with dielectric couplings (or unions) rated for

the service.

Make final connections to equipment with flanges provided every 100 feet of straight run. Provide unions in the line downstream of screwed- and welded-end valves.

Ream all pipe ends before joint connections are made.

Screwed joints shall be made up with specified joint compound and not more than three threads shall show after joint is made up.

Apply joint compounds to the male thread only and exercise care to prevent compound from reaching the unthreaded interior of the pipe.

Provide screwed unions, welded unions, or bolted flanges wherever required to permit convenient removal of equipment, valves, and piping accessories from the piping system for maintenance.

Securely support piping systems with due allowance for thrust forces, thermal expansion and contraction, and shall not be subjected to mechanical, chemical, vibrational or other damage as specified in ASME B31.3.

Field welded joints shall conform to the requirements of the AWS WHB-2.9, ASME B31.3, and ASME BPVC SEC IX.

Take all necessary precautions during installation of flexible pipe and hose including flushing and purging with water, steam, and compressed air to preclude bellows failure due to pipe line debris lodged in bellows. Installation shall conform to manufacturer's instructions.

3.2 VALVES

Provide valves in piping mains and all branches and at equipment where indicated and as specified.

Provide valves to permit isolation of branch piping and each equipment item from the balance of the system.

Riser and downcomer drains above piping shutoff valves in piping 2-1/2 inches and larger shall be provided. Tap and fit shutoff valve body with a 1/2-inch plugged globe valve.

Valves unavoidably located in furred or other normally inaccessible places shall be provided with access panels adequately sized for the location and located so that concealed items may be serviced, maintained, or replaced.

3.3 SUPPORTING ELEMENTS INSTALLATION

Provide supporting elements in accordance with the referenced codes and standards.

Support piping from building structure. No piping shall be supported from roof deck or from other pipe.

Piping shall run parallel with the lines of the building. Space and install piping and components so that a threaded pipe fitting may be removed between adjacent pipes and so that there shall be no less than 1/2 inch of clear space between the finished surface and other work and

between the finished surface of parallel adjacent piping. Hangers on different adjacent service lines running parallel with each other shall be arranged to be in line with each other and parallel to the lines of the building.

Install piping support elements at intervals specified hereinafter, at locations not more than 3 feet from the ends of each runout, and not over 1 foot from each change in direction of piping.

Load rating for all pipe-hanger supports shall be based on insulated weight of lines filled with water and forces imposed. Deflection per span shall not exceed slope gradient of pipe. Supports shall be in accordance with the following minimum rod size and maximum allowable hanger spacing for specified pipe. For concentrated loads such as valves, the allowable span must be reduced proportionately:

PIPE SIZE INCHES	ROD SIZE INCHES	STEEL PIPE FEET	COPPER PIPE FEET
1 and smaller	3/8	8	6
1-1/4 to 1-1/2	3/8	10	8
2	3/8	10	8
2-1/2 to 3-1/2	1/2	12	12
4 to 5	5/8	16	14
6	3/4	16	16
8 to 12	7/8	20	20
14 to 18	1	20	20
20 and over	1-1/4	20	20

Provide vibration isolation supports where needed.

Vertical risers shall be supported independently of connected horizontal piping, whenever practicable, with fixed or spring supports at the base and at intervals to accommodate system range of thermal conditions. Risers shall be guided for lateral stability. For risers subject to expansion, provide only one rigid support at a point approximately one-third down from the top. Place clamps under fittings unless otherwise specified. Support carbon-steel pipe at each floor and at not more than 15-footintervals for pipe 2 inches and smaller and at not more than 20-foot intervals for pipe 2-1/2 inches and larger.

3.4 PAINTING OF NEW EQUIPMENT

3.4.1 Factory Painting Systems

Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall withstand 500 hours in a salt-spray fog test. Salt-spray fog test shall be in accordance with ASTM B117, and for that test the acceptance criteria shall be as follows: immediately after completion of the test, the paint shall show no signs of blistering, wrinkling, or cracking, and

no loss of adhesion; and the specimen shall show no signs of rust creepage beyond 0.125 inch on either side of the scratch mark.

The film thickness of the factory painting system applied on the equipment shall not be less than the film thickness used on the test specimen. If manufacturer's standard factory painting system is being proposed for use on surfaces subject to temperatures above 120 degrees F, design the factory painting system for the temperature service.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING

SECTION 23 31 13.00 40

METAL DUCTS

11/12

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 RECORD DRAWINGS

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION
2.2 MATERIALS
2.2.1 Galvanized Steel Ductwork Materials
2.2.2 Mill-Rolled Reinforcing And Supporting Materials
2.3 COMPONENTS
2.3.1 Round Sheet Metal Duct Fittings
2.3.1.1 Fittings Construction
2.3.2 Reinforcement
2.3.3 Fittings
2.3.4 Dampers
2.3.5 Duct Hangers
2.3.6 Mill-Rolled Reinforcing And Supporting Materials
2.3.7 Manual Volume Dampers
2.3.7.1 Round Dampers
2.3.7.1.1 Frames
2.3.7.1.2 Blades
2.3.7.1.3 Blade Axles
2.3.7.1.4 Axle Bearings
2.3.7.1.5 Control Shaft/Hand Quadrant
2.3.7.1.6 Finish
2.3.7.2 Damper Construction

PART 3 EXECUTION

3.1 PREPARATION
3.1.1 Construction Standards
3.2 INSTALLATION
3.2.1 Jointing
3.2.2 Ducts
3.3 APPLICATION
3.3.1 Low Pressure Sheet Metal Ducts
3.3.1.1 Longitudinal Duct Seams
3.3.1.2 Joints and Gaskets
3.3.1.3 Radius Elbows
3.3.1.4 Outlets, Inlets, And Duct Branches
3.3.1.5 Duct Transitions
3.3.1.6 Branch Connections
3.3.1.7 Manual Volume Dampers

3.3.2 Round Sheet Metal Ducts
3.3.2.1 Duct Gages And Reinforcement
3.3.2.2 Duct Joints
3.3.2.3 Duct Transitions
3.3.3 Transverse Reinforcement Joints
3.3.4 Joint Gaskets
3.3.5 Radius Elbows
3.3.6 Plenum Connections
3.3.7 Duct Supports
3.3.7.1 Hangars
3.3.7.2 Installation
3.3.7.3 Strap-type Hangars
3.3.7.4 Trapeze Hangars
3.3.7.5 Purlins
3.3.8 Openings In Roofs And Walls
3.4 FIELD QUALITY CONTROL
3.4.1 Inspection
3.5 DUCTWORK CLEANING PROVISIONS
3.6 OPERATION AND MAINTENANCE

-- End of Section Table of Contents --

SECTION 23 31 13.00 40

METAL DUCTS
11/12

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325	(2011) Steel Construction Manual
AISC 360	(2010) Specification for Structural Steel Buildings

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE EQUIP IP HDBK	(2012) Handbook, HVAC Systems and Equipment (IP Edition)
ASHRAE FUN IP	(2013; Addenda and Corrigendum 2013) Fundamentals Handbook, I-P Edition

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A36/A36M	(2012) Standard Specification for Carbon Structural Steel
ASTM A653/A653M	(2013) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A924/A924M	(2014) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1966	(2005) HVAC Duct Construction Standards Metal and Flexible, 3rd Edition

SMACNA 1987 (2006) HVAC Duct Systems Inspection Guide, 3rd Edition

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE AMS 2480 (2009; Rev H) Phosphate Treatment, Paint, Base

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 35 26.00 22 PWD ME. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists; G, AE

SD-02 Shop Drawings

offset fitting configurations; G, AE

Record Drawings; G

SD-03 Product Data

Galvanized Steel Ductwork Materials; G, AE

Dampers; G, AE

Round Sheet Metal Duct Fittings; G, AE

Manual Volume Dampers; G, AE

SD-07 Certificates

Galvanized Steel Ductwork Materials; G

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

1.3 RECORD DRAWINGS

Provide record drawings with current factual information. Include deviations from, and amendments to, the drawings and concealed or visible changes in the work, for medium/high pressure ductwork systems. Label drawings "As-Built".

PART 2 PRODUCTS

Include the manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information within material, equipment, and fixture lists.

2.1 SYSTEM DESCRIPTION

Provide low-pressure systems ductwork and plenums where maximum air velocity is 2,000 feet per minute(fpm) and maximum static pressure is 2 inches water gage (wg), positive or negative.

Encompass high velocity systems ductwork where:

a. Minimum air velocity exceeds 2,000 feet per minute (fpm) or static pressure exceeds 2 inches water gage (wg).

B. Medium static pressure ranges from over 2 inches wg through 3 inches wg, positive or negative, or over 3 inches wg through 6 inches wg positive.

c.

d. Do not use rigid fibrous-glass ductwork.

2.2 MATERIALS

2.2.1 Galvanized Steel Ductwork Materials

Provide hot-dip galvanized carbon steel ductwork sheet metal of lock-forming quality, with regular spangle-type zinc coating, conforming to ASTM A924/A924M and ASTM A653/A653M, Designation G90. Treat duct surfaces to be painted by apostatizing.

Conform to ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966 for sheet metal gages and reinforcement thickness.

Low pressure ductwork minimum standards are:

MINIMUM SHEET METAL GAGE

DUCT WIDTH INCHES	GAGE
0 - 12	26
13 - 30	24
31 - 60	22

2.2.2 Mill-Rolled Reinforcing And Supporting Materials

Conform to ASTM A36/A36Mfor mill-rolled structural steel and, wherever in contact with sheet metal ducting galvanize to commercial weight of zinc or coated with materials conforming to ASTM A123/A123M .

In lieu of mill-rolled structural steel, submit for approval equivalent strength, proprietary design, rolled-steel structural support systems.

2.3 COMPONENTS

2.3.1 Round Sheet Metal Duct Fittings

Shop fabricate fittings.

2.3.1.1 Fittings Construction

Manufacture as separate fittings, not as tap collars welded or brazed into duct sections.

Provide two-piece type miter elbows for angles less than 31 degrees, three-piece type for angles 31 through 60 degrees, and five-piece type for angles 61 through 90 degrees. Ensure centerline radius of elbows is 1-1/2 times fitting cross section diameter.

Provide conical type crosses, increasers, reducers, reducing tees, and 90-degree tees.

Ensure cutouts in fitting body are equal to branch tap dimension or, where smaller, excess material is flared and rolled into smooth radius nozzle configuration.

2.3.2 Reinforcement

Support inner liners of both duct and fittings by metal spacers welded in position to maintain spacing and concentricity.

2.3.3 Fittings

Submit offset fitting configurations for approval.

Make divided flow fittings as separate fittings, not tap collars into duct sections, with the following construction requirements:

a. Sound, airtight, continuous welds at intersection of fitting body and tap

B. Tap liner securely welded to inner liner, with weld spacing not to exceed 3 inches

c. Pack insulation around the branch tap area for complete cavity filling.

d. Carefully fit branch connection to cutout openings in inner liner without spaces for air erosion of insulation and without sharp projections that cause noise and airflow disturbance.

Continuously braze seams in the pressure shell of fittings. Protect galvanized areas that have been damaged by welding with manufacturer's standard corrosion-resistant coating.

Construct two-piece type elbows for angles through 35 degrees, three-piece type for angles 36 through 71 degrees, and five-piece type for angles 72 through 90 degrees.

2.3.4 Dampers

Construct low pressure drop, high-velocity manual volume dampers, and high-velocity fire dampers in accordance with ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966.

2.3.5 Duct Hangers

For duct hangers in contact with galvanized duct surfaces, provide galvanized steel painted with inorganic zinc.

2.3.6 Mill-Rolled Reinforcing And Supporting Materials

Provide mill-rolled structural steel conforming to ASTM A36/A36M. Whenever in contact with sheet metal ducting, provide galvanized steel in accordance with ASTM A123/A123M.

In lieu of mill-rolled structural steel, submit equivalent strength, proprietary-design, rolled-steel structural support systems for approval.

2.3.7 Manual Volume Dampers

2.3.7.1 Round Dampers

2.3.7.1.1 Frames

Size	Galvanized Steel Thickness	Length
4 to 20 inches	Minimum 20 gauge	Minimum 6 inches
22 to 30 inches	Minimum 20 gauge	Minimum 10 inches
32 to 40 inches	Minimum 16 gauge	Minimum 10 inches

2.3.7.1.2 Blades

Size	Galvanized Steel Thickness
4 to 20 inches	Minimum 20 gauge
22 to 30 inches	Minimum 16 gauge
32 to 40 inches	Minimum 10 gauge

2.3.7.1.3 Blade Axles

To support the blades of round dampers, provide galvanized steel shafts supporting the blade the entire duct diameter frame-to-frame. Axle shafts shall extend through standoff bracket and hand quadrant.

Size	Shaft Size and Shape
4 to 20 inches	Minimum 3/8 inch square
22 to 30 inches	Minimum 1/2 inch square

Size	Shaft Size and Shape
32 to 40 inches	Minimum 3/4 inch square

2.3.7.1.4 Axle Bearings

Support the shaft on each end at the frames with shaft bearings constructed of oil-impregnated bronze, or solid nylon, or a solid plastic equivalent to nylon. Shaft bearings configuration shall be a pressed fit to provide a tight joint between blade shaft and damper frame.

Size	Material
4 to 20 inches	solid nylon, or equivalent solid plastic, or oil-impregnated bronze
22 to 30 inches	solid nylon, or equivalent solid plastic, or oil-impregnated bronze
32 to 40 inches	oil-impregnated bronze, or stainless steel sleeve bearing

2.3.7.1.5 Control Shaft/Hand Quadrant

Provide dampers with accessible locking-type control shaft/hand quadrant operators.

Provide stand-off mounting brackets, bases, or adapters for the locking-type quadrant operators on dampers installed on ducts to be thermally insulated. Stand-off distance shall be a minimum of 2 inches off the metal duct surface. Stand-off mounting items shall be integral with the operator or standard accessory of the damper manufacturer.

2.3.7.1.6 Finish

Mill Galvanized

2.3.7.2 Damper Construction

Provide all damper shafts with two-end bearings.

Provide a full length damper shaft and extend it beyond the damper blade. use a 3/8 inch square shaft for damper lengths up to 20 inches and a 1/2 inch square shaft for damper lengths 20 inches and larger. Where necessary to prevent damper vibration or slippage, provide adjustable support rods with locking provisions external to duct at damper blade end.

Provide dampers in ducts having a width perpendicular to the axis of the damper that is greater than 12 inches of multiblade type having a substantial frame with blades fabricated of 16 -gage metal. Provide blades not exceeding 10 inches in width and 48 inches in length, welded to 1/2 inch diameter shafts. Ensure dampers greater than 48 inches in width are made in two or more sections with intermediate mullions, each section being mechanically interlocked with the adjoining section or sections.

Provide blades with graphite-impregnated nylon bearings and connect so that adjoining blades rotate in opposite directions.

PART 3 EXECUTION

3.1 PREPARATION

For sheet metal surfaces to be painted, and surfaces to which adhesives are to be applied, clean surface of oil, grease, and deleterious substances.

Ensure strength is adequate to prevent failure under service pressure or vacuum created by fast closure of duct devices. Provide leaktight, automatic relief devices.

3.1.1 Construction Standards

Provide sheet metal construction in accordance with the recommendations for best practices in ASHRAE EQUIP IP HDBK, Chapter 16, SMACNA 1966, NFPA 90A, and ASHRAE FUN IP, Chapter 32.

Design and fabricate supplementary steel in accordance with AISC 360 and AISC 325.

Where construction methods for certain items are not described in the referenced standards or herein, perform the work in accordance with recommendations for best practice defined in ASHRAE EQUIP IP HDBK.

3.2 INSTALLATION

Fabricate airtight and include reinforcements, bracing, supports, framing, gasketing, sealing, and fastening to provide rigid construction and freedom from vibration, airflow-induced motion and noise, and excessive deflection at specified maximum system air pressure and velocity.

Provide offsets and transformations as required to avoid interference with the building construction, piping, or equipment.

Make plenum anchorage provisions, sheet metal joints, and other areas airtight and watertight by caulking mating galvanized steel and concrete surfaces with a two-component elastomer.

3.2.1 Jointing

Enclose dampers located behind architectural intake or exhaust louvers by a rigid sheet metal collar and sealed to building construction with elastomers for complete air tightness.

Provide outside air-intake ducts and plenums made from sheet metal with soldered watertight joints.

3.2.2 Ducts

Wherever ducts pass through firewalls or through walls or floors dividing conditioned spaces from unconditioned spaces, provide a flanged segment in that surface during surface construction.

Where interiors of ducting may be viewed through air diffusion devices,

construct the viewed interior with sheet metal and paint flat black.

3.3 APPLICATION

3.3.1 Low Pressure Sheet Metal Ducts

Weld angle iron frames at corners and ends, whenever possible. Rivet or weld angle iron reinforcements to ducts not more than 6 inches on center, with not less than two points of attachment. Spot welding, where used, is 3 inches on center.

Seal standard seam joints with an elastomer compound to comply with SMACNA 1966 Seal Class A, B or C as applicable.

Limit crossbreaking to 4 feet and provide on all ducts 8 inches wide and wider. Provide bead reinforcement in lieu of crossbreaking where panel popping may occur. Where rigid insulation is applied, crossbreaking is not required.

3.3.1.1 Longitudinal Duct Seams

Provide Pittsburgh lock corner seams.

3.3.1.2 Joints and Gaskets

Bolt companion angle flanges together with 1/4 inch diameter bolts and nuts spaced 6 inches on center. Gasket flanged joints with chloroprene full-face gaskets 1/8 inch thick, with Shore A 40 durometer hardness. Use one piece gaskets, vulcanized at joints.

3.3.1.3 Radius Elbows

Conform to SMACNA 1966 for radius elbows. Provide an inside radius equal to the width of the duct. Where installation conditions preclude use of standard elbows, the inside radius may be reduced to a minimum of 0.25 times duct width and install turning vanes in accordance with the following schedule.

WIDTH OF ELBOWS INCHES	RADIUS OF TURNING VANES IN PERCENT OF DUCT WIDTH VANE NO. 1	VANE NO. 2	VANE NO. 3
Up to 16	56	--	--
17 to 48	43	73	--
49 and over	37	55	83

Where two elbows are placed together in the same plane in ducts 30 inches wide and larger, continue the guide vanes through both elbows rather than spaced in accordance with above schedule.

3.3.1.4 Outlets, Inlets, And Duct Branches

Install branches, inlets, and outlets per drawings.

3.3.1.5 Duct Transitions

Where the shape of a duct changes, ensure the angle of the side of the transition piece does not exceed 15 degrees from the straight run of duct connected thereto.

3.3.1.6 Branch Connections

Construct radius tap-ins in accordance with SMACNA 1966.

3.3.1.7 Manual Volume Dampers

Provide balancing dampers of the butterflytype, to balance each respective main and branch duct.

3.3.2 Round Sheet Metal Ducts

3.3.2.1 Duct Gages And Reinforcement

Sheet metal minimum thickness, joints, and reinforcement between joints shall be in accordance with ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966.

Provide ducts with supplemental girth angle supports, riveted with solid rivets 6 inches on center to duct. Locate girth angles as follows:

DIAMETER, INCHES	REINFORCEMENT-MAXIMUM SPACING, INCHES
25 to 36	1-1/4 by 1-1/4, 1/8 thick, 72 inches on center
37 to 50	1-1/4 by 1-1/4, 1/8 thick, 60 inches on center
51 to 60	1-1/2 by 1-1/2, 1/8 thick, 48 inches on center

Bolt heads and nuts shall be hex-shaped, 5/16 inch diameter for ducts up to 50 inch diameter, and 3/8 inch diameter for 51 inch diameter ducts and larger.

Continuously weld flanges to duct on outside of duct and intermittently welded with 1 inch welds every4 inches on inside joint face. Remove excess filler metal from inside face. Protect galvanized areas that have been damaged by welding with manufacturer's standard corrosion-resistant coating.

3.3.2.2 Duct Joints

Provide duct joints manufactured by machine, with spiral locksets to and including 60 inch diameters, and to dimensional tolerances compatible with fittings provided. Draw band girth joints are not acceptable.

Prepare slip joints by coating the male fitting with elastomer sealing

materials, exercising care to prevent mastic from entering fitting bore, leaving only a thin annular mastic line exposed internally. Use sheet metal screws to make assembly rigid, not less than four screws per joint, maximum spacing 6 inches. Do not use pop rivets. Tape and heat seal all joints.

3.3.2.3 Duct Transitions

Where the shape of a duct changes, ensure the angle of the side of the transition piece does not exceed 15 degrees from the straight run of duct connected thereto.

Where equipment is installed in ductwork, ensure the angle of the side of the transition piece from the straight run of duct connected thereto does not exceed 15 degrees on the upstream side of the equipment and 22-1/2 degrees on the downstream side of the equipment.

3.3.3 Transverse Reinforcement Joints

Provide transverse reinforcements that are riveted with solid rivets to duct sides 6 inches on center . Weld transverse reinforcement at all corners to form continuous frames.

3.3.4 Joint Gaskets

Gasket flanged joints with chloroprene full-face gaskets 1/8 inch thick, Shore A 40 durometer hardness. Use one-piece gaskets, vulcanized at joints.

3.3.5 Radius Elbows

Fabricate elbow proportions and radius elbows in accordance with ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966.

3.3.6 Plenum Connections

Ensure round duct connections are welded joint bellmouth type.

Ensure rectangular duct connections are bellmouth type, constructed in accordance with ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966.

3.3.7 Duct Supports

Install duct support in accordance with ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966. Meet the minimum size for duct hangers as specified in ASHRAE EQUIP IP HDBK, Chapter 16, ASHRAE FUN IP, Chapter 32 and SMACNA 1966. Provide two hangers where necessary to eliminate sway. Support attachment to duct surfaces by bolt 4 inches on center.

Take the following into account in selection of a hanging system:

a. Location and precedence of work under other sections

b. Interferences of various piping and electrical conduit

c. Equipment,and building configuration

d. Structural and safety factor requirements

e. Vibration, and imposed loads under normal and abnormal service conditions

Support sizes, configurations, and spacing are given to show the minimal type of supporting components required. If installed loads are excessive for the specified hanger spacing, hangers, and accessories provide heavier-duty components . After system startup, replace any duct support device which, due to length, configuration, or size, vibrates or causes possible failure of a member, or the condition otherwise be alleviated. Exercise special care to preclude cascade-type failures.

Do not hang ductwork and equipment from roof deck, piping, or other ducts or equipment. Maximum span between any two points is 10 feet, with lesser spans as required by duct assemblies, interferences, and permitted loads imposed.

Where support from metal deck systems is involved, coordinate support requirements with installation of metal deck.

3.3.7.1 Hangars

Attach hanger rods, angles, and straps to beam clamps. Receive approval from the Contracting Officer for concrete inserts, masonry anchors, and fasteners for the application.

Hardened high-carbon spring-steel fasteners fitted onto beams and miscellaneous structural steel are acceptable upon prior approval of each proposed application and upon field demonstration of conformance to specification requirements. Make fasteners from steel conforming to AISI Type 1055 , treated and finished in conformance with SAE AMS 2480, Type Z (zinc phosphate base), Class 2 (supplementary treatment). Verify a 72-hour load-carrying capacity by a certified independent laboratory.

Where ductwork system contains heavy equipment, excluding air-diffusion devices and single-leaf dampers, hang such equipment independently of the ductwork by means of rods or angles of sizes adequate to support the load.

Sufficiently cross-brace hangers to eliminate swaying both vertically and laterally.

3.3.7.2 Installation

Ensure hanger spacing gives a 20-to-1 safety factor for supported load.

Maximum load supported by any two fasteners is 100 pounds.

Install hangers on both sides of all duct turns, branch fittings, and transitions.

Friction rod assemblies are not acceptable.

3.3.7.3 Strap-type Hangars

Support rectangular ducts up to 36 inches by strap-type hangers attached at not less than three places to not less than two duct surfaces in different planes.

Perforated strap hangers are not acceptable.

3.3.7.4 Trapeze Hangars

Support rectangular ducting, 36 inches and larger, by trapeze hangers. Support ducts situated in unconditioned areas and required to have insulation with a vapor-sealed facing on trapeze hangers. Space hangers far enough out from the side of the duct to permit the duct insulation to be placed on the duct inside the trapeze. Do not penetrate the vapor-sealed facing with duct hangers.

Where trapeze hangers are used, support the bottom of the duct on angles sized as follows:

WIDTH OF DUCT, INCHES	MINIMUM BOTTOM ANGLE SIZE, INCHES
30 and smaller	1-1/4 by 1-1/4 by 1/8
31 to 48	1-1/2 by 1-1/2 by 1/8
49 to 72	1-1/2 by 1-1/2 by 3/16
73 to 96	2 by 2 by 1/4
97 and wider	3 by 3 by 1/4

3.3.7.5 Purlins

Do not support ducting, when supported from roof purlins, at points greater than one-sixth of the purlin span from the roof truss. Do not exceed 400 pounds load per hanger when support is from a single purlin or 800 pounds when hanger load is applied halfway between purlins by means of auxiliary support steel provided under this section. When support is not halfway between purlins, the allowable hanger load is the product of 400 times the inverse ratio of the longest distance of purlin-to-purlin spacing.

When the hanger load exceeds the above limits, provide reinforcing of purlin(s) or additional support beam(s). When an additional beam is used, have the beam bear on the top chord of the roof trusses, and also bear over the gusset plates of top chord. Stabilize the beam by connection to roof purlin along bottom flange.

Purlins used for supporting fire-protection sprinkler mains, electrical lighting fixtures, electrical power ducts, or cable trays are considered fully loaded. Provide supplemental reinforcing or auxiliary support steel for these purlins.

3.3.8 Openings In Roofs And Walls

Building openings are fixed and provide equipment to suit.

3.4 FIELD QUALITY CONTROL

3.4.1 Inspection

Inspect ductwork in accordance with SMACNA 1987.

3.5 DUCTWORK CLEANING PROVISIONS

Protect open ducting from construction dust and debris in a manner approved by the Contracting Officer. Clean dirty assembled ducting by subjecting all main and branch interior surfaces to airstreams moving at velocities two times specified working velocities, at static pressures within maximum ratings. This may be accomplished by: filter-equipped portable blowers which remain the Contractor's property; wheel-mounted, compressed-air operated perimeter lances which direct the compressed air and which are pulled in the direction of normal airflow; or other means approved by the Contracting Officer. Use water- and oil- free compressed air for cleaning ducting. After construction is complete, and prior to acceptance of the work, remove construction dust and debris from exterior surfaces.

3.6 OPERATION AND MAINTENANCE

Submit 6 copies of the operation and maintenance manuals 30 calendar days prior to testing the medium/high pressure ductwork systems. Update data and resubmit for final approval no later than 30 calendar days prior to contract completion.

Ensure Operation and Maintenance Manuals are consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures and safety precautions.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 00 00.00 20

BASIC ELECTRICAL MATERIALS AND METHODS

07/06

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED REQUIREMENTS
1.3 DEFINITIONS
1.4 ELECTRICAL CHARACTERISTICS
1.5 ADDITIONAL SUBMITTALS INFORMATION
1.5.1 Shop Drawings (SD-02)
1.5.2 Product Data (SD-03)
1.6 QUALITY ASSURANCE
1.6.1 Regulatory Requirements
1.6.2 Standard Products
1.6.2.1 Alternative Qualifications
1.6.2.2 Material and Equipment Manufacturing Date
1.7 WARRANTY
1.8 POSTED OPERATING INSTRUCTIONS
1.9 MANUFACTURER'S NAMEPLATE
1.10 FIELD FABRICATED NAMEPLATES
1.11 ELECTRICAL REQUIREMENTS
1.12 INSTRUCTION TO GOVERNMENT PERSONNEL

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING
3.2 FIELD FABRICATED NAMEPLATE MOUNTING
3.3 WARNING SIGN MOUNTING

-- End of Section Table of Contents --

SECTION 26 00 00.00 20

BASIC ELECTRICAL MATERIALS AND METHODS
07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

1.2 RELATED REQUIREMENTS

. This section applies to all sections of Division 26, ELECTRICAL , of this project specification unless specified otherwise in the individual sections. This section has been incorporated into, and thus, does not apply to, and is not referenced in the following sections.

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM
Section 26 51 00 INTERIOR LIGHTING

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed

description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be 480 volts, three phase, three wire. Final connections to the power distribution system will be made by the government.

1.5 ADDITIONAL SUBMITTALS INFORMATION

Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1.5.1 Shop Drawings (SD-02)

Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.2 Product Data (SD-03)

Submittal shall include performance and characteristic curves.

1.6 QUALITY ASSURANCE

1.6.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.6.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless

stated in the technical section.

1.6.2.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.8 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

c. Safety precautions.

d. The procedure in the event of equipment failure.

e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.9 MANUFACTURER'S NAMEPLATE

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.10 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription

shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.11 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.12 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instructions to acquaint the operating personnel with the changes or modifications.

PART 2 PRODUCTS

2.1 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.

PART 3 EXECUTION

3.1 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 20 00

INTERIOR DISTRIBUTION SYSTEM

02/14

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Fuses
1.4.2 Regulatory Requirements
1.4.3 Standard Products
1.4.3.1 Alternative Qualifications
1.4.3.2 Material and Equipment Manufacturing Date
1.5 MAINTENANCE
1.5.1 Electrical Systems
1.6 WARRANTY

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT
2.2 CONDUIT AND FITTINGS
2.2.1 Rigid Metallic Conduit
2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit
2.2.2 Flexible Metal Conduit
2.2.2.1 Liquid-Tight Flexible Metal Conduit, Steel
2.2.3 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit
2.2.3.1 Fittings for Rigid Metal Conduit and IMC
2.3 OUTLET BOXES AND COVERS
2.4 CABINETS, JUNCTION BOXES, AND PULL BOXES
2.5 WIRES AND CABLES
2.5.1 Conductors
2.5.1.1 Minimum Conductor Sizes
2.5.2 Color Coding
2.5.2.1 Ground and Neutral Conductors
2.5.2.2 Ungrounded Conductors
2.5.3 Insulation
2.5.4 Bonding Conductors
2.6 SPLICES AND TERMINATION COMPONENTS
2.7 DEVICE PLATES
2.8 SWITCHES
2.8.1 Toggle Switches
2.8.2 Disconnect Switches
2.9 FUSES
2.9.1 Fuseholders
2.9.2 Cartridge Fuses, Current Limiting Type (Class R)
2.9.3 Cartridge Fuses, High-Interrupting Capacity, Current Limiting Type (Classes J, L, and CC)
2.10 RECEPTACLES

2.10.1 Switched Duplex Receptacles
2.10.2 Weatherproof Receptacles
2.10.3 Ground-Fault Circuit Interrupter Receptacles
2.10.4 Special Purpose Receptacles
2.10.5 Plugs
2.11 CABLE REELS
2.12 PANELBOARDS
2.12.1 Enclosure
2.12.2 Panelboard Buses
2.12.3 Circuit Breakers
2.12.3.1 Multipole Breakers
2.12.3.2 Circuit Breakers for HVAC Equipment
2.13 TRANSFORMERS
2.13.1 Specified Transformer Efficiency
2.14 MOTORS
2.14.1 High Efficiency Single-Phase Motors
2.14.2 Premium Efficiency Polyphase Motors
2.14.3 Motor Sizes
2.14.4 Wiring and Conduit
2.15 MOTOR CONTROLLERS
2.15.1 Control Wiring
2.15.2 Control Circuit Terminal Blocks
2.15.2.1 Types of Terminal Blocks
2.15.3 Control Circuits
2.15.4 Enclosures for Motor Controllers
2.15.5 Multiple-Speed Motor Controllers and Reversible Motor Controllers
2.15.6 Pushbutton Stations
2.15.7 Pilot and Indicating Lights
2.16 LOCKOUT REQUIREMENTS
2.17 GROUNDING AND BONDING EQUIPMENT
2.17.1 Ground Bus
2.18 HAZARDOUS LOCATIONS
2.19 MANUFACTURER'S NAMEPLATE
2.20 FIELD FABRICATED NAMEPLATES
2.21 WARNING SIGNS
2.22 FIRESTOPPING MATERIALS
2.23 FACTORY APPLIED FINISH
2.24 SOURCE QUALITY CONTROL
2.24.1 Transformer Factory Tests

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Hazardous Locations
3.1.2 Wiring Methods
3.1.2.1 Pull Wire
3.1.3 Conduit Installation
3.1.3.1 Conduit Support
3.1.3.2 Directional Changes in Conduit Runs
3.1.3.3 Locknuts and Bushings
3.1.3.4 Flexible Connections
3.1.4 Boxes, Outlets, and Supports
3.1.4.1 Boxes
3.1.4.2 Pull Boxes
3.1.5 Mounting Heights
3.1.6 Conductor Identification
3.1.6.1 Marking Strips
3.1.7 Splices

3.1.8 Covers and Device Plates
3.1.9 Electrical Penetrations
3.1.10 Grounding and Bonding
3.1.10.1 Ground Bus
3.1.10.2 Resistance
3.1.11 Equipment Connections
3.1.12 Surge Protective Devices
3.2 FIELD FABRICATED NAMEPLATE MOUNTING
3.3 WARNING SIGN MOUNTING
3.4 FIELD APPLIED PAINTING
3.5 FIELD QUALITY CONTROL
3.5.1 Devices Subject to Manual Operation
3.5.2 600-Volt Wiring Test
3.5.3 Transformer Tests
3.5.4 Ground-Fault Receptacle Test
3.5.5 Grounding System Test

-- End of Section Table of Contents --

SECTION 26 20 00

INTERIOR DISTRIBUTION SYSTEM
02/14

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM B1	(2013) Standard Specification for Hard-Drawn Copper Wire
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C80.1	(2005) American National Standard for Electrical Rigid Steel Conduit (ERSC)
NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA FU 1	(2012) Low Voltage Cartridge Fuses
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V

NEMA ICS 4	(2010) Terminal Blocks
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA KS 1	(2013) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA MG 1	(2011; Errata 2012) Motors and Generators
NEMA MG 10	(2013) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors
NEMA MG 11	(1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors
NEMA ST 20	(1992; R 1997) Standard for Dry-Type Transformers for General Applications
NEMA TP 1	(2002) Guide for Determining Energy Efficiency for Distribution Transformers
NEMA WD 1	(1999; R 2005; R 2010) Standard for General Color Requirements for Wiring Devices
NEMA WD 6	(2012) Wiring Devices Dimensions Specifications
NEMA Z535.4	(2011) American National Standard for Product Safety Signs and Labels

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NFPA 70E	(2015) Standard for Electrical Safety in the Workplace

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

29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint Jul 2012) Standard for Flexible Metal Conduit
UL 1063	(2006; Reprint Jul 2012) Machine-Tool Wires and Cables
UL 1203	(2013) UL Standard for Safety Explosion-Proof and Dust-Ignition-Proof

	Electrical Equipment for Use in Hazardous (Classified) Locations
UL 198M	(2003; Reprint Feb 2013) Standard for Mine-Duty Fuses
UL 20	(2010; Reprint Feb 2012) General-Use Snap Switches
UL 360	(2013; Reprint Aug 2014) Liquid-Tight Flexible Steel Conduit
UL 4248-1	(2007; Reprint Oct 2013) UL Standard for Safety Fuseholders - Part 1: General Requirements
UL 4248-12	(2007; Reprint Dec 2012) UL Standard for Safety Fuseholders - Part 12: Class R
UL 44	(2014; Reprint Jun 2014) Thermoset-Insulated Wires and Cables
UL 486A-486B	(2013; Reprint Feb 2014) Wire Connectors
UL 486C	(2013; Reprint Feb 2014) Splicing Wire Connectors
UL 489	(2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 498	(2012; Reprint Oct 2014) Attachment Plugs and Receptacles
UL 50	(2007; Reprint Apr 2012) Enclosures for Electrical Equipment, Non-environmental Considerations
UL 506	(2008; Reprint Oct 2013) Specialty Transformers
UL 508	(1999; Reprint Oct 2013) Industrial Control Equipment
UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012; Reprint Nov 2014) Conduit, Tubing and Cable Fittings
UL 514C	(2014) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 6	(2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel

UL 67	(2009; Reprint Nov 2014) Standard for Panelboards
UL 674	(2011; Reprint Jul 2013) Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations
UL 83	(2014) Thermoplastic-Insulated Wires and Cables
UL 869A	(2006) Reference Standard for Service Equipment
UL 943	(2006; Reprint Jun 2012) Ground-Fault Circuit-Interrupters
UL 984	(1996; Reprint Sep 2005) Hermetic Refrigerant Motor-Compressors

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE 100.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00.

SD-02 Shop Drawings

Panelboards; G, AE

Transformers; G, AE

SD-03 Product Data

Receptacles; G, AE

Circuit breakers; G, AE

Switches; G, AE

Transformers; G, AE

Motor controllers; G, AE

Cable Reels; G, AE

SD-06 Test Reports

600-volt wiring test; G

Grounding system test; G

Transformer tests; G

Ground-fault receptacle test; G

SD-09 Manufacturer's Field Reports

Transformer factory tests; G

SD-10 Operation and Maintenance Data

Electrical Systems, Data Package 5; G

Submit operation and maintenance data in accordance with Section 01 78 23, OPERATION AND MAINTENANCE DATA and as specified herein.

1.4 QUALITY ASSURANCE

1.4.1 Fuses

Submit coordination data as specified in paragraph, FUSES of this section.

1.4.2 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.4.3 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and:

a. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening including applications of equipment and materials under similar circumstances and of similar size.

b. Have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.

c. Where two or more items of the same class of equipment are required, provide products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.3.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.3.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable.

1.5 MAINTENANCE

1.5.1 Electrical Systems

Submit operation and maintenance manuals for electrical systems that provide basic data relating to the design, operation, and maintenance of the electrical distribution system for the building. Include the following:

a. Single line diagram of the "as-built" building electrical system.

b. Schematic diagram of electrical control system (other than HVAC, covered elsewhere).

c. Manufacturers' operating and maintenance manuals on active electrical equipment.

1.6 WARRANTY

Provide equipment items supported by service organizations that are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.

2.2 CONDUIT AND FITTINGS

Conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

ANSI C80.1, UL 6.

2.2.2 Flexible Metal Conduit

UL 1.

2.2.2.1 Liquid-Tight Flexible Metal Conduit, Steel

UL 360.

2.2.3 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings: cadmium- or zinc-coated in accordance with UL 514B.

2.2.3.1 Fittings for Rigid Metal Conduit and IMC

Threaded-type. Split couplings unacceptable.

2.3 OUTLET BOXES AND COVERS

UL 514A, cadmium- or zinc-coated, if ferrous metal. UL 514C, if nonmetallic.

2.4 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.5 WIRES AND CABLES

Provide wires and cables in accordance applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Do not use wires and cables manufactured more than 12 months prior to date of delivery to site.

2.5.1 Conductors

Provide the following:

a. Conductor sizes and capacities shown are based on copper, unless indicated otherwise.

b. Conductors No. 12 AWG and larger diameter: stranded.

c. Conductors No. 14 AWG and smaller diameter: solid.

d. Conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3: stranded unless specifically indicated otherwise.

e. All conductors: copper.

2.5.1.1 Minimum Conductor Sizes

Provide minimum conductor size in accordance with the following:

a. Branch circuits: No. 12 AWG.

b. Class 1 remote-control and signal circuits: No. 14 AWG.

c. Class 2 low-energy, remote-control and signal circuits: No. 16 AWG.

d. Class 3 low-energy, remote-control, alarm and signal circuits: No. 22 AWG.

2.5.2 Color Coding

Provide color coding for service, feeder, branch, control, and signaling circuit conductors.

2.5.2.1 Ground and Neutral Conductors

Provide color coding of ground and neutral conductors as follows:

a. Grounding conductors: Green.

b. Neutral conductors: White.

c. Exception, where neutrals of more than one system are installed in same raceway or box, other neutrals color coding: white with a different colored (not green) stripe for each.

2.5.2.2 Ungrounded Conductors

Provide color coding of ungrounded conductors in different voltage systems as follows:

a. 208/120 volt, three-phase

(1) Phase A - black

(2) Phase B - red

(3) Phase C - blue

b. 480 volt, three-phase

(1) Phase A - brown

(2) Phase B - orange

(3) Phase C - yellow

c. 120/240 volt, single phase: Black and red

2.5.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, provide power and lighting wires rated for 600-volts, Type THWN/THHN conforming to UL 83 or Type XHHW conforming to UL 44, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits: Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.5.4 Bonding Conductors

ASTM B1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.6 SPLICES AND TERMINATION COMPONENTS

UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires: insulated, pressure-type in accordance with UL 486A-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.7 DEVICE PLATES

Provide the following:

a. UL listed, one-piece device plates for outlets to suit the devices installed.

b. For metal outlet boxes, plates on unfinished walls: zinc-coated sheet steel or cast metal having round or beveled edges.

g. Sectional type device plates are not be permitted.

h. Plates installed in wet locations: gasketed and UL listed for "wet locations."

2.8 SWITCHES

2.8.1 Toggle Switches

NEMA WD 1, UL 20, single pole, totally enclosed with bodies of thermoplastic or thermoset plastic and mounting strap with grounding screw. Include the following:

a. Handles: white thermoplastic.

b. Wiring terminals: screw-type, side-wired.

c. Contacts: silver-cadmium and contact arm - one-piece copper alloy.

d. Switches: rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.

2.8.2 Disconnect Switches

NEMA KS 1. Provide heavy duty-type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches. Utilize Class R fuseholders and fuses for fused switches, unless indicated otherwise. Provide horsepower rated for switches serving as the motor-disconnect means. Provide switches in NEMA enclosure as indicated per NEMA ICS 6.

2.9 FUSES

NEMA FU 1. Provide complete set of fuses for each fusible switch. Coordinate time-current characteristics curves of fuses serving motors or connected in series with circuit breakers or other circuit protective devices for proper operation. Submit coordination data for approval. Provide fuses with a voltage rating not less than circuit voltage.

2.9.1 Fuseholders

Provide in accordance with UL 4248-1.

2.9.2 Cartridge Fuses, Current Limiting Type (Class R)

UL 198M, Class RK-1 time-delay type. Provide only Class R associated fuseholders in accordance with UL 4248-12.

2.9.3 Cartridge Fuses, High-Interrupting Capacity, Current Limiting Type (Classes J, L, and CC)

UL 198M, Class J for zero to 600 amperes, Class L for 601 to 6,000

amperes, and Class CC for zero to 30 amperes.

2.10 RECEPTACLES

Provide the following:

a. UL 498, hard use (also designated heavy-duty), grounding-type.

b. Ratings and configurations: as indicated.

c. Bodies: white as per NEMA WD 1.

d. Face and body: thermoplastic supported on a metal mounting strap.

e. Dimensional requirements: per NEMA WD 6.

f. Screw-type, side-wired wiring terminals or of the solderless pressure type having suitable conductor-release arrangement.

g. Grounding pole connected to mounting strap.

h. The receptacle: containing triple-wipe power contacts and double or triple-wipe ground contacts.

2.10.1 Switched Duplex Receptacles

Provide separate terminals for each ungrounded pole. Top receptacle: switched when installed.

2.10.2 Weatherproof Receptacles

Provide receptacles, UL listed for use in "wet locations". Include cast metal box with gasketed, hinged, lockable and weatherproof while-in-use, die-cast metal/aluminum cover plate.

2.10.3 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Provide device capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A ground-fault circuit interrupter devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

2.10.4 Special Purpose Receptacles

Several receptacles indicated on the drawings are special purpose. Provide in ratings indicated and submit each receptacle/plug (as applicable) for review/approval. Furnish one matching plug with each receptacle as indicated on the drawings, unless otherwise noted.

2.10.5 Plugs

Provide heavy-duty, rubber-covered three-, four-, or five-wire cord of required size, install plugs thereon, and attach to equipment. Provide UL listed plugs with receptacles, complete with grounding blades. Where equipment is not available, turn over plugs and cord assemblies to the Government.

2.11 CABLE REELS

Provide cable reels in quantities and sizes as indicated on the drawings. Coordinate installation of cable reel with other disciplines and provide and install support bracket as required to support the install. Cable reel shall be retracted when roof is in closed position and the cable reel shall hold the tension when roof is opened. Intermediate cable support shall be provided if cable droop/slack is greater than 1' every 20'.

2.12 PANELBOARDS

Provide panelboards in accordance with the following:

a. UL 67 and UL 50 having a short-circuit current rating as indicated.

b. Panelboards for use as service disconnecting means: additionally conform to UL 869A.

c. Panelboards: circuit breaker-equipped.

d. Designed such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL.

e. "Specific breaker placement" is required in panelboards to match the breaker placement indicated in the panelboard schedule on the drawings.

f. Use of "Subfeed Breakers" is not acceptable unless specifically indicated otherwise.

g. Main breaker: "separately" mounted "above" branch breakers.

h. Where "space only" is indicated, make provisions for future installation of breakers.

i. Directories: indicate load served by each circuit in panelboard.

j. Directories: indicate source of service to panelboard (e.g., Panel PA served from Panel MDP).

l. Type directories and mount in holder behind transparent protective covering.

m. Panelboards: listed and labeled for their intended use.

n. Panelboard nameplates: provided in accordance with paragraph FIELD FABRICATED NAMEPLATES.

2.12.1 Enclosure

Provide panelboard enclosure in accordance with the following:

a. UL 50.

b. Cabinets mounted outdoors or flush-mounted: hot-dipped galvanized after fabrication.

c. Cabinets: painted in accordance with paragraph PAINTING.

d. Outdoor cabinets: NEMA 3R raintight with conduit hubs welded to the cabinet.

e. Front edges of cabinets: form-flanged or fitted with structural shapes welded or riveted to the sheet steel, for supporting the panelboard front.

f. All cabinets: fabricated such that no part of any surface on the finished cabinet deviates from a true plane by more than 1/8 inch.

g. Holes: provided in the back of indoor surface-mounted cabinets, with outside spacers and inside stiffeners, for mounting the cabinets with a 1/2 inch clear space between the back of the cabinet and the wall surface.

h. Flush doors: mounted on hinges that expose only the hinge roll to view when the door is closed.

i. Each door: fitted with a combined catch and lock, except that doors over 24 inches long provided with a three-point latch having a knob with a T-handle, and a cylinder lock.

j. Keys: two provided with each lock, with all locks keyed alike.

k. Finished-head cap screws: provided for mounting the panelboard fronts on the cabinets.

2.12.2 Panelboard Buses

Support bus bars on bases independent of circuit breakers. Design main buses and back pans so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus per UL 67 for connecting grounding conductors; bond to steel cabinet.

2.12.3 Circuit Breakers

UL 489, thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker will be mounted. Breaker terminals: UL listed as suitable for type of conductor provided. Series rated circuit breakers and plug-in circuit breakers are unacceptable.

2.12.3.1 Multipole Breakers

Provide common trip-type with single operating handle. Design breaker such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

2.12.3.2 Circuit Breakers for HVAC Equipment

Provide circuit breakers for HVAC equipment having motors (group or individual) marked for use with HACR type and UL listed as HACR type.

2.13 TRANSFORMERS

Provide transformers in accordance with the following:

a. NEMA ST 20, general purpose, dry-type, self-cooled, non-ventilated.

b. Provide transformers in NEMA 3R enclosure.

c. Transformer insulation system:

(1) 220 degrees C insulation system for transformers 15 kVA and greater, with temperature rise not exceeding 115 degrees C under full-rated load in maximum ambient of 40 degrees C.

e. Transformer of 115 degrees C temperature rise: capable of carrying continuously 115 percent of nameplate kVA without exceeding insulation rating.

g. Transformers: quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.

2.13.1 Specified Transformer Efficiency

Transformers, indicated and specified with: 480V primary, 80 degrees C or 115 degrees C temperature rise, kVA ratings of 37.5 to 100 for single phase or 30 to 500 for three phase, energy efficient type. Minimum efficiency, based on factory test results: not be less than NEMA Class 1 efficiency as defined by NEMA TP 1.

2.14 MOTORS

Provide motors in accordance with the following:

b. Hermetic-type sealed motor compressors: Also comply with UL 984.

c. Provide the size in terms of HP, or kVA, or full-load current, or a combination of these characteristics, and other characteristics, of each motor as indicated or specified.

d. Determine specific motor characteristics to ensure provision of correctly sized starters and overload heaters.

e. Rate motors for operation on 208-volt, 3-phase circuits with a terminal voltage rating of 200 volts, and those for operation on 480-volt, 3-phase circuits with a terminal voltage rating of 460 volts.

f. Use motors designed to operate at full capacity with voltage variation of plus or minus 10 percent of motor voltage rating.

g. Unless otherwise indicated, use continuous duty type motors if rated 1 HP and above.

h. Where fuse protection is specifically recommended by the equipment manufacturer, provide fused switches in lieu of non-fused switches indicated.

2.14.1 High Efficiency Single-Phase Motors

Single-phase fractional-horsepower alternating-current motors: high efficiency types corresponding to the applications listed in NEMA MG 11. In exception, for motor-driven equipment with a minimum seasonal or overall efficiency rating, such as a SEER rating, provide equipment with motor to meet the overall system rating indicated.

2.14.2 Premium Efficiency Polyphase Motors

Select polyphase motors based on high efficiency characteristics relative to typical characteristics and applications as listed in NEMA MG 10. In addition, continuous rated, polyphase squirrel-cage medium induction motors must meet the requirements for premium efficiency electric motors in accordance with NEMA MG 1, including the NEMA full load efficiency ratings. In exception, for motor-driven equipment with a minimum seasonal or overall efficiency rating, such as a SEER rating, provide equipment with motor to meet the overall system rating indicated.

2.14.3 Motor Sizes

Provide size for duty to be performed, not exceeding the full-load nameplate current rating when driven equipment is operated at specified capacity under most severe conditions likely to be encountered. When motor size provided differs from size indicated or specified, make adjustments to wiring, disconnect devices, and branch circuit protection to accommodate equipment actually provided. Provide controllers for motors rated 1-hp and above with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage. Provide protection for motors from immediate restart by a time adjustable restart relay.

2.14.4 Wiring and Conduit

Provide internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field-installed equipment, and motor control equipment forming part of motor control centers, the conduit and wiring connecting such centers, assemblies, or other power sources to equipment as specified herein. Power wiring and conduit: conform to the requirements specified herein. Control wiring: provided under, and conform to, the requirements of the section specifying the associated equipment.

2.15 MOTOR CONTROLLERS

Provide motor controllers in accordance with the following:

a. UL 508, NEMA ICS 1, and NEMA ICS 2.

b. Provide controllers with thermal overload protection in each phase, and one spare normally open auxiliary contact, and one spare normally closed auxiliary contact.

c. Provide controllers for motors rated 1-hp and above with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage.

d. Provide protection for motors from immediate restart by a time adjustable restart relay.

e. When used with pressure, float, or similar automatic-type or maintained-contact switch, provide a hand/off/automatic selector switch with the controller.

f. Connections to selector switch: wired such that only normal automatic regulatory control devices are bypassed when switch is in "hand" position.

g. Safety control devices, such as low and high pressure cutouts, high temperature cutouts, and motor overload protective devices: connected in motor control circuit in "hand" and "automatic" positions.

h. Control circuit connections to hand/off/automatic selector switch or to more than one automatic regulatory control device: made in accordance with indicated or manufacturer's approved wiring diagram.

j. Provide a disconnecting means, capable of being locked in the open position, for the motor that is located in sight from the motor location and the driven machinery location. As an alternative, provide a motor controller disconnect, capable of being locked in the open position, to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

l. Overload protective devices: provide adequate protection to motor windings; be thermal inverse-time-limit type; and include manual reset-type pushbutton on outside of motor controller case.

m. Cover of combination motor controller and manual switch or circuit breaker: interlocked with operating handle of switch or circuit breaker so that cover cannot be opened unless handle of switch or circuit breaker is in "off" position.

o. Provide controllers in hazardous locations with classifications as indicated.

2.15.1 Control Wiring

Provide control wiring in accordance with the following:

a. All control wire: stranded tinned copper switchboard wire with 600-volt flame-retardant insulation Type SIS meeting UL 44, or Type MTW meeting UL 1063, and passing the VW-1 flame tests included in those standards.

b. Hinge wire: Class K stranding.

c. Current transformer secondary leads: not smaller than No. 10 AWG.

d. Control wire minimum size: No. 14 AWG.

e. Power wiring for 480-volt circuits and below: the same type as control wiring with No. 12 AWG minimum size.

f. Provide wiring and terminal arrangement on the terminal blocks to permit the individual conductors of each external cable to be terminated on adjacent terminal points.

2.15.2 Control Circuit Terminal Blocks

Provide control circuit terminal blocks in accordance with the following:

a. NEMA ICS 4.

b. Control circuit terminal blocks for control wiring: molded or fabricated type with barriers, rated not less than 600 volts.

c. Provide terminals with removable binding, fillister or washer head screw type, or of the stud type with contact and locking nuts.

d. Terminals: not less than No. 10 in size with sufficient length and space for connecting at least two indented terminals for 10 AWG conductors to each terminal.

e. Terminal arrangement: subject to the approval of the Contracting Officer with not less than four (4) spare terminals or 10 percent, whichever is greater, provided on each block or group of blocks.

f. Modular, pull apart, terminal blocks are acceptable provided they are of the channel or rail-mounted type.

g. Submit data showing that any proposed alternate will accommodate the specified number of wires, are of adequate current-carrying capacity, and are constructed to assure positive contact between current-carrying parts.

2.15.2.1 Types of Terminal Blocks

a. Short-Circuiting Type: Short-circuiting type terminal blocks: furnished for all current transformer secondary leads with provision for shorting together all leads from each current transformer without first opening any circuit. Terminal blocks: comply with the requirements of paragraph CONTROL CIRCUIT TERMINAL BLOCKS above.

b. Load Type: Load terminal blocks rated not less than 600 volts and of adequate capacity: provided for the conductors for NEMA Size 3 and smaller motor controllers and for other power circuits, except those for feeder tap units. Provide terminals of either the stud type with contact nuts and locking nuts or of the removable screw type, having length and space for at least two indented terminals of the size required on the conductors to be terminated. For conductors rated more than 50 amperes, provide screws with hexagonal heads. Conducting parts between connected terminals must have adequate contact surface and cross-section to operate without overheating. Provide eEach connected terminal with the circuit designation or wire number placed on or near the terminal in permanent contrasting color.

2.15.3 Control Circuits

Control circuits: maximum voltage of 120 volts derived from control transformer in same enclosure. Transformers: conform to UL 506, as applicable. Transformers, other than transformers in bridge circuits: provide primaries wound for voltage available and secondaries wound for correct control circuit voltage. Size transformers so that 80 percent of rated capacity equals connected load. Provide disconnect switch on primary side. Provide fuses in each ungrounded primary feeder. Provide one fused secondary lead with the other lead grounded.

2.15.4 Enclosures for Motor Controllers

NEMA ICS 6.

2.15.5 Multiple-Speed Motor Controllers and Reversible Motor Controllers

Across-the-line-type, electrically and mechanically interlocked. Multiple-speed controllers: include compelling relays and multiple-button, station-type with pilot lights for each speed.

2.15.6 Pushbutton Stations

Provide with "start/stop" momentary contacts having one normally open and one normally closed set of contacts, and red lights to indicate when motor is running. Stations: heavy duty, oil-tight design.

2.15.7 Pilot and Indicating Lights

Provide LED cluster lamps.

2.16 LOCKOUT REQUIREMENTS

Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Comply with requirements of Division 23, "Mechanical" for mechanical isolation of machines and other equipment.

2.17 GROUNDING AND BONDING EQUIPMENT

2.17.1 Ground Bus

Copper ground bus: Provided as indicated.

2.18 HAZARDOUS LOCATIONS

Electrical materials, equipment, and devices for installation in hazardous locations, as defined by NFPA 70: specifically approved by Underwriters' Laboratories, Inc., or Factory Mutual for particular "Class," "Division," and "Group" of hazardous locations involved. Boundaries and classifications of hazardous locations: as indicated. Equipment in hazardous locations: comply with UL 1203 for electrical equipment and industrial controls and UL 674 for motors.

2.19 MANUFACTURER'S NAMEPLATE

Provide on each item of equipment a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.20 FIELD FABRICATED NAMEPLATES

Provide field fabricated nameplates in accordance with the following:

a. ASTM D709.

b. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the

drawings.

c. Each nameplate inscription: identify the function and, when applicable, the position.

d. Nameplates: melamine plastic, 0.125 inch thick, white with black center core.

f. Surface: matte finish. Corners: square. Accurately align lettering and engrave into the core.

g. Minimum size of nameplates: one by 2.5 inches.

h. Lettering size and style: a minimum of 0.25 inch high normal block style.

2.21 WARNING SIGNS

Provide warning signs for flash protection in accordance with NFPA 70E and NEMA Z535.4 for switchboards, panelboards, industrial control panels, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized. Provide field installed signs to warn qualified persons of potential electric arc flash hazards when warning signs are not provided by the manufacturer. Provide marking that is clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

2.22 FIRESTOPPING MATERIALS

Provide firestopping around electrical penetrations with a UL Approved fire sealant material to maintain the rating of separation.

2.23 FACTORY APPLIED FINISH

Provide factory-applied finish on electrical equipment in accordance with the following:

a. NEMA 250 corrosion-resistance test and the additional requirements as specified herein.

b. Interior and exterior steel surfaces of equipment enclosures: thoroughly cleaned followed by a rust-inhibitive phosphatizing or equivalent treatment prior to painting.

c. Exterior surfaces: free from holes, seams, dents, weld marks, loose scale or other imperfections.

d. Interior surfaces: receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice.

e. Exterior surfaces: primed, filled where necessary, and given not less than two coats baked enamel with semigloss finish.

g. Provide manufacturer's coatings for touch-up work and as specified in paragraph FIELD APPLIED PAINTING.

2.24 SOURCE QUALITY CONTROL

2.24.1 Transformer Factory Tests

Submittal: include routine NEMA ST 20 transformer test results on each transformer and also provide the results of NEMA "design" and "prototype" tests that were made on transformers electrically and mechanically equal to those specified.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces: conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

3.1.1 Hazardous Locations

Perform work in hazardous locations, as defined by NFPA 70, in strict accordance with NFPA 70 for particular "Class," "Division," and "Group" of hazardous locations involved. Provide conduit and cable seals where required by NFPA 70. Provide conduit with tapered threads.

3.1.2 Wiring Methods

Provide insulated conductors installed in rigid steel conduit except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor: separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size: 3/4 inch in diameter for low voltage lighting and power circuits. Firestop conduit which penetrates fire-rated walls, fire-rated partitions, or fire-rated floors with a UL Approved fire sealant material to maintain the rating of separation.

3.1.2.1 Pull Wire

Install pull wires in empty conduits. Pull wire: plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

3.1.3 Conduit Installation

Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where conduit will be visible after completion of project.

3.1.3.1 Conduit Support

Support conduit by pipe straps, wall brackets, threaded rod conduit hangers.. Fasten by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Do not exceed one-fourth proof test load for load applied to fasteners. Do not share supporting means between electrical raceways and mechanical piping or ducts. Coordinate installation with mechanical

systems to assure maximum accessibility to all systems. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. For conduits greater than 2 1/2 inches inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

3.1.3.2 Directional Changes in Conduit Runs

Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.1.3.3 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Provide locknuts with sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.3.4 Flexible Connections

Provide flexible steel conduit between 3 and 6 feet in length for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size: 3/4 inch diameter. Provide liquidtight flexible conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

3.1.4 Boxes, Outlets, and Supports

Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways: cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, or when installed in hazardous areas and when specifically indicated. Provide each box with volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures: minimum 4 inches square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature. Fasten boxes and supports with machine screws or welded studs on steel.

3.1.4.1 Boxes

Boxes for use with raceway systems: minimum 1 1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets: minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet.

3.1.4.2 Pull Boxes

Construct of at least minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

3.1.5 Mounting Heights

Mount panelboards, circuit breakers, motor controller and disconnecting switches so height of operating handle at its highest position is maximum 78 inches above floor. Mount lighting switches 48 inches above finished floor. Mount receptacles 48 inches above finished floor, unless otherwise indicated. Mount other devices as indicated. Measure mounting heights of receptacle outlet boxes in the hazardous areas to the bottom of the outlet box.

3.1.6 Conductor Identification

Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, provide color coding by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, provide color coding by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves.

3.1.6.1 Marking Strips

Provide marking strips in accordance with the following:

a. Provide white or other light-colored plastic marking strips, fastened by screws to each terminal block, for wire designations.

b. Use permanent ink for the wire numbers

c. Provide reversible marking strips to permit marking both sides, or provide two marking strips with each block.

d. Size marking strips to accommodate the two sets of wire numbers.

e. Assign a device designation in accordance with NEMA ICS 1 to each device to which a connection is made. Mark each device terminal to which a connection is made with a distinct terminal marking corresponding to the wire designation used on the Contractor's schematic and connection diagrams.

f. The wire (terminal point) designations used on the Contractor's wiring diagrams and printed on terminal block marking strips may be according to the Contractor's standard practice; however, provide additional wire and cable designations for identification of remote (external) circuits for the Government's wire designations.

g. Prints of the marking strips drawings submitted for approval will be so marked and returned to the Contractor for addition of the designations to the terminal strips and tracings, along with any rearrangement of points required.

3.1.7 Splices

Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

3.1.8 Covers and Device Plates

Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 inch. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.

3.1.9 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated walls, partitions, floors, or ceilings in accordance with with a UL Approved fire sealant material to maintain the rating of separation

3.1.10 Grounding and Bonding

Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, and neutral conductor of wiring systems. Make ground connection at main service equipment. Interconnect all grounding media in or on the structure to provide a common ground potential. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

3.1.10.1 Ground Bus

Provide a copper ground bus as indicated. Noncurrent-carrying metal parts of transformer neutrals and other electrical equipment: effectively grounded by bonding to the ground bus. Bond the ground bus to both the entrance ground. Make connections and splices of the brazed, welded, bolted, or pressure-connector type, except use pressure connectors or bolted connections for connections to removable equipment.

3.1.10.2 Resistance

Maximum resistance-to-ground of grounding system: do not exceed 5 ohms under dry conditions. Where resistance obtained exceeds 5 ohms, contact Contracting Officer for further instructions.

3.1.11 Equipment Connections

Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications and are provided under the section specifying the associated equipment.

3.1.12 Surge Protective Devices

Connect the surge protective devices in parallel to the power source, keeping the conductors as short and straight as practically possible. Maximum allowed lead length is 3 feet.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

3.4 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Where field painting of enclosures for panelboards, load centers or the like is specified to match adjacent surfaces, to correct damage to the manufacturer's factory applied coatings, or to meet the indicated or specified safety criteria, provide manufacturer's recommended coatings and apply in accordance to manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 working days notice prior to each test.

3.5.1 Devices Subject to Manual Operation

Operate each device subject to manual operation at least five times, demonstrating satisfactory operation each time.

3.5.2 600-Volt Wiring Test

Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance: 250,000 ohms.

3.5.3 Transformer Tests

Perform the standard, not optional, tests in accordance with the Inspection and Test Procedures for transformers, dry type, air-cooled, 600 volt and below; as specified in NETA ATS. Measure primary and secondary voltages for proper tap settings. Tests need not be performed by a recognized independent testing firm or independent electrical consulting firm.

3.5.4 Ground-Fault Receptacle Test

Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed.

3.5.5 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 29 23

VARIABLE FREQUENCY DRIVE SYSTEMS UNDER 600 VOLTS

04/06

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED REQUIREMENTS
1.3 SYSTEM DESCRIPTION
1.3.1 Performance Requirements
1.3.1.1 Electromagnetic Interference Suppression
1.3.1.2 Electromechanical and Electrical Components
1.3.2 Electrical Requirements
1.3.2.1 Power Line Surge Protection
1.3.2.2 Sensor and Control Wiring Surge Protection
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Schematic Diagrams
1.5.2 Interconnecting Diagrams
1.5.3 Installation Drawings
1.5.4 Equipment Schedule
1.5.5 Installation instructions
1.5.6 Factory Test Results
1.6 DELIVERY AND STORAGE
1.7 WARRANTY
1.8 MAINTENANCE
1.8.1 Spare Parts
1.8.2 Maintenance Support

PART 2 PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES (VFD)
2.2 ENCLOSURES
2.3 WIRES AND CABLES
2.4 NAMEPLATES
2.5 SOURCE QUALITY CONTROL
2.5.1 VFD Factory Test Plan

PART 3 EXECUTION

3.1 INSTALLATION
3.2 FIELD QUALITY CONTROL
3.2.1 VFD Test
3.2.2 Performance Verification Tests
3.2.3 Endurance Test
3.3 DEMONSTRATION
3.3.1 Training
3.3.1.1 Instructions to Government Personnel
3.3.1.2 Operating Personnel Training Program
3.3.1.3 Engineering/Maintenance Personnel Training

-- End of Section Table of Contents --

SECTION 26 29 23

VARIABLE FREQUENCY DRIVE SYSTEMS UNDER 600 VOLTS
04/06

PART 1 GENERAL

1.1 REFERENCES

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

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 519	(2014) Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 3.1	(2009) Guide for the Application, Handling, Storage, Installation and Maintenance of Medium-Voltage AC Contactors, Controllers and Control Centers
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA ICS 7	(2014) Adjustable-Speed Drives

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-461	(2007; Rev F) Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

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

47 CFR 15	Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)

UL 489	(2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 508C	(2002; Reprint Nov 2010) Power Conversion Equipment

1.2 RELATED REQUIREMENTS

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS, and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM apply to this section with additions and modifications specified herein.

1.3 SYSTEM DESCRIPTION

1.3.1 Performance Requirements

1.3.1.1 Electromagnetic Interference Suppression

Computing devices, as defined by 47 CFR 15, MIL-STD-461 rules and regulations, shall be certified to comply with the requirements for class A computing devices and labeled as set forth in part 15.

1.3.1.2 Electromechanical and Electrical Components

Electrical and electromechanical components of the Variable Frequency Drive (VFD) shall not cause electromagnetic interference to adjacent electrical or electromechanical equipment while in operation.

1.3.2 Electrical Requirements

1.3.2.1 Power Line Surge Protection

IEEE C62.41.1 and IEEE C62.41.2, IEEE 519 Control panel shall have surge protection, included within the panel to protect the unit from damaging transient voltage surges. Surge arrestor shall be mounted near the incoming power source and properly wired to all three phases and ground. Fuses shall not be used for surge protection.

1.3.2.2 Sensor and Control Wiring Surge Protection

I/O functions as specified shall be protected against surges induced on control and sensor wiring installed outdoors and as shown. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10 microsecond by 1000 microsecond waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.

b. An 8 microsecond by 20 microsecond waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Schematic diagrams; G, AE

Interconnecting diagrams; G, AE

Installation drawings; G, AE

Submit drawings for government approval prior to equipment construction or integration. Modifications to original drawings made during installation shall be immediately recorded for inclusion into the as-built drawings.

SD-03 Product Data

Variable frequency drives; G, AE

Wires and cables; G, AE

Equipment schedule; G, AE

Include data indicating compatibility with motors being driven.

SD-06 Test Reports

VFD Test; G

Performance Verification Tests; G

Endurance Test; G

SD-08 Manufacturer's Instructions

Installation instructions; G

SD-09 Manufacturer's Field Reports

VFD Factory Test Plan; G

Factory test results; G

SD-10 Operation and Maintenance Data

Variable frequency drives, Data Package 4; G

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Provide service and maintenance information including preventive maintenance, assembly, and disassembly procedures. Include electrical drawings from electrical general sections. Submit additional information necessary to provide complete operation, repair, and maintenance information, detailed

to the smallest replaceable unit. Include copies of as-built submittals. Provide routine preventative maintenance instructions, and equipment required. Provide instructions on how to modify program settings, and modify the control program. Provide instructions on drive adjustment, trouble-shooting, and configuration. Provide instructions on process tuning and system calibration.

1.5 QUALITY ASSURANCE

1.5.1 Schematic Diagrams

Show circuits and device elements for each replaceable module. Schematic diagrams of printed circuit boards are permitted to group functional assemblies as devices, provided that sufficient information is provided for government maintenance personnel to verify proper operation of the functional assemblies.

1.5.2 Interconnecting Diagrams

Show interconnections between equipment assemblies, and external interfaces, including power and signal conductors. Include for enclosures and external devices.

1.5.3 Installation Drawings

Show floor plan of each site, with V.F.D.'s and motors indicated. Indicate ventilation requirements, adequate clearances, and cable routes.

1.5.4 Equipment Schedule

Provide schedule of equipment supplied. Schedule shall provide a cross reference between manufacturer data and identifiers indicated in shop drawings. Schedule shall include the total quantity of each item of equipment supplied. For complete assemblies, such as VFD's, provide the serial numbers of each assembly, and a sub-schedule of components within the assembly. Provide recommended spare parts listing for each assembly or component.

1.5.5 Installation instructions

Provide installation instructions issued by the manufacturer of the equipment, including notes and recommendations, prior to shipment to the site. Provide operation instructions prior to acceptance testing.

1.5.6 Factory Test Results

Document test results and submit to government within 7 working days after completion of test.

1.6 DELIVERY AND STORAGE

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

1.7 WARRANTY

The complete system shall be warranted by the manufacturer for a period of

one year, or the contracted period of any extended warrantee agreed upon by the contractor and the Government, after successful completion of the acceptance test. Any component failing to perform its function as specified and documented shall be repaired or replaced by the contractor at no additional cost to the Government. Items repaired or replaced shall be warranted for an additional period of at least one year from the date that it becomes functional again, as specified in the FAR CLAUSE 52.246-21.

1.8 MAINTENANCE

1.8.1 Spare Parts

Manufacturers provide spare parts in accordance with recommended spare parts list.

1.8.2 Maintenance Support

During the warranty period, the Contractor shall provide on-site, on-call maintenance services by Contractor's personnel on the following basis: The service shall be on a per-call basis with 36 hour response. Contractor shall support the maintenance of all hardware and software of the system. Various personnel of different expertise shall be sent on-site depending on the nature of the maintenance service required. Costs shall include travel, local transportation, living expenses, and labor rates of the service personnel while responding to the service request. The provisions of this Section are not in lieu of, nor relieve the Contractor of, warranty responsibilities covered in this specification. Should the result of the service request be the uncovering of a system defect covered under the warranty provisions, all costs for the call, including the labor necessary to identify the defect, shall be borne by the Contractor.

PART 2 PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES (VFD)

Provide frequency drive to control the speed of induction motor(s). The VFD shall include the following minimum functions, features and ratings.

a. Input circuit breaker per UL 489 with a minimum of 10,000 amps symmetrical interrupting capacity and door interlocked external operator.

b. A converter stage per UL 508C shall change fixed voltage, fixed frequency, ac line power to a fixed dc voltage. The converter shall utilize a full wave bridge design incorporating diode rectifiers. Silicon Controlled Rectifiers (SCR) are not acceptable. The converter shall be insensitive to three phase rotation of the ac line and shall not cause displacement power factor of less than .95 lagging under any speed and load condition.

c. An inverter stage shall change fixed dc voltage to variable frequency, variable voltage, ac for application to a standard NEMA design B squirrel cage motor. The inverter shall be switched in a manner to produce a sine coded pulse width modulated (PWM) output waveform.

d. The VFD shall be capable of supplying 120 percent of rated full load current for one minute at maximum ambient temperature.

e. The VFD shall be designed to operate from a 480 volt, plus or minus 10 percent, three phase, 60 Hz supply, and control motors with a corresponding voltage rating.

f. Acceleration and deceleration time shall be independently adjustable from one second to 600 seconds.

g. Adjustable full-time current limiting shall limit the current to a preset value which shall not exceed 120 percent of the controller rated current. The current limiting action shall maintain the V/Hz ratio constant so that variable torque can be maintained. Short time starting override shall allow starting current to reach 175 percent of controller rated current to maximum starting torque.

h. The controllers shall be capable of producing an output frequency over the range of 3 Hz to 60 Hz (20 to one speed range), without low speed cogging. Over frequency protection shall be included such that a failure in the controller electronic circuitry shall not cause frequency to exceed 110 percent of the maximum controller output frequency selected.

i. Minimum and maximum output frequency shall be adjustable over the following ranges: 1) Minimum frequency 3 Hz to 50 percent of maximum selected frequency; 2) Maximum frequency 40 Hz to 60 Hz.

j. The controller efficiency at any speed shall not be less than 96 percent.

k. The controllers shall be capable of being restarted into a motor coasting in the forward direction without tripping.

l. Protection of power semiconductor components shall be accomplished without the use of fast acting semiconductor output fuses. Subjecting the controllers to any of the following conditions shall not result in component failure or the need for fuse replacement:

1. Short circuit at controller output

2. Ground fault at controller output

3. Open circuit at controller output

4. Input undervoltage

5. Input overvoltage

6. Loss of input phase

7. AC line switching transients

8. Instantaneous overload

9. Sustained overload exceeding 115 percent of controller rated current

10. Over temperature

11. Phase reversal

m. Solid state motor overload protection shall be included such that current exceeding an adjustable threshold shall activate a 60 second timing circuit. Should current remain above the threshold continuously for the timing period, the controller will automatically shut down.

n. A slip compensation circuit shall be included which will sense changing motor load conditions and adjust output frequency to provide speed regulation of NEMA B motors to within plus or minus 0.5 percent of maximum speed without the necessity of a tachometer generator.

o. The VFD shall be factory set for manual restart after the first protective circuit trip for malfunction (overcurrent,undervoltage, overvoltage or overtemperature) or an interruption of power. The VFD shall be capable of being set for automatic restart after a selected time delay. If the drive faults again within a specified time period (adjustable 0-60 seconds), a manual restart will be required.

p. The VFD shall include external fault reset capability. All the necessary logic to accept an external fault reset contact shall be included.

q. Provide critical speed lockout circuitry to prevent operating at frequencies with critical harmonics that cause resonant vibrations. The VFD shall have a minimum of three user selectable bandwidths.

r. Provide the following operator control and monitoring devices mounted on the front panel of the VFD:

1. Manual speed potentiometer.

2. Hand-Off-Auto (HOA) switch.

3. Power on light.

4. Drive run power light.

5. Local display.

s. Provide properly sized Uninterruptible Power Supply (UPS) in the roof control panel to provide control power to the VFD/gearmoter brake release circuit. The UPS shall be sized to provide thirty (30) minutes of run time in the event of a main power failure.

t. The VFDs shall be configured to operate in sensorless vector mode for constant torque applications and in Volts/Hz mode for variable torque applications.

u. The VFDs shall be equipped with Modbus RTU over serial RS485 communication capability as a minimum.

2.2 ENCLOSURES

Provide equipment enclosures conforming to NEMA 250, NEMA ICS 7, NEMA ICS 6.

2.3 WIRES AND CABLES

All wires and cables shall conform to NEMA 250, NEMA ICS 7, NFPA 70.

2.4 NAMEPLATES

Nameplates external to NEMA enclosures shall conform with the requirements of Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS. Nameplates internal to enclosures shall be manufacturer's standard, with the exception that they must be permanent.

2.5 SOURCE QUALITY CONTROL

2.5.1 VFD Factory Test Plan

To ensure quality, each VFD shall be subject to a series of in-plant quality control inspections before approval for shipment from the manufacturer's facilities. Provide test plans and test reports.

PART 3 EXECUTION

3.1 INSTALLATION

Per NEMA ICS 3.1, install equipment in accordance with the approved manufacturer's printed installation drawings, instructions, wiring diagrams, and as indicated on project drawings and the approved shop drawings. A field representative of the drive manufacturer shall supervise the installation of all equipment, and wiring.

3.2 FIELD QUALITY CONTROL

Specified products shall be tested as a system for conformance to specification requirements prior to scheduling the acceptance tests. Contractor shall conduct performance verification tests in the presence of Government representative, observing and documenting complete compliance of the system to the specifications. Contractor shall submit a signed copy of the test results, certifying proper system operation before scheduling tests.

3.2.1 VFD Test

A proposed test plan shall be submitted to the contracting officer at least 28 calendar days prior to proposed testing for approval. The tests shall conform to NEMA ICS 1, NEMA ICS 7, and all manufacturer's safety regulations. The Government reserves the right to witness all tests and review any documentation. The contractor shall inform the Government at least 14 working days prior to the dates of testing. Contractor shall provide video tapes, if available, of all training provided to the Government for subsequent use in training new personnel. All training aids, texts, and expendable support material for a self-sufficient presentation shall be provided, the amount of which to be determined by the contracting officer.

3.2.2 Performance Verification Tests

"Performance Verification Test" plan shall provide the step by step procedure required to establish formal verification of the performance of the VFD. Compliance with the specification requirements shall be verified by inspections, review of critical data, demonstrations, and tests. The Government reserves the right to witness all tests, review data, and request other such additional inspections and repeat tests as necessary to ensure that the system and provided services conform to the stated requirements. The contractor shall inform the Government 14 calendar days

prior to the date the test is to be conducted.

3.2.3 Endurance Test

Immediately upon completion of the performance verification test, the endurance test shall commence. The system shall be operated at varying rates for not less than 192 consecutive hours, at an average effectiveness level of .9998, to demonstrate proper functioning of the complete PCS. Continue the test on a day-to-day basis until performance standard is met. During the endurance test, the contractor shall not be allowed in the building. The system shall respond as designed.

3.3 DEMONSTRATION

3.3.1 Training

Coordinate training requirements with the Contracting Officer.

3.3.1.1 Instructions to Government Personnel

Provide the services of competent instructors who will give full instruction to designated personnel in operation, maintenance, calibration, configuration, and programming of the complete control system. Orient the training specifically to the system installed. Instructors shall be thoroughly familiar with the subject matter they are to teach. The Government personnel designated to attend the training will have a high school education or equivalent. The number of training days of instruction furnished shall be as specified. A training day is defined as eight hours of instruction, including two 15-minute breaks and excluding lunch time; Monday through Friday. Provide a training manual for each student at each training phase which describes in detail the material included in each training program. Provide one additional copy for archiving. Provide equipment and materials required for classroom training. Provide a list of additional related courses, and offers, noting any courses recommended. List each training course individually by name, including duration, approximate cost per person, and location of course. Unused copies of training manuals shall be turned over to the Government at the end of last training session.

3.3.1.2 Operating Personnel Training Program

Provide one 2 hour training session at the site at a time and place mutually agreeable between the Contractor and the Government. Provide session to train 4 operation personnel in the functional operations of the system and the procedures that personnel will follow in system operation. This training shall include:

a. System overview

b. General theory of operation

c. System operation

d. Alarm formats

e. Failure recovery procedures

f. Troubleshooting

3.3.1.3 Engineering/Maintenance Personnel Training

Accomplish the training program as specified. Training shall be conducted on site at a location designated by the Government. Provide a one day training session to train 4 engineering personnel in the functional operations of the system. This training shall include:

a. System overview

b. General theory of operation

c. System operation

d. System configuration

e. Alarm formats

f. Failure recovery procedures

g. Troubleshooting and repair

h. Maintenance and calibration

i. System programming and configuration

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 51 00

INTERIOR LIGHTING

07/07

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED REQUIREMENTS
1.3 DEFINITIONS
1.4 SYSTEM DESCRIPTION
1.5 SUBMITTALS
1.6 QUALITY ASSURANCE
1.6.1 Fluorescent Electronic Ballasts
1.6.2 Lighting Fixtures, Complete With Lamps and Ballasts
1.6.3 Regulatory Requirements
1.6.4 Standard Products
1.6.4.1 Alternative Qualifications
1.6.4.2 Material and Equipment Manufacturing Date
1.6.4.3 Energy Efficiency
1.7 WARRANTY
1.7.1 Electronic Ballast Warranty
1.8 OPERATIONAL SERVICE
1.9 SUSTAINABLE DESIGN REQUIREMENTS
1.9.1 Local/Regional Materials

PART 2 PRODUCTS

2.1 FLUORESCENT LIGHTING FIXTURES
2.1.1 Fluorescent Lamp Electronic Ballasts
2.1.1.1 T-8 Lamp Ballast
2.1.2 Fluorescent Lamps
2.2 FIXTURES FOR HAZARDOUS LOCATIONS
2.3 SWITCHES
2.3.1 Toggle Switches
2.4 LIGHTING CONTACTOR
2.5 EXIT SIGNS
2.5.1 Self-Powered LED Type Exit Signs (Battery Backup)
2.6 EMERGENCY LIGHTING EQUIPMENT
2.6.1 Emergency Lighting Unit
2.7 SELF-TESTING MODULE
2.8 EQUIPMENT IDENTIFICATION
2.8.1 Manufacturer's Nameplate
2.8.2 Labels
2.9 FACTORY APPLIED FINISH

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Lamps
3.1.2 Lighting Fixtures

3.1.3 Exit Signs and Emergency Lighting Units
3.2 FIELD APPLIED PAINTING
3.3 FIELD QUALITY CONTROL

-- End of Section Table of Contents --

SECTION 26 51 00

INTERIOR LIGHTING
07/07

PART 1 GENERAL

1.1 REFERENCES

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

CALIFORNIA ENERGY COMMISSION (CEC)

CEC Title 24	(2008; Effective Jan 2010) California's Energy Efficiency Standards for Residential and Nonresidential Buildings

ILLUMINATING ENGINEERING SOCIETY (IES)

IES HB-10	(2011) IES Lighting Handbook

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013; INT 8 2014) National Electrical Safety Code
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ANSLG C82.11	(2011) Lamp Ballasts - High-Frequency Fluorescent Lamp Ballasts
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA LL 1	(1997; R 2002) Procedures for Linear Fluorescent Lamp Sample Preparation and the TCLP Extraction

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2015) Life Safety Code
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

UNDERWRITERS LABORATORIES (UL)

UL 1598	(2008; Reprint Oct 2012) Luminaires
UL 844	(2012) Standard for Luminaires for Use in Hazardous (Classified) Locations
UL 924	(2006; Reprint Apr 2014) Standard for Emergency Lighting and Power Equipment
UL 935	(2001; Reprint Aug 2014) Standard for Fluorescent-Lamp Ballasts

1.2 RELATED REQUIREMENTS

Materials not considered to be lighting equipment or lighting fixture accessories are specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Lighting fixtures and accessories mounted on exterior surfaces of buildings are specified in this section.

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

b. Average life is the time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

c. Total harmonic distortion (THD) is the root mean square (RMS) of all the harmonic components divided by the total fundamental current.

1.4 SYSTEM DESCRIPTION

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Data, drawings, and reports shall employ the terminology, classifications,

and methods prescribed by theIES HB-10 , as applicable, for the lighting system specified.

SD-03 Product Data

Fluorescent lighting fixtures; G, AE

Fluorescent electronic ballasts; G, AE

Fluorescent lamps; G, AE

Lighting contactor; G, AE

Exit signs; G, AE

Emergency lighting equipment; G, AE

SD-04 Samples

Lighting fixtures, complete with lamps and ballasts; G

SD-06 Test Reports

Operating test; G

Submit test results as stated in paragraph entitled "Field Quality Control."

SD-10 Operation and Maintenance Data

Operational Service; G

Submit documentation that includes contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

1.6 QUALITY ASSURANCE

1.6.1 Fluorescent Electronic Ballasts

Submit ballast catalog data as required in the paragraph entitled "Fluorescent Lamp Electronic Ballasts" contained herein. As an option, submit the fluorescent fixture manufacturer's electronic ballast specification information in lieu of the actual ballast manufacturer's catalog data. This information shall include published specifications and sketches, which covers the information required by the paragraph entitled "Fluorescent Lamp Electronic Ballasts" herein. This information may be supplemented by catalog data if required, and shall contain a list of vendors with vendor part numbers.

1.6.2 Lighting Fixtures, Complete With Lamps and Ballasts

Submit one sample of each fixture type for inspection, review, and approval. The sample shall be retained for comparison against the remainder of the fixtures. The sample may be used in the final fixture installation.

1.6.3 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.6.4 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.6.4.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.4.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.6.4.3 Energy Efficiency

Comply with National Energy Policy Act and Energy Star requirements for lighting products. Submit data indicating lumens per watt efficiency and color rendition index of light source.

1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.7.1 Electronic Ballast Warranty

Furnish the electronic ballast manufacturer's warranty. The warranty period shall not be less than 5 years from the date of manufacture of the electronic ballast. Ballast assembly in the lighting fixture, transportation, and on-site storage shall not exceed 12 months, thereby permitting 4 years of the ballast 5 year warranty to be in service and energized. The warranty shall state that the malfunctioning ballast shall

be exchanged by the manufacturer and promptly shipped to the using Government facility. The replacement ballast shall be identical to, or an improvement upon, the original design of the malfunctioning ballast.

1.8 OPERATIONAL SERVICE

Coordinate with manufacturer for maintenance agreement.Collect information from the manufacturer about maintenance agreement options, and submit to Contracting Officer.

1.9 SUSTAINABLE DESIGN REQUIREMENTS

1.9.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.

PART 2 PRODUCTS

2.1 FLUORESCENT LIGHTING FIXTURES

UL 1598. Fluorescent fixtures shall have electronic ballasts.

2.1.1 Fluorescent Lamp Electronic Ballasts

The electronic ballast shall as a minimum meet the following characteristics:

a. Ballast shall comply with UL 935, NEMA ANSLG C82.11, NFPA 70, and CEC Title 24 unless specified otherwise. Ballast shall be 100 percent electronic high frequency type with no magnetic core and coil components. Ballast shall provide transient immunity as recommended by IEEE C62.41.1 and IEEE C62.41.2. Ballast shall be designed for the wattage of the lamps used in the indicated application. Ballasts shall be designed to operate on the voltage system to which they are connected.

b. Power factor shall be 0.95 (minimum).

c. Ballast shall operate at a frequency of 20,000 Hertz (minimum). Ballast shall be compatible with and not cause interference with the operation of occupancy sensors or other infrared control systems. Provide ballasts operating at or above 40,000 Hertz where available.

d. Ballast shall have light regulation of plus or minus 10 percent lumen output with a plus or minus 10 percent input voltage regulation. Ballast shall have 10 percent flicker (maximum) using any compatible lamp.

e. Ballast factor shall be between 0.85 (minimum) and 1.00 (maximum). Current crest factor shall be 1.7 (maximum).

f. Ballast shall be UL listed Class P with a sound rating of "A."

g. Ballast shall have circuit diagrams and lamp connections displayed on the ballast.

h. Ballasts shall be instant start unless otherwise indicated. Ballasts

shall be programmed start where indicated. Instant start ballasts shall operate lamps in a parallel circuit configuration that permits the operation of remaining lamps if one or more lamps fail or are removed.

k. Ballast shall be capable of starting and maintaining operation at a minimum of 0 degrees F unless otherwise indicated.

l. Electronic ballast shall have a full replacement warranty of 5 years from date of manufacture as specified in paragraph entitled "Electronic Ballast Warranty" herein.

2.1.1.1 T-8 Lamp Ballast

a. Total harmonic distortion (THD): Shall be 20 percent (maximum).

b. Input wattage.

3. 92 watts (maximum) when operating three F32T8 lamps

c. Ballast efficacy factor.

3. 0.93 (minimum) when operating three F32T8 lamps

2.1.2 Fluorescent Lamps

a. T-8 rapid start low mercury lamps shall be rated 32 watts (maximum), 2800 initial lumens (minimum), CRI of 75 (minimum), color temperature of 4100 K, and an average rated life of 20,000 hours. Low mercury lamps shall have passed the EPA Toxicity Characteristic Leachate Procedure (TCLP) for mercury by using the lamp sample preparation procedure described in NEMA LL 1.

Average rated life is based on 3 hours operating per start.

2.2 FIXTURES FOR HAZARDOUS LOCATIONS

In addition to requirements stated herein, provide fluorescent fixtures for hazardous locations which conform to UL 844 or which have Factory Mutual certification for the class and division indicated.

2.3 SWITCHES

2.3.1 Toggle Switches

Provide toggle switches as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.4 LIGHTING CONTACTOR

NEMA ICS 2 Rate contactor as indicated. Provide in NEMA 4 enclosure conforming to NEMA ICS 6. Contactor shall have silver alloy double-break contacts. Provide contactor with hand-off-automatic selector switch.

2.5 EXIT SIGNS

UL 924, NFPA 70, and NFPA 101. Exit signs shall be self-powered type. Exit signs shall use no more than 5 watts.

2.5.1 Self-Powered LED Type Exit Signs (Battery Backup)

Provide with automatic power failure device, test switch, pilot light, integral self-testing module and fully automatic high/low trickle charger in a self-contained power pack. Battery shall be sealed electrolyte type, shall operate unattended, and require no maintenance, including no additional water, for a period of not less than 5 years. LED exit sign shall have emergency run time of 1 1/2 hours (minimum). The light emitting diodes shall have rated lamp life of 70,000 hours (minimum).

2.6 EMERGENCY LIGHTING EQUIPMENT

UL 924, NFPA 70, and NFPA 101. Provide lamps in wattage indicated. Provide accessories required for remote-mounted lamps where indicated. Remote-mounted lamps shall be as indicated.

2.6.1 Emergency Lighting Unit

Provide as indicated. Emergency lighting units shall be rated for 12 vo lts. Provide integral self-testing module.

2.7 SELF-TESTING MODULE

Self-testing module for exit signs and emergency lighting equipment shall perform the following functions:

a. Continuous monitoring of charger operation and battery voltage with visual indication of normal operation and of malfunction.

b. Monthly discharge cycling of battery with monitoring of transfer circuit function, battery capacity and emergency lamp operation with visual indication of malfunction. The battery capacity test may be conducted by using a synthetic load.

c. Manual test switch to simulate a discharge test cycle.

d. Module shall have low voltage battery disconnect (LVD) and brown-out protection circuit.

2.8 EQUIPMENT IDENTIFICATION

2.8.1 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.8.2 Labels

Provide labeled luminaires in accordance with UL 1598 requirements. All luminaires shall be clearly marked for operation of specific lamps and ballasts according to proper lamp type. The following lamp characteristics shall be noted in the format "Use Only _____":

a. Lamp diameter code (T-4, T-5, T-8, T-12), tube configuration (twin, quad, triple), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.

b. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.

c. Start type (preheat, rapid start, instant start) for fluorescent and compact fluorescent luminaires.

d. ANSI ballast type (M98, M57, etc.) for HID luminaires.

e. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

All markings related to lamp type shall be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place. Ballasts shall have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.9 FACTORY APPLIED FINISH

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

3.1.1 Lamps

Lamps of the type, wattage, and voltage rating indicated shall be delivered to the project in the original cartons and installed just prior to project completion. Lamps installed and used for working light during construction shall be replaced prior to turnover to the Government if more than 15 percent of their rated life has been used. Lamps shall be tested for proper operation prior to turn-over and shall be replaced if necessary with new lamps from the original manufacturer. Provide 10 percent spare lamps of each type from the original manufacturer.

3.1.2 Lighting Fixtures

Set lighting fixtures plumb, square, and level with ceiling and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved drawings. Installation shall meet requirements of NFPA 70. Mounting heights specified or indicated shall be to the bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed.

3.1.3 Exit Signs and Emergency Lighting Units

Wire exit signs and emergency lighting units ahead of the switch to the normal lighting circuit located in the same room or area.

3.2 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be performed in accordance with manufacturers requirements.

3.3 FIELD QUALITY CONTROL

Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test to show that equipment operates in accordance with requirements of this section.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 40 - PROCESS INTEGRATION

SECTION 40 95 00

ROOF CONTROL

10/07

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.3 SYSTEM DESCRIPTION
1.3.1 General Requirements
1.3.2 Operation
1.3.3 Points
1.3.4 Operation and Maintenance Data Requirements
1.4 SUBMITTALS

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT
2.1.1 Standard Products
2.1.2 Nameplates
2.2 GENERAL REQUIREMENTS
2.3 MONITORING AND CONTROL PARAMETERS
2.4 PROGRAMMABLE LOGIC CONTROLLER (PLC)
2.4.1 PLC General Requirements
2.4.2 Modular PLC
2.4.2.1 Central Processing Unit (CPU) Module
2.4.2.2 Communications Module
2.4.2.3 Power Supply Module
2.4.2.4 Input/Output (I/O) Modules
2.4.3 Program Storage/Memory Requirements
2.4.4 Input/Output Characteristics
2.4.5 Wiring Connections
2.4.6 On-Off Switch
2.4.7 Diagnostics
2.4.8 Accuracy
2.5 PLC SOFTWARE
2.5.1 Operating System
2.5.1.1 Startup
2.5.1.2 Failure Mode
2.5.2 Functions
2.5.2.1 Analog Monitoring
2.5.2.2 Logic (Virtual)
2.5.2.3 State Variables
2.5.3 Alarm Processing
2.5.3.1 Digital Alarms
2.5.3.2 Analog Alarms
2.5.4 Resident Application Software
2.5.4.1 Failure Mode
2.6 CONTROL PANELS
2.6.1 Components

2.6.1.1 Enclosures
2.6.1.2 Standard Indicator Light
2.6.1.3 Selector Switches
2.6.1.4 Illuminated Push Buttons
2.6.1.5 Relays
2.6.1.6 Terminal Blocks
2.6.2 Panel Assembly
2.6.3 Electrical Requirements
2.6.4 Power Line Conditioner
2.6.4.1 85 Percent Load
2.6.4.2 Load Changes
2.6.5 Grounding
2.6.6 Convenience Outlet
2.6.7 Panel Interior Light
2.6.8 Heating System
2.7 FACTORY TEST
2.7.1 Factory Test Setup
2.7.2 Factory Test Procedure
2.7.3 Factory Test Report

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS
3.1.1 Installation
3.1.1.1 Isolation, Penetrations and Clearance from Equipment
3.1.1.2 Device Mounting
3.1.2 Sequences of Operation
3.2 INSTALLATION OF EQUIPMENT
3.2.1 Control Panels
3.3 WIRE, CABLE AND CONNECTING HARDWARE
3.3.1 Metering and Sensor Wiring
3.3.1.1 Power Line Surge Protection
3.3.1.2 Sensor and Control Wiring Surge Protection
3.4 SOFTWARE INSTALLATION
3.5 CONTROL SYSTEM DRAWINGS
3.6 FIELD TESTING AND ADJUSTING EQUIPMENT
3.6.1 Testing, Adjusting and Commissioning
3.6.2 Performance Verification Test (PVT)
3.7 MANUFACTURERS' FIELD SERVICES
3.8 FIELD TRAINING

-- End of Section Table of Contents --

SECTION 40 95 00

ROOF CONTROL
10/07

PART 1 GENERAL

1.1 REFERENCES

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

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.90	(2005) Standard for Relays and Relay Systems Associated With Electric Power Apparatus
IEEE C37.90.1	(2012) Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 61131-3	(2013) Programmable Controllers - Part 3: Programming Languages

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C12.1	(2008) Electric Meters Code for Electricity Metering
NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 3	(2005; R 2010) Medium-Voltage Controllers

	Rated 2001 to 7200 V AC
NEMA ICS 4	(2010) Terminal Blocks
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)	
NIST SP 250	(1991) Calibration Services Users Guide
U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)	
47 CFR 15	Radio Frequency Devices
UNDERWRITERS LABORATORIES (UL)	
UL 1059	(2001; Reprint Oct 2011) Standard for Terminal Blocks
UL 508	(1999; Reprint Oct 2013) Industrial Control Equipment

1.2 DEFINITIONS

Definitions, Symbols, and engineering unit abbreviations shall conform to IEEE Stds Dictionary, as applicable.

1.3 SYSTEM DESCRIPTION

The roof instrumentation and control system shall be used to monitor and control the operation of roof equipment as specified and in accordance with the sequence of control and control schematics shown on the drawings. The control system shall provide for operator interaction, overall control system supervision, and roof equipment control and monitoring. Provide hardware configured and sized to support expansion as specified and shown on the drawings.

1.3.1 General Requirements

The control system shall consist of a local, stand-alone control panel for basic monitoring and control of the retractable roof system motors and VFDs. The enclosure shall contain the station PLC and VFDs and accessories. The PLC and VFDs shall communicate via Modbus RTU over serial RS485 .

1.3.2 Operation

The control system provided under this specification shall operate using PLC algorithms or ladder logic type and supervisory control to provide the required sequence of operation. Input data to the controller shall be obtained by using instruments and controls interfaced to mechanical and , electrical systems and other systems as shown and specified. All required setpoints, settings, alarm limits, and sequences of operation shall be as identified in the sequences of operation shown on the drawings. The

number and location of control panels shown on drawings shall be provided as a minimum.

The roof retraction system shall be enabled from a key switch on the front door of the control panel. The traction motors shall be operated from momentary, iluminated pushbuttons on the control panel. Once enabled, one or both roof panels can be operated at any time. The roof panels shall be capable of changing direction in mid travel. The pushbuttons must be held in to operate the motors. Releasing the pushbutton shall stop the motors. The pushbutton L.E.D. shall be illuminated when the roof panel motors are engaged and the panel is in motion. The L.E.D. shall turn off when the panel reaches the end limit.

A maintained E-stop pushbutton shall be wired in series to a three-phase motor contactor with mechanically-linked contacts and located between the VFD and motor. Activation of the E-stop pushbutton will immediately remove power to the motors, which will coast to a stop. An auxiliary contact on the motor contactor shall be wired to the PLC for monitoring purposes and to reset the drive to Stop mode in the event that the E-stop switch is activated. A normally open contact on the E-stop pushbutton shall be wired to a PLC input for monitoring purposes. The drive shall be capable of sensing an open circuit between the VFD and the motor, and shall take approprate action to prevent a fault from being generated when the E-stop is activated.

The roof traction motors shall operate at two speeds utilizing variable frequency drives (VFDs), depending on the roof panel location along its travel. Initially the roofs open at a slow speed of 15 fpm (adjustable) and then shift to a faster speed of 30 fpm (adjustable) in between the end limits. The roofs slow to the slower speed when approaching either the open or closed position. Two limit switches located on each end of the roof travel limits shall be used for shifting the roof speed, and then stopping the panel at the end position.

The roofs shall be controlled through a PLC with hardwired inputs and outputs for the pushbuttons and run/stop commands to the VFDs. The PLC and VFD control power source shall be supplied through an uninterruptible power supply (UPS), which shall be sized for 30-minutes of operation at 75% load. In the event of a power failure the UPS shall provide control power to the PLC, and to the motor brake release circuit, which shall be activated from a keyswitch on the control panel. A "Trouble" L.E.D. shall flash at 1 Hz in the event of a VFD fault. The Trouble L.E.D. shall automatically stop flashing when the fault is cleared. The PLC shall monitor the VFDs over a daisy-chained serial communication network using Modbus RTU protocol. Operation of the roof motors from the VFD operator interface terminal shall be disabled.

1.3.3 Points

Inputs to and outputs from the control system shall be in accordance with the Input/Output (I/O) Summary Table shown on the drawings as a minimum and shall be as required to provide a functioning system. Each connected analog output (AO), analog input (AI), digital output (DO), digital input (DI), pulse accumulator (PA) input and other input or output device connected to the control system shall represent a "point" where referred to in this specification.

1.3.4 Operation and Maintenance Data Requirements

Outline the step-by-step procedures required for system startup, operation and shutdown. Include in the instructions layout, wiring and control diagrams of the system as installed, the manufacturer's name, model number, service manual, parts list and a brief description of all equipment and their basic operating features.

List routine maintenance procedures, possible breakdowns and repairs and trouble shooting guides.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Submit in booklet form, indexed to the unique identifiers, consisting of data sheets that document compliance with the specification. Where multiple components are shown on a catalog cut, mark the application specific component.

SD-02 Shop Drawings

Installation; G, AE
Wiring; G, AE
Control System Drawings; G, AE

SD-03 Product Data

Control and Sensor Wiring; G, AE
Factory Test Procedure; G, AE
Control System Components; G, AE

SD-06 Test Reports

Factory Test Report; G, AE
Testing, Adjusting and Commissioning; G, AE
Performance Verification Test(PVT); G, AE

SD-10 Operation and Maintenance Data

Training Manual; G
Instrumentation and Control System; G

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Standard Products

Materials and equipment shall be standard unmodified products of a manufacturer regularly engaged in the manufacturing of such products. Units of the same type of equipment shall be products of a single manufacturer. Items of the same type and purpose shall be identical and supplied by the same manufacturer, unless replaced by a new version approved by the Government.

2.1.2 Nameplates

Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Laminated plastic nameplates shall be provided for equipment devices and panels furnished. Each nameplate shall identify the device, such as pump "P-1" or valve "VLV-402" and as shown on the Drawings. Labels shall be coordinate with the schedules and the process and instrumentation drawings. Laminated plastic shall be 1/8 inch thick, white with black center core. Nameplates shall be a minimum of 1 by 3 inches with minimum 1/4 inch high engraved block lettering. Nameplates for devices smaller than 1 by 3 inches shall be attached by a nonferrous metal chain. All other nameplates shall be attached to the device.

2.2 GENERAL REQUIREMENTS

Electrical equipment shall conform to Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Equipment and wiring must be in accordance with NFPA 70, with proper consideration given to environmental conditions such as moisture, dirt, corrosive agents, and hazardous area classification.

2.3 MONITORING AND CONTROL PARAMETERS

The control system shall be complete including sensors, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, engineering units conversions and algorithms for the applications; and shall maintain the specified end-to-end process control loop accuracy from sensor to final control element. Control equipment enclosures shall be powered by a 120 vAc, single phase, 60 Hz power source, with local transformers included as needed for signal transmission and subsystem operation. Connecting conductors shall be suitable for installed service. All control system components shall be submitted for review.

2.4 PROGRAMMABLE LOGIC CONTROLLER (PLC)

2.4.1 PLC General Requirements

The basis of design model for the PLC is the Allen-Bradley Micrologix series.ThePLC shall be micro-processor based, capable of receiving discrete and analog inputs and, through programming, shall be able to control discrete and analog output functions, perform data handling operations and communicate with external devices. The PLC shall meet the requirements of Class A computing devices, and shall be labeled as set forth in 47 CFR 15 and shall be able to withstand conducted susceptibility test as outlined in NEMA ICS 1, NEMA ICS 2, NEMA ICS 3, and IEEE C37.90.1. The PLC shall function properly at temperatures between 32 and 122 degrees F at 5 to 95 percent relative humidity non-condensing and shall tolerate storage temperatures between minus 40 and plus 140 degrees F at 5 to 95 percent relative humidity non-condensing.

2.4.2 Modular PLC

The PLC shall be based on a modular, field expandable design allowing the system to be tailored to the process control application. The system shall be expandable through the use of additional hardware and/or user software. As a minimum, the PLC shall include a mounting backplane, power supply module, central processing unit (CPU) module, MODBUS RTU

communications module, and input/output (I/O) modules. The modules shall be grouped together in a mounting rack or cabinet. The mounting rack backplane shall provide the communications mechanism to fully integrate the individual modules located within the rack. Modules shall plug directly into the backplane. The use of wire connectors between modules will not be allowed. The rack size shall be as needed to hold the equipment necessary while performing the required control functions. The system configuration shall allow for the removal and/or installation of modules under power.

2.4.2.1 Central Processing Unit (CPU) Module

The CPU module shall be a self contained, microprocessor based unit that provides time of day, scanning, application (ladder rung logic) program execution, storage of application programs, storage of numerical values related to the application process and logic, I/O bus traffic control, peripheral and external device communications and self diagnostics.

2.4.2.2 Communications Module

The PLC communications module shall provide communication capability with the VFDs. The communication modules shall utilize serial, RS485 communication architecture and MODBUS RTU protocol. The communication module and enclosure design shall allow programming of the PLC to be done locally through the control panel enclosure with the doors closed via the use of a Graceport-type of interface adapter.

2.4.2.3 Power Supply Module

One or more power supply modules shall be provided as necessary to power other modules installed in the same cabinet.

a. Power supply modules shall use AC power with a nominal voltage of 120 vAc plus or minus 5 percent. The power supply module shall monitor the incoming line voltage level and shall provide over current and over voltage protection. If the voltage level is detected as being out of range the power supply module shall continue to provide power for an adequate amount of time to allow for a safe and orderly shutdown. Power supply modules shall be capable of withstanding a power loss for a minimum of 20 milliseconds while still remaining in operation and providing adequate power to all connected modules.

b. Each power supply module shall be provided with an on-off switch integral to the module.

c. Power supply modules shall be provided with an indicating light which shall be lit when the module is operating properly.

2.4.2.4 Input/Output (I/O) Modules

Modules shall be self contained, microprocessor based units that provide an interface to field devices. The module shall be located in the same mounting rack as the other PLC components. The unit shall plug directly into the backplane of the mounting rack. Each module shall contain visual indication to display the on-off status of individual inputs or outputs.

2.4.3 Program Storage/Memory Requirements

The CPU shall utilize the manufacturer's standard non-volatile memory for

the operating system. The controller shall have electronically erasable, programmable, read only memory (EEPROM) for storage of user programs and battery backed RAM for application memory. The EEPROM shall be loaded through the controller keypad, central station or through the use of a laptop computer. The CPU memory capacity shall be based on the system's control requirements. The memory capacity shall be sized such that, when the system is completely programmed and functional, no more than 50 percent of the memory allocated for these purposes is used.

2.4.4 Input/Output Characteristics

Each controller shall allow for analog inputs, analog outputs, discrete inputs and discrete outputs. The number and type of inputs and outputs for the system shall be as shown on the drawings and shall comply with the sequence of control. The system capacity shall include a minimum of 20 percent spare input and output points (no less than two points) for each point type provided. During normal operation, a malfunction in any input/output channel shall affect the operation of that channel only and shall not affect the operation of the CPU or any other channel. Analog input circuits shall be available in 4-20 mA. Discrete input circuits shall be available in 10-30 vDc or 79-132 vAc as required for interfacing with the roof retraction systems. All input circuits shall have a minimum optical isolation of 1500 VRMS and shall be filtered to guard against high voltage transients from the externally connected devices. Analog output circuits shall be available in 4-20 mA. Discrete output circuits shall be available in 10-30 vDc, 79-132 vAc, or as potential-free, isolated relay contacts as required for interfacing with the roof retraction systems. All output circuits shall have a minimum optical isolation of 1500 VRMS and shall be filtered to guard against high voltage transients from the externally connected devices.

2.4.5 Wiring Connections

Wiring connections shall be heavy duty, self lifting, pressure type screw terminals to provide easy wire insertion and secure connections. Twist-on wire connectors are not acceptable. The terminals shall accept two #14 AWG wires and shall be touch-safe to prevent accidental contact with live terminals. The terminal blocks shall have write-on areas for identification of the external circuits.

2.4.6 On-Off Switch

Each controller shall be provided with an integral on-off power switch and an external circuit breaker rated per the manufacturer's specifications. The circuit breaker shall also serve as an on/off switch for the CPU and shall be clearly labeled as to its function.

2.4.7 Diagnostics

Each PLC shall have diagnostic routines implemented in firmware. The CPU shall continuously perform self-diagnostic routines that will provide information on the configuration and status of the CPU, memory, communications and input/output. The diagnostic routines shall be regularly performed during normal system operation. A portion of the scan time of the controller shall be dedicated to performing these housekeeping functions. In addition, a more extensive diagnostic routine shall be performed at power up and during normal system shutdown. The CPU shall log input/output and system faults in fault tables which shall be accessible for display. When a fault affects input/output or

communications modules the CPU shall shut down only the hardware affected and continue operation by utilizing the healthy system components. All faults shall be annunciated at the PLC. Diagnostic software shall be useable in conjunction with the portable tester.

2.4.8 Accuracy

Controllers shall have an accuracy of plus or minus 0.25 percent of input span.

2.5 PLC SOFTWARE

All PLC software described in this specification shall be furnished as part of the complete control system.

2.5.1 Operating System

The PLC shall be provided with the manufacturer's standard operating system software package. The PLC shall maintain a point database in its memory that includes all parameters, constraints and the latest value or status of all points connected to the PLC. Execution of the PLC application programs shall use the data in memory resident files. The operating system shall support a full compliment of process control functions. It shall be possible to define these functions using a mix of function blocks, ladder logic diagrams, sequential function charts and text programming. Programming methods and interactions shall be based on IEC 61131-3. A combination of the programming methods shall be possible within a single controller. The operating system shall allow loading of software locally or from the central station and data files from the portable tester. It shall also support data entry and diagnostics using an operator interface panel attached directly to the PLC.

2.5.1.1 Startup

The PLC shall have startup software that causes automatic commencement of operation without human intervention, including startup of all connected I/O functions. A PLC restart program based on detection of power failure at the PLC shall be included in the PLC software. The restart program shall include start time delays between successive commands to prevent demand surges or overload trips.

2.5.1.2 Failure Mode

Upon failure for any reason, each PLC shall perform an orderly shutdown and force all PLC outputs to a predetermined (failure mode) state, consistent with the failure modes shown and the associated control device.

2.5.2 Functions

The controller operating system shall be able to scan inputs, control outputs, and read and write to its internal memory in order to perform the required control as indicated in the sequence of control on the drawings. The controller shall periodically perform self diagnostics to verify that it is functioning properly.

2.5.2.1 Analog Monitoring

The system shall measure and transmit all analog values including calculated analog points.

2.5.2.2 Logic (Virtual)

Logic (virtual) points shall be software points entered in the point database which are not directly associated with a physical I/O function. Logic (virtual) points shall be analog or digital points created by calculation from any combination of digital and analog points, or other data having all the properties of real points, including alarms, without the associated hardware. Logic (virtual) points shall be defined or calculated and entered into the database. The calculated analog point shall have point identification in the same format as any other analog point.

2.5.2.3 State Variables

If an analog point represents more than two (up to 8) specific states, each state shall be nameable. For example, a level sensor shall be displayed at its measured engineering units plus a state variable with named states usable in programs or for display such as low alarm/low/normal/high/high alarm.

2.5.3 Alarm Processing

The PLC shall have alarm processing software for indicating a general fault condition for all real and virtual points connected to the PLC. In the event of a fault in one of the VFDs the respective Touble LED on the control panel enclosure door shall flash at 1 Hz. In the event of a general PLC fault the Port and Starboard Roof Trouble indicator LEDs on the control panel enclosure door shall flash in unison at 1 Hz.

2.5.3.1 Digital Alarms

Digital alarms are those abnormal conditions indicated by DIs as specified and shown. The system shall automatically suppress analog alarm reporting associated with a digital point when that point is turned off.

2.5.3.2 Analog Alarms

Analog alarms are those conditions higher or lower than a defined value, as measured by an AI. Analog readings shall be compared to predefined high and low limits, and alarmed each time a value enters or returns from a limit condition. Unique high and low limits shall be assigned to each analog point in the system.

2.5.4 Resident Application Software

2.5.4.1 Failure Mode

In the event of a PLC failure, the controlled equipment shall cease to function via the control panel, and the roof sections shall be operated in manual mode.

2.6 CONTROL PANELS

2.6.1 Components

2.6.1.1 Enclosures

The enclosure for the Control Panel shall conform to the requirements of

NEMA 250 Type 4X (stainless steel), and configured for bottom or top-entry of power and control wiring. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish. Painted steel shall not be allowed for outdoor use. The enclosure for the Roof Control Panel shall be free-standing with continuously hinged exterior doors with print pocket, 3-point latching mechanisms and key lock.

The control panel enclosure shall house the PLC, VFDs, contactors and relays, and all necessary componts for a fully functioning, UL508A-approved control panel. The control panel electronic components shall be protected from condensation with an electric heater. The heater shall have the capacity to maintain the enclosure space to 40 °F with a -4 °F ambient air temperature.

2.6.1.2 Standard Indicator Light

Indicator lights shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Lights shall be heavy duty, round and shall mount in a 0.875 inch (30 mm) mounting hole. Indicator lights shall be LED type and shall operate at 120 vAc or 24 vDc. Long life bulbs shall be used. Indicator light shall be provided with a legend plate labeled as shown on the drawings. Lens color shall be as indicated on the drawings. Lights shall be push to test (lamp) type.

2.6.1.3 Selector Switches

Selector switches shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Selector switches shall be key-operated, non-illuminated, heavy duty, round and shall mount in a 0.875 inch mounting hole. The number of positions shall be as indicated on the drawings. Switches shall be rated for 600 volts, 10 amperes continuous. Selector switches shall be provided with a legend plate labeled as shown on the drawings. Where indicated or required, dual auxiliary contacts shall be provided for the automatic position to provide position sensing at the central station or workstation. Auxiliary contacts shall be rated for 10 A at 120 vAc as a minimum. All keys shall be identical.

2.6.1.4 Illuminated Push Buttons

Push buttons shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Push buttons shall be the illuminated type and shall beheavy duty, round and shall mount in a 0.875 inch (30 mm) mounting hole. The number and type of contacts shall be as required by the Sequence of Control. Push buttons shall be rated for 600 volts, 10 amperes continuous. Push buttons shall be provided with a legend plate labeled as shown on the drawings.

2.6.1.5 Relays

Relays shall comply with IEEE C37.90 and derated for altitude above 1,500 m. Relays shall be as required by the Sequence of Control. Relay coil shall be 24 vDc and shall be provided with matching mounting socket. Power consumption shall not be greater than 3 watts.

2.6.1.6 Terminal Blocks

Terminal blocks shall comply with NEMA ICS 4 and UL 1059. Terminal blocks for conductors exiting control panels shall be two-way type with double terminals, one for internal wiring connections and the other for external

wiring connections. Terminal blocks shall be "touch-safe" type andmade of bakelite or other suitable insulating material with full deep barriers between each pair of terminals. A terminal identification strip shall form part of the terminal block and each terminal shall be identified by a number in accordance with the numbering scheme on the approved wiring diagrams.

2.6.2 Panel Assembly

Control panels shall be factory assembled and shipped to the jobsite as a single unit. Panels shall be fabricated as indicated and devices shall be mounted as shown or required. Each panel shall be fabricated as a bottom or top-entry connection point for control system electrical power and control system wiring. .

2.6.3 Electrical Requirements

Each panel shall be powered by a dedicated 460 volts ac circuit, and a dedicated 120 VAC circuit each with a fuse, sized as required for the installed equipment, and a disconnect switch located on the panel door. Wiring, including spares, shall terminate inside the panel on terminal blocks. Electrical work shall be as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM and as shown on the drawings.

2.6.4 Power Line Conditioner

Each control panel shall be provided with a power line conditioner to provide both voltage regulation and noise rejection. The power line conditioner shall be of the ferro-resonant design, with no moving parts and no tap switching, while electrically isolating the secondary from the power line side. The power line conditioner shall be sized for 125 percent of the actual connected kva load. Characteristics of the power line conditioner shall be as follows:

2.6.4.1 85 Percent Load

At 85 percent load, the output voltage shall not deviate by more than plus or minus 1 percent of nominal voltage when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal voltage.

2.6.4.2 Load Changes

During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus 3 percent of nominal voltage. Full correction of load switching disturbances shall be accomplished within 5 cycles, and 95 percent correction shall be accomplished within 2 cycles of the onset of the disturbance.

2.6.5 Grounding

Control panel enclosures shall be equipped with a solid copper ground bus or equivalent. The ground bus shall be securely anchored to the enclosure so as to effectively ground the entire structure. Clamp-type terminals sized large enough to carry the maximum expected current shall be provided on the ground bus for grounding cables. Where a definite circuit ground is required, a single wire not less than #10 AWG shall run independently to the panel ground bus and shall be fastened to the ground bus with a bolted terminal lug. Cases of instruments, relays and other devices shall be effectively grounded through the enclosures steel structure unless otherwise indicated. Insulated wiring having a continuous rated current

of not less than the circuit fuse rating shall be used for grounding. Grounding terminals of power receptacles shall be solidly grounded to the panel enclosure.

2.6.6 Convenience Outlet

A 120 volt ac, 5 amp, ground fault interruption (GFI) type duplex convenience outlet shall be provided inside the panel. The outlet circuit shall be separate from the panel power circuit and shall have a dedicated circuit breaker rated at 5 amps.

2.6.7 Panel Interior Light

The control panel shall be provided with a 40 watt fluorescent light. The light shall be operated by a switch mounted on the door of the enclosure. The light shall be powered by the same circuit as the convenience outlet.

2.6.8 Heating System

WThe control panel enclosure shall be provided with a thermostatically controlled electric heater capable of maintaining an enclosure temperature of 45 degrees F when continuously exposed to an ambient temperature of -4 degrees F.

2.7 FACTORY TEST

The control system shall be tested at the factory prior to shipment. Written notification of planned testing shall be given to the Government at least 21 days prior to testing, and in no case shall notice be given until after the Contractor has received written Government approval of the test procedures.

2.7.1 Factory Test Setup

Assemble and integrate the factory test setup as specified to prove that performance of the system satisfies all requirements of this project, including system communications requirements in accordance with the approved test procedures. The factory test shall take place during regular daytime working hours on weekdays. Equipment used shall be the same equipment that is to be delivered to the site. The factory test setup shall include the following:

communications circuits	one of each type and speed to be utilized in the proposed system including bridges, modems, encoder/decoders, transceivers and repeaters.
surge protection equipment	for power, communications, I/O functions and networks
I/O functions	sufficient to demonstrate the I/O capability and system normal operation
software	software required for proper operation of the proposed system including application programs and sequences of operation

2.7.2 Factory Test Procedure

Test procedures shall define the tests required to ensure that the system meets technical, operational, and performance requirements. The test procedures shall define location of tests, milestones for the tests, and identify simulation programs, equipment, personnel, facilities, and supplies required. Provide for testing all control system capabilities and functions specified and shown. Cover actual equipment and sequences to be used for the specified project and include detailed instructions for test setup, execution, and evaluation of test results. The test reports shall document results of the tests. Surge testing need not be conducted acceptable documented proof can be provided that such testing has been satisfactorily demonstrated to the Government with identical surge protection applied. The procedures shall include the following:

	Test Procedure
equipment	block diagram
hardware and software	descriptions
commands	operator commands
I/O functions	test database points with failure modes
passwords	required for each operator access level
each type of digital and analog point in the test database	description
test equipment	list
surge protection	circuit diagrams
inputs required (I/O point values and status) and corresponding expected results of each set of input values	for each application program
default values	for the application program inputs not implemented or provided for in the contract documents for the application programs to be tested

2.7.3 Factory Test Report

Submit original copies of data produced during the factory test, including results of each demonstration procedure within 7 days after completion of each test. Arrange the report so that commands, responses, and data acquired are correlated to allow logical interpretation of the data.

PART 3 EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS

3.1.1 Installation

Install system components and appurtenances in accordance with the manufacturer's instructions and provide necessary interconnections, services, and adjustments required for a complete and operable system. Adjust or replace devices not conforming to the required accuracies. Replace factory sealed devices, rather than adjusting.

a. Install instrumentation and communication equipment and cable grounding as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

b. Install wiring in exposed areas, including low voltage wiring, in metallic raceways or EMT conduit as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Wiring in air plenum areas installed without conduit shall be plenum-rated in accordance with NFPA 70.

c. Submit detail drawings containing complete wiring and, schematic flow diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Include in the Drawings, as appropriate: product specific catalog cuts; a drawing index; a list of symbols; and a series of drawings for each control system using abbreviations, symbols, nomenclature and identifiers as shown.

3.1.1.1 Isolation, Penetrations and Clearance from Equipment

Dielectric isolation shall be provided where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exteriors shall be made watertight. Holes in concrete, brick, steel and wood walls shall be drilled or core drilled with proper equipment; conduits installed through openings shall be sealed with materials which are compatible with existing materials. Openings shall be sealed with materials which meet the requirements of NFPA 70. Installation shall provide clearance for control-system maintenance. Control system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance.

3.1.1.2 Device Mounting

Devices shall be installed in accordance with manufacturers' recommendations and as shown. Control devices to be installed in piping shall be provided with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Any deviations shall be documented and submitted to the Government for approval prior to mounting. Damaged insulation shall be replaced or repaired after devices are installed to match existing work. Damaged galvanized surfaces shall be repaired by touching up with zinc paint.

3.1.2 Sequences of Operation

Study the operation and sequence of local equipment controls, as a part of the conditions report, and note any deviations from the described sequences of operation on the contract drawings. Perform necessary

adjustments to make the equipment operate in an optimum manner and shall fully document changes made.

3.2 INSTALLATION OF EQUIPMENT

Install equipment as specified, as shown and as required in the manufacturer's instructions for a complete and fully operational control system.

3.2.1 Control Panels

Control panels shall be located as indicated on the drawings. Devices located in the control panels shall be as shown on the drawings or as needed to provide the indicated control sequences.

3.3 WIRE, CABLE AND CONNECTING HARDWARE

3.3.1 Metering and Sensor Wiring

Metering and sensor wiring shall be installed in accordance with the requirements of ANSI C12.1, NFPA 70, and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

3.3.1.1 Power Line Surge Protection

Control panels shall be protected from power line surges. Protection shall meet the requirements of IEEE C62.41.1 and IEEE C62.41.2. Fuses shall not be used for surge protection.

3.3.1.2 Sensor and Control Wiring Surge Protection

Digital and analog inputs shall be protected against surges induced on control and sensor wiring. Protect digital and analog outputs against surges induced on control and sensor wiring installed outdoors and as shown. Fuses shall not be used for surge protection. Test the inputs and outputs in both the normal and common mode using the following two waveforms: The first waveform shall be 10 microseconds by 1000 microseconds with a peak voltage of 1500 volts and a peak current of 60 amperes. The second waveform shall be 8 microseconds by 20 microseconds with a peak voltage of 1000 volts and a peak current of 500 amperes. Submit certified test results for surge protection.

3.4 SOFTWARE INSTALLATION

Load software required for an operational control system, including databases (for points specified and shown), operational parameters, and system, command, and application programs. Adjust, tune, debug, and commission all software and parameters for controlled systems to assure proper operation in accordance with the sequences of operation and database tables.

3.5 CONTROL SYSTEM DRAWINGS

Control drawings shall be provided for equipment furnished and for interfaces to equipment at each respective equipment location. 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 manually shall be prepared in typed form, and posted beside the diagrams. Diagrams and instructions

shall be submitted prior to posting.

3.6 FIELD TESTING AND ADJUSTING EQUIPMENT

Provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Government will witness the PVT, and written permission shall be obtained from the Government before proceeding with the testing. Original copies of data produced, including results of each test procedure, during PVT shall be turned over to the Government at the conclusion of each phase of testing prior to Government approval of the test. The test procedures shall cover actual equipment and functions specified for the project.

3.6.1 Testing, Adjusting and Commissioning

After successful completion of the factory test as specified, the Contractor will be authorized to proceed with the installation of the system equipment, hardware, and software. Once the installation has been completed, test, adjust, and commission each control loop and system in accordance with NIST SP 250 and shall verify proper operation of each item in the sequences of operation, including hardware and software. Calibrate field equipment, including control devices, adjust control parameters and logic (virtual) points including control loop setpoints, gain constants, constraints, and verify data communications before the system is placed online. Check each control point within the control system control network by making a comparison between the control command at the central PLC and field-controlled device. Deliver trend logs/graphs of all points showing to the Government that stable control has been achieved. Points on common systems shall be trended simultaneously. Verify operation of systems in the specified failure modes upon Control system network failure or loss of power, and verify that systems require manual restart upon a resumption of control system network operation or return of power. Deliver a report describing results of functional tests, diagnostics, calibrations and commissioning procedures including written certification to the Government that the installed complete system has been calibrated, tested, adjusted and commissioned and is ready to begin the PVT. The report shall also include a copy of the approved PVT procedure.

3.6.2 Performance Verification Test (PVT)

Submit test procedures for the PVT. The test procedure shall describe all tests to be performed and other pertinent information such as specialized test equipment required and the length of the PVT. The test procedures shall explain, in detail, step-by-step actions and the expected results, to demonstrate compliance with all the requirements of the drawings and this specification. The test procedure shall be site specific and based on the inputs and outputs, required calculated points and the sequence of control. Refer to the actions and expected results to demonstrate that the control system performs in accordance with the sequence of control. Include a list of the equipment to be used during the testing plus manufacturer's name, model number, equipment function, the date of the latest calibration and the results of the latest calibration.

Demonstrate that the completed Control system complies with the contract requirements. All physical and functional requirements of the project including communication requirements shall be demonstrated and shown. Demonstrate that each system operates as required in the sequence of operation. The PVT as specified shall not be started until after receipt of written permission by the Government, based on the written report

including certification of successful completion of testing, adjusting and commissioning as specified, and upon successful completion of training as specified. Upon successful completion of the PVT, furnish test reports and other documentation.

3.7 MANUFACTURERS' FIELD SERVICES

Obtain the services of a manufacturer's representative experienced in the installation, adjustment, and operation of the equipment specified. The representative shall supervise the installing, adjusting, and testing of the equipment.

3.8 FIELD TRAINING

Field training oriented to the specific system shall be provided for designated personnel. Furnish a copy of the training manual for each trainee. Manuals shall include an agenda, the defined objectives for each lesson, and a detailed description of the subject matter for each lesson. Furnish audiovisual equipment and other training supplies and materials. Copies of the audiovisuals shall be delivered with the printed training manuals. The Government reserves the right to videotape training sessions for later use. A training day is defined as 8 hours of classroom instruction, excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. Submit the training manual and schedule to receive approval from the Government at least 30 days before the training.

-- End of Section --